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The Relationship Between Creativity and Anomalous Cognition in the Ganzfeld

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To my husband, Doug

Abstract

In relating various measures of personality and cognitive style to enhanced psi performance, parapsychologists have consistently drawn parallels between creativity and extrasensory perception. Concepts such as intuition, dissociation, and openness are often used synonymously with, and as descriptors for, both creativity and psi. This thesis reviews studies suggesting a relationship between creativity and psi performance, and reports on the outcome of two meta-analyses of ganzfeld studies, the first presented in 1985 and the second in 1994. These meta-analyses suggest that there is a need for independent replication of the ganzfeld-psi findings, particularly that assessing the role of the sender in the ganzfeld. While the review of the creativity-psi literature clearly indicates the success of creative populations in free response work, it provides no explanation of the relationship, demonstrating a need for replication and extension of the creativity-psi research. Difficulties with the previous methods of conducting ganzfeld research are identified, as well as the various problems and methods associated with the measuring of creativity. The development of a more secure, prototypic automated ganzfeld testing system, using an improved dynamic target pool and presentation system, is presented and the creativity assessments used in the thesis described. Five experiments are conducted to explore the relationship between creativity and psi using this prototypic automated ganzfeld testing system. Experiment 1 describes a systematic comparison of the presence or absence of the sender in ganzfeld research, using a self-assessed creative population. Experiments 2a and 2b compares the ganzfeld-psi performance of two specific creative groups, musicians and visual artists, using both objective and subjective creativity measures. Experiments 3a and 3b compares the ganzfeld-psi performance of two more creative groups, actors and creative writers, again using both objective and subjective creativity assessments. The final chapter provides a comparison and contrast of creativity and psi performance variables for the four creative groups from experiments 2 and 3, summarizes and synthesizes the findings of the experiments conducted, and makes suggestions for future research. The main findings of these experiments are that the ganzfeld continues to be a psi facilitative technique, yielding a very high success rate for creative populations, but that there appears to be no systematic relationship between creativity measures and free response ESP. Importantly, there is also the lack of any correlation between the presence or absence of a sender on the ganzfeld-psi effect. It is concluded that while there is a need for further, more systematic exploration of the creativity-psi connection, these experiments have shown the continued success of the automated ganzfeld system as a useful tool, both for parapsychologists wishing to explore the psi-ganzfeld process, including its relationship to human perception, and for psychologists interested in understanding the role of creativity in human performance.

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I have composed this thesis, and declare that the work is my own.

Kathy Dalton

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Introduction, Definitions and Outline of Thesis

Chapter 1

> "It is fairly obvious that parapsychology has more in common with the field of psychology than with any other branch of science." (Rhine, 1972, p.112).

Parapsychology, as defined by Thalbourne (1982), is the scientific study of certain paranormal, or ostensibly paranormal, phenomena, in particular, ESP and PK. In general, this implies an anomalous means of communication between an organism and its environment. It may be considered 'anomalous' (meaning 'deviation from the norm') because this type of communication appears to take place despite the fact that the known (normal) channels of communication and inference are closed.

Even from the very inception of parapsychology J. B. Rhine, the father of experimental parapsychology, felt there were considerable similarities between the research approaches and findings of psychology and those of parapsychology. When searching for a name for this newly developed field of scientific inquiry Rhine, although trained as a botanist, wanted something that would demonstrate the fields' deep roots in, and direct links with, his own chosen profession of psychology. Rhine borrowed the term 'parapsychology' from Max Dessoir (as cited in Edge, Morris, Palmer, & Rush, 1986) who added the term 'para', meaning 'along side of' to psychology, to form the term 'parapsychology' (along side of psychology), hoping to demonstrate that not only did the discipline of psychology have much to offer in guiding the research efforts of this infant science, but that their respective domains overlapped considerably in examining similar variables. These similarities, and contrasts, have been comprehensively reviewed by Child (1985), Irwin (1979) and Schmeidler (1988). For example, Irwin (1994) points out the similarities of what has been called 'the experimenter effect' for both disciplines. In these cases, the emotional attitude of the experimenter (warm or cold) towards the participant, as well as their expectations for success (positive or negative), have been shown to similarly influence the outcome of both psychological and parapsychological studies (Crandall, 1985; Honorton, Ramsey, & Cabibbo, 1975; Parker, 1975a; Taddonio, 1976; White, 1977; for a summary of psychological studies see Harris & Rosenthal, 1985; Rosenthal, 1966). Psi research, if pursued within the framework of more diversified psychological domains, holds promise for more cogent findings. This may, in turn, contribute towards the resolution of conceptual dilemmas and questions in both psychology and its younger sibling science, parapsychology.

As will be evident below, an overlapping area of great interest for psychology and parapsychology is the use of altered states as a way of facilitating an inwardly directed mental state and the manifestation of mental visual imagery. An 'altered state of consciousness' according to Tart (1969), is one in which the individual experiences a qualitative shift in his pattern of mental functioning. There are numerous ways of inducing or obtaining an altered state, some of which include the dream state, the use of drugs, meditation, or sensory deprivation (Glickson, 1991; Ludwig, 1966; Tart, 1983). The 'ganzfeld', (from the German 'ganz' meaning whole and 'feld' meaning field) was originally used in psychology as a sensory deprivation technique for inducing an altered state, and has its origins in studies of the psychology of perception (e.g. Avant, 1965). The ganzfeld technique referred to a homogeneous, unpatterned visual field first used to explore visual perception under conditions of visual sensory deprivation and later, the exploration of mental visual imagery produced under conditions of visual sensory deprivation (Bexton, Heron, & Scott, 1958). Its use was first introduced into parapsychology by Charles Honorton in 1974 (Honorton and Harper, 1974), who felt that the experimental production of hypnagogic imagery could facilitate the reception and recognition of extrasensory perception, or ESP, in the laboratory. This feeling was due to the similarity of the hypnagogic state (that drowsy state between wakefulness and sleep) in a number of respects to certain altered states of consciousness traditionally associated with spontaneous psychic experiences and practices alleged to develop psychic abilities (Honorton, 1974). Both Price (1949) and Louisa Rhine (1961) described the personality who experiences psi phenomena as 'unrestrictive' and as one that experienced a lessening of the 'repressive mechanism' that censors the information that the human mind processes on a conscious basis. Price (1949) went on to note that the 'repressive mechanisms' which typically censor and inhibit are in part in abeyance during the states of relaxation and dreaming, perhaps accounting for the bizarre and vivid imagery emerging from the subconscious mind at that time. In the ganzfeld procedure, the participant relaxes in a pleasant state of partial sensory deprivation induced by the unpatterned auditory and visual stimulation which induces a state of consciousness thought to be conducive to ESP, typically by damping down external and internal mental sources of distraction or 'noise' and encouraging the experience of internal mental imagery (Braud, Wood and Braud, 1975; Honorton and Harper, 1974; Parker, 1975b). The ganzfeld is viewed as one of parapsychology's best techniques for examining psi under controlled laboratory conditions, and the ganzfeld database is considered, as a whole, to be some of the best evidence for a replicable psi effect (Utts, 1991). As such, it provides our best method of examining those variables and characteristics thought to enhance or facilitate the psi process(es) itself, such as creativity. The ganzfeld is reviewed in detail in the following chapter.

Phenomenologically, creativity and extrasensory perception appear to have many commonalties. Various authors have noted parallels between extrasensory perception 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) observed that both psi (a general term for psychic abilities) 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, 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. Moriarty and Murphy (1967a) ascertain that both experiences are more likely in people with high self-esteem, empathy, and self-understanding. In addition, they surmised that both psi and creativity are characterized by a demand for openness to new and unusual experiences, tolerance for the unrealistic, and both make use of subconscious processing. Both processes are considered to be elusive, intuitive, dissociative and facilitated by altered states

(Anderson, 1962, Servadio, 1969; Sondow, 1987, White, 1964). The creative individual is widely viewed as someone who is unconventional and erratic, in touch with something outside of the physical reality, and who routinely makes use of creative intuition or insight in the course of their work. Koestler (1964) found, in studying some of the great creative discoveries made by man, affirmations of the superiority of unconscious mentation at certain stages of creative work. An example he provides of the creative individual making use of creative insight while in an altered state is that of Coleridge, who was inspired to write the poem 'Kubla Khan' while half-asleep from the effects of an anodyne prescribed for an illness (Koestler, 1964). Or consider Poincare, who discovered a major class of mathematical functions while in a state between waking and sleeping, known as the hypnagogic state (Estabrooks & Gross, 1961), and used meditation to facilitate the awareness of other such 'unconscious material'.

As these anecdotal reports seem to indicate a connection between creativity and psi, and as we shall see in the next chapter, there is some experimental research that supports this connection, the question becomes 'what is the nature of this connection, and what role does it play in the facilitation of psi?' This thesis takes the first steps towards the answers to that question through the systematic examination of creative populations using the ganzfeld technique.

Early experimental work with creative populations relied heavily on forced choice tests, producing ambiguous results (Anderson, 1966; Honorton, 1967; Schmeidler, 1962, 1964). Later research using free response material with this population produced overall positive results (Braud and Loewenstern, 1982; Moss, 1969; Moss and Gengerelli, 1968), leading Moss to speculate that creative individuals may find free response materials more in keeping with their own flexibility of mind, allowing the artists more creative expression and fluidity of thought than forced choice tasks. However, none of the previous research has focused on understanding the links between psi and creativity, nor how these links may influence or facilitate psi performance. This may have been in part due to the difficulty inherent in finding a large population of creative individuals willing to take part in parapsychological testing, or the type of test material used, or even the unavailability of appropriate creativity measures. As Hocevar (1981) has pointed out, every creativity evaluation is problematic, revealing the complexity of creativity as a construct. Most recently, two studies have made use of musicians and artists as participants in ganzfeld-psi research, and while both obtained significantly positive results, only one (Schlitz & Honorton, 1992) made use of an objective creativity measure, while the other (Morris, Cunningham, McAlpine & Taylor, 1993) had participants provide a self rating of creativity. Neither study attempted an in-depth exploration of the different facets of creativity and how they relate to psi results, nor did they attempt to draw any in-depth comparisons or contrasts between the creative groups themselves. As the ganzfeld sets a psi task within the context of an internal state induction technique (discussed in chapter 2) designed to give the participant access to unconscious mental processes, it is likely to have the best chance of success in research designed to explore the links between psi and creativity.

A comprehensive exploration of these links necessarily involves an examination of participant characteristics and attributes. It is felt that by exploring individual differences in cognitive processes, personality, attitudes and motivation, parapsychologists can learn more about the psi process, and this thesis is intended to make a contribution to that effort. Before proceeding, however, it is necessary to clarify the meaning of some terms which will be used frequently, and to set a context for the research which follows. It is beneficial, at this point, to distinguish between 'proof-oriented' and 'process-oriented' research in parapsychology. The principal aim of the former is to prove that 'psi' exists, while the latter is more concerned with finding out how psi works. Based on the premise that it's not possible to prove anything beyond doubt, most parapsychologists prefer to accept the existence of psi as a working hypothesis. Their research efforts have therefore tended to focus on identifying correlates of psi performance and testing process related hypotheses that may lead to the construction of theories of psi. For a more extensive consideration of the theoretical conceptualizations of psi, see Stanford (1977, 1992). This thesis continues the process-oriented tradition.

Psi is a general term used either as a noun or an adjective to identify extrasensory perception (ESP) or psychokinesis (PK) and is applied to situations where anomalous information transfer is thought to be occurring. A psi experiment, therefore, may be defined as an experiment designed to prevent information transfer along known channels of communication or inference, that may enable one to infer that some sort of 'anomalous' information transfer, or anomalous cognition, has taken place. It is through replication of such experiments, with statistical comparisons against chance, that allows for the examination of whether an experiment, or group of experiments, supports the hypothesis of anomalous communication.

As psi is a general term, parapsychologists usually distinguish between two subgroups of anomalous communication within it, extrasensory perception (ESP) and psychokinesis (PK). ESP may be defined as paranormal cognition; the acquisition of information about an external event, object, or influence (mental or physical; past, present, or future) in some way other than through the use of any of the known sensory channels. Under the general category of ESP we see the subcategories of: 'Telepathy' which refers to cases where the organism gains information from its environment, usually involving the thoughts, feelings, or activity of another conscious being; 'Clairvoyance' which refers to the acquisition of information about an object or contemporary physical event (in contrast to telepathy, this information is assumed to derive directly from an external physical source and not from the conscious mediation of another organism); 'Precognition' which is viewed as a form of ESP involving awareness of some future event that cannot be deduced from normally known data in the present. The second class of psi phenomena is 'Psychokinesis' (PK) and generally refers to the influence of mind on a physical system that cannot be entirely accounted for by the mediation of any known physical energy. PK is also popularly known as 'mind over matter.'

It is difficult to distinguish, at a theoretical level, between the differing categories of psi. Researchers have been trying for decades to establish, on a conceptual level, the difference between, for example, clairvoyance and telepathy. In an experiment in which a 'sender' is directed to view a photograph and mentally project this image to a 'receiver' in another room, this task may be presented to subjects as a telepathy task. But, if the receiver instead gains information about the picture itself rather than receiving the image from the sender mind, this then becomes a clairvoyant task. To complicate matters even further, it is also possible that the receiver may gain impressions of the picture by looking ahead to the future moment of feedback on the target's identity, thus rendering the task a precognitive one. In view of these complications, it has become standard procedure to define the task in operational terms; in other words, how the task is presented to the participant will establish their direction of attention and intention, framing the task for them.

ESP experiments make use of a range of test, or target, materials and these typically fall into one of three realms, 'forced choice', 'free response', or 'somatic response'. Depending upon the type of response demanded, an experiment may be said to be a 'forced choice' test, which refers to any test of ESP in which the percipient is required to make a response that is limited to a range of possibilities known in advance. An example of a forced choice test would be the Zener cards which were used in the early days of parapsychological research (Rhine, 1937), consisting of five simple geometric symbols. The basic ESP task in these instances was to request participants to correctly chose which one of the five symbols was the target. Then the number of correct choices (hits) would be compared against the mean chance expectation (MCE) for that trial and if the actual number of hits deviated significantly from chance expectation then this was thought to indicate that some sort of anomalous transfer has occurred, (assuming, of course, that known channels of communication and inference have been ruled out). A 'free response' test is considered to be any test of ESP in which the range of possible targets is relatively unlimited and is unknown to the percipient, thus permitting a free response to whatever impressions come to mind. By allowing the participants to explore their minds freely, free response tests capture the spontaneity characteristic of ESP as it is thought to occur in real life. Typically, the participant responds to the free response target by noting or voicing out loud their responses to the target, which may include thoughts and feelings as well as images and impressions. This 'mentation' is then compared to a duplicate of the target, usually in the company of several dummy, or decoy, targets. The degree of similarity between the participants' mentation and the set of possible targets is then rated, either by the participant or by independent judges. The target which is judged to be most similar to the participants' mentation is chosen to be the 'correct' target. If this choice is correct, it results in a 'hit', and the process from then on is similar to that of forced choice, in that the number of correct choices is compared to MCE. Free response scoring systems enable analyses of the degree of correspondence between the mentation and the target choices. The main difference between forced choice and free response methodologies is that the latter provided qualitatively richer material, material which may give greater insight into the ESP process than the former. On the other hand, forced choice tests are much easier to score and evaluate statistically than are free response tests. The occurrence of a hit is unambiguous with forced choice methods, whereas the rich, free-response material may include 'noise' that is unrelated to the target, or that may be related by chance to one of the other decoy targets, so there is more ambiguity in identifying a hit with the latter methodology. 'Somatic response' materials involves the use of the involuntary physiological processes of the participant as a target. For example, the task may be to remotely lower or raise a participants' blood pressure or galvanic skin response. The results are analyzed in relation to deviation from the statistical norm, or from a baseline reading taken from the participant prior to study onset. For more detailed descriptions of experimental and statistical methods in parapsychology, see Edge, Morris, Palmer, and Rush, 1986; Hansen and Utts, 1987.

The definitions of exactly what 'creativity' is, and how it operates, are as varied and creative as their sources. Concepts such as imagination, ingenuity, innovation, intuition, originality, invention and discovery, all of which have strong similarity's, have often been used synonymously with 'creativity'. Koestler (1964) defined creativity as the 'biosociation of matrices', or, in other words, a juxtaposition of formerly unrelated ideas, in which a single idea or situation becomes perceived as being related to two habitually incompatible frames of reference. The Collins English Dictionary lists creativity as, "having the ability or power to create, characterized by originality of thought or inventiveness," and, "having or showing imagination" (Collins, 1985, p. 351). Still others have viewed creativity as being linked with intuitive ideas and divine insight (Ghiselin, 1952; Knellor, 1965). Welsch (1980) reviewed 22 different definitions of creativity, and after noting key attributes amongst them, suggested this definition: "Creativity is the process of generating unique products by transformation of existing products. These products, tangible and intangible, must be unique only to the creator, and must meet the criteria of purpose and value established by the creator." (Welsch, 1980, p. 97).

However, these definitions communicate little or nothing about the creative process itself. Poincare (as cited in Martindale, 1989) suggested that creativity requires the hidden or new combination of unconscious ideas and Koestler (1964) felt that various types of unconscious thinking may be involved, including visual imagery, concrete (and sometimes personal) exemplars of abstract ideas, shifting emphasis, reasoning backwards, and generating analogies of diverse kinds. Both Koestler and Poincare, then, explained the creative process in terms of the unconscious combination of ideas drawn from different domains, although only Koestler specifically mentioned mental structure. Although creative individuals approach the manifestation of their ability in disparate ways, there are two primary areas of creative thought processes, or cognitive styles, widely recognized. 'Divergent' thinking is characterized by thought processes that radiate outwards from an original idea and explore new ideas that are generated from the original notion (Dowd, 1989). By its very nature, divergent thinking is tentative, exploratory, and creative, and is oriented towards the development of possibilities rather than data, to speculation rather than conclusions. The second area, 'convergent' thinking is characterized by reasoning that brings together the relevant data and arrives at a firm conclusion based on these data. It tends to be deductive rather than inductive. Thus, divergent thinking can be thought of as being more intuitive and less data based than convergent thinking. Although both types of thinking are useful under different conditions, it seems reasonable that the ability to engage in divergent thinking should be related to creativity. This is covered in greater detail in chapter 3, as are the various measures of creativity and the controversial nature of their use.

'Openness' has a variety of meanings, from readiness to entertain new ideas, to being unbiased and unreserved or liberal. The operational definition of openness used in this thesis will be the one supplied by Costa and McCrae (1992b), that of 'Openness to Experience.' They define the elements of this as: Active imagination, aesthetic sensitivity, attentiveness to inner feelings, preference for variety, intellectual curiosity, and independence of judgement. Furthermore, they define the 'open' individual as being "curious about both inner and outer worlds, and their lives are experientially richer. They are willing to entertain novel ideas and unconventional values, and they experience both positive and negative emotions more keenly than do closed individuals." (Costa & McCrae, 1992b, p. 15). Open people are willing to question authority, and are prepared to entertain new ethical, social and political ideas. Conversely, those who are low on the 'openness' scale are considered to be 'closed' individuals and, according to Costa and McCrae, tend to be conventional in behavior and conservative in outlook. The closed individual prefers the familiar to the novel, and their emotional responses may be somewhat muted.

'Dissociation' has been defined as "the disconnection, independence, or separateness of one part of memory from another" (Yates & Nasby, 1993, p. 309), and somewhat more broadly as the "disconnectedness or lack of integration of knowledge, identity, memory, and control" (Frankel, 1990, p. 828). According to Bernstein and Putnam (1986), dissociation is the lack of the normal integration of thoughts, feelings, and experiences into the stream of consciousness and memory. In this respect, they feel that dissociation is a normal process that occurs to some degree in everyone. Murphy (1966), in looking at the similarities between creative behavior and the operation of psi, suggested three principles which he believed were common to the occurrence of psi and creativity: Positive motivation, relaxation, and dissociation. Thus, the ability to dissociate has been linked with the achievement and enhancement of both the psi state (Moriarty & Murphy, 1967a; Braude, 1988; Pekala, Kumar, & Marcano, 1995) and the creative state (Eysenck, 1994; Barron, 1990).

'Extraversion' is defined by the Collins English Dictionary (1985) as, "the directing of one's attention outwards, especially towards social contacts" (1985, p. 518). The

Professional Manual for the NEO Five Factor Inventory (NEO-FFI) characterizes extraverts as not only being sociable, but also "liking people and preferring large groups and gatherings, extraverts are also assertive, active, and talkative. They like excitement and stimulation and tend to be cheerful in disposition. They are upbeat, energetic, and optimistic." (Costa & McCrae, 1992b, p. 15). Likewise, Costa and McCrae see 'introversion' more as the absence of extraversion rather than its opposite, and characterize introverts as being reserved rather than friendly, and independent rather than followers. Introverts generally prefer to be alone rather than in groups, and although not given to the exuberant high spirits of extraverts, introverts are not typically unhappy or pessimistic. A meta-analysis conducted by Honorton, Ferrari, and Bem (1990), discussed in more detail in chapter 2, demonstrated a strong ESP-extraversion relationship for free response studies that was highly significant ($p = .0000083$). Extraversion will be explored in this thesis as a contribution to that database.

Turning now to the relationship between creativity and psi, Schlitz and Honorton (1992) note that, "the creativity and psi database provides support for a relationship between psi functioning and artistic talent" (p. 86). However, as yet there has been little experimental research aimed at understanding the underlying process at work in such a relationship. Research data on the relationships between creativity and openness, dissociation and extraversion, and their relationship to psi, are inconsistent. Positive relationships between extraversion and creativity test measures were reported by Di Scipio (1971), Matthews (1986), and Tapasak, Roodin and Vaught (1978), while Leith (1972), Mangan (1967), and Rump (1982) found no significant linear relationships between extraversion and creativity measures, and Kumar (1978) found superior creativity performance in introverts. On the basis of earlier work, Eysenck and Eysenck (1985) took the view that extraversion would positively correlate with some forms of dissociation, however, deSilva and Ward (1993) did not find this in their study with a British population. A study by McCrae (1987) examining the relationships between creativity, divergent thinking, and openness to experience find that both divergent thinking and openness were modestly correlated with a creative personality scale, and concluded that creativity is positively related to the personality domain of openness to experience. The significant relationship between openness and psi ganzfeld performance reported by vanKampen et al., (1994) was not replicated in later studies in the same series (Bierman, 1995). Chapter 4 includes further discussion on the relevant literature.

In summary, then, creativity may be linked to psi on a theoretical level, and there is some experiential research that also indirectly suggests possible relationships between these and the characteristics of openness, dissociation, and extraversion. The experiments in this thesis may enable a more direct comparison between creativity and its correlates, and psi. The ganzfeld procedure, a free response based paradigm, will be used in the attempt to systematically explore different creative groups. The first experiment explores the sender/no sender question with creative groups, and the final four experiments are a more in-depth exploration of the creativity question. In these final four experiments, the psi results from each group were correlated with their responses to various creativity measures, personality assessments and questionnaires designed to explore the attributes of openness, extraversion, dissociation, and cognitive orientation. A number of mentation categories were explored in relation to scoring for each group, and various target attributes examined. Finally, the findings for all four groups are compared and contrasted in relation to each other for these variables.

Outline of Thesis

The elusive nature of psi has made the repeatable experiment something of a holy grail for researchers. Progress in a science is not possible when the relevant phenomena under study are not available, and this severely limits the ability to build and test adequate theories on the nature of the subject matter, in this case, psi. Although it appears that psi effects are apparently weak and unreliable (Shapin & Coly, 1984; Schmeidler, 1988; Rush, 1986), the use of meta-analytic techniques has helped to identify both the size of psi effects and some of the factors associated with enhanced psi performance (e.g. Harris & Rosenthal, 1985; Honorton, et al., 1990; Honorton, Ferrari, & Bem, 1990; Utts, 1991; Radin & Ferrari, 1991). Meta-analysis can therefore be used to help identify fruitful lines of research. Two meta-analytic reviews of the ganzfeld database will be presented here: That conducted by Honorton and Hyman during their debate in 1985 and the review conducted by Bem and Honorton (1994) of the entire Psychophysical Research Laboratories (PRL) automated ganzfeld database. In addition, because of the relevance of the work to this thesis, a review of the parapsychological literature dealing with the relationship between psi performance and the creativity is presented. The review and meta-analysis suggest there is a need for independent replication of creativity-psi findings. Difficulties with past ganzfeld research as well as the various methods used for measuring creativity are identified, and the development of a more secure automated ganzfeld testing system is described (chapter 6). Five experiments are reported, in chapters 7 through 9. Their aim is to assess and examine the performance of different creative populations in a secured ganzfeld setting, to provide insight into the role of the sender in a ganzfeld setting, to examine process related questions of how the personality of the creative participant and the nature of the ESP target correlate with psi and creative performance, and to explore a number of mentation categories and target attributes in relation to creativity levels and psi scoring. After summarizing and synthesizing the findings of these experiments in chapter 10, the thesis concludes with some suggestions for future research.

The Ganzfeld Technique

Chapter 2

This chapter reviews the development of the ganzfeld and its adaptation into parapsychology for experimental research. Since the first publication of ganzfeld-psi experimentation in 1974 there have been over 108 studies reported to date. Given the complexity and variability of designs to be found in the ganzfeld database to date, it would not be possible to adequately review each and every one of these studies within one chapter. Therefore, the meta-analyses of the ganzfeld database presented by Hyman and Honorton (1986), Bem and Honorton (1994), and Honorton (1995) are focused on, with special attention to the ganzfeld studies that incorporated factors relevant to the use of the technique in this thesis.

General Introduction and Review

Historically, psi has often been associated with meditation, hypnosis, dreaming, and other naturally occurring or deliberately induced altered states of consciousness. These diverse lines of study suggested a working model in which psi mediated information is conceptualized as a weak signal normally masked by internal somatic and external sensory 'noise'. By reducing ordinary sensory input, these various psi conducive states are presumed to improve the signal-to–noise ratio, thereby enhancing a person's ability to detect the psi mediated information (Honorton, 1970; 1977). In order to test the hypothesis that a reduction of sensory input facilitates psi performance, investigators turned to the ganzfeld procedure (Braud, Wood, & Braud, 1975; Honorton & Harper, 1974; Parker, 1975a).

The term 'ganzfeld' is of German origin and translates literally as 'whole field'; 'ganz' meaning whole and 'feld' meaning field. This term referred to a homogenous unpatterned visual field, and was originally used in psychology in connection with Gestalt theory and exploration of human visual perception. According to Gestalt theories of arousal, perceptual processes require stimulation of an inhomogeneous nature to function normally (Koffka, 1935). Metzger first coined the term 'ganzfeld' when presenting his work on perception of tridimensional space. In 1930, Metzger (cited in Avant, 1965) seated observers in front of a whitewashed square surface from which wings extended toward the observer on three sides. He illuminated the field with a neutral light and asked observers to verbalize their experience of this field, and found that when low illumination was used, subjects perceived the wall as being a space filling mist or fog.

Following on this early research, Hochberg, Triebel and Seaman (1958) used halved ping pong balls to create a translucent visual field in a series of studies designed to examine color adaptation in the ganzfeld. These had the advantage of producing a totally homogenous field for subjects whereas the previous methods had allowed the subject to view the nose and other objects by peripheral vision. The first experiment in the series tested Koffka's theory that a homogeneous field of color, in this case either red or green light, would become chromatically neutral after prolonged inspection. In the red condition, adaptation occurred faster, with subjects reporting a total disappearance of the red color within three minutes. In the green condition, adaptation took place somewhat slower with subjects reporting the loss of the green color within six minutes, almost double the time it took to adapt to the red light. Research by Weintraub (1964), and Wasserman (1978), indicates that within a ganzfeld setting, color adaptation takes place most rapidly with red light, with the corresponding visual field then being perceived as a homogeneous dark or neutral gray. Studies examining whether the purity of the color or its intensity affected its perception by the participant found that these factors essentially had no impact; if there is no structure in the visual field, the ultimate perception by the participant is an undifferentiated neutral gray (Gilchrist, 1994; Schouten & Blommaert, 1995).

In an attempt to understand the lapses of attention that occur when individuals are subjected to long periods of time without environmental stimulus, such as observing a radar screen for hours without a break, Bexton, Heron, and Scott (1958) began a series of studies in 1954 using a ganzfeld setup similar to Hochberg, et al.'s (1958) to examine sensory deprivation. Subjects were paid to lie on a comfortable bed in a lighted sound-proof cubicle for 24 hours a day, with time out only for eating and going to the toilet. During this time they wore translucent goggles as well as gloves and cardboard cuffs from the elbow down to beyond the fingertips. Auditory stimulus was limited by the cubicle and by a U-shaped foam rubber pillow in which the subject kept their head while in the cubicle. In addition, there was a continuous hum provided by fans, and an air conditioner which produced a fairly efficient masking noise. This masking noise can be considered to be an early precursor of the 'white noise' used in contemporary ganzfeld work, which is often described to participants as being similar to radio static or the hum of a fan.

Subjects in this experiment seemed to experience a type of cognitive disturbance during the period of isolation and immediately afterwards, seeming dazed and confused when released from the cubicle. During the isolation period they experienced a 'stimulus hunger', which they tried to alleviate by singing, talking to themselves, whistling or interacting with their physical environment. There was a deterioration in their ability to think systematically and competently, indicating what appeared to be a general impairment of mental ability. They lapsed into day dreaming, and reported periods of 'black-out' in which visual experience seemed to disappear altogether (Cohen, 1960; Gur, 1991; Fuhr, Hershner and Daun, 1990). However, the most surprising result of this sensory deprivation experiment was the hallucinatory activity that subjects reported. One subject called it similar to "having a dream while awake" (Bexton, Heron, & Scott, 1958, p. 325). Simpler forms of hallucinations, i.e., light changes, lines or simple geometric patterns, were followed by increasingly more complex forms of the phenomena, such as single detailed objects (a German helmet) to entire scenes involving figures, backgrounds, auditory hallucinations and seeming motions (a procession of squirrels with sacks on their shoulders marching purposefully across a snow covered field), some of which appeared quite vivid to the participants, and involved kinesthetic and somesthetic sensations (feeling an electrical shock from an imaginary door knob, feeling bent over or scrunched up when lying straight).

Much of the imagery that participants reported during these experiments is similar to that reported in the hypnagogic state. The 'hypnagogic state' is encountered in that drowsy period between sleeping and waking, typically just as one is about to fall asleep. 'Hypnagogic imagery' has been described as consisting of spontaneously appearing visual, auditory and kinesthetic images, some of which may be unusually vivid or bizarre (Schacter, 1976), and these changes are considered to be characterized by qualitative changes in the percipients mental content.

In 1963 Witkin and Lewis made used of a refined ganzfeld technique to examine the content of the hypnagogic interval in relation to a pre-sleep event and subsequent dreams. In order to facilitate drowsiness, encourage imagery, and permit observation of the participant's 'stream of consciousness', Witkin and Lewis (1963) had subjects take a reclining position, then fed white noise (a homogeneous, unpatterned sound) into their subjects ears' at the same time that the subject observed a red homogeneous visual field (via halved ping pong balls). While in this position, subjects were asked to continuously verbalize any thoughts, feelings, or images that they might have. A tape recording was made of the subject's speech. Building on this research, Bertini, Lewis and Witkin (1969), in presenting this visual and auditory ganzfeld as a means of facilitating hallucinatory hypnagogic-like imagery in the laboratory, stated that, "having people in the experimental-hypnagogic (*ganzfeld*) procedure facilitates the flow of ideation and imagery and is evocative of feeling" (p. 108 – italics are author's addition). With regard to feelings evoked in this procedure, they comment that, "some subjects showed open preoccupation with the experimenter – what he is doing, what is he like as a person, what his purposes may be, suggesting a 'budding' transference as an important source of feelings in the experimental situation." (Bertini et al., 1969, p. 108). Transference reactions have been strongly implicated in the psychiatric literature concerning patient-therapist psi interactions (Devereaux, 1953; Eisenbud, 1970; Ullman, 1974). Bertini et al., further stated that "these characteristics of the experimental-hypnagogic (*ganzfeld*) productions make the procedure a useful one for the study of phenomena of free association." (p. 108 – italics are author's addition). Specifically, Bertini et al., felt that this technique incorporated three features that would facilitate the psi process: a) the reduction of sensory 'noise' through the regulation of perceptual input; b) the establishment of an effective link between the subject and the experimenter or sender, thus increasing the participant's desire for communication; and c) increased imagery and ideation which may serve as 'mediating vehicles' for encoding psi information (e.g., Tyrrell, 1946).

Although imagery has been identified as the most frequent means by which psi information enters the consciousness (as indicated by the surveys of George, 1981; George & Krippner, 1984; Honorton, Tierney & Torres, 1974), research directed towards trying to measure individual differences in imagery, or towards augmenting imagery to try to develop psi ability, has met with conflicting results (George & Krippner, 1984; Braud & Schlitz, 1989). This may indicate that enhancement of imagery production alone is not sufficient for improved psi reception. A situation similar to the hypnagogic state, where imagery is produced in a relaxed, inwardly focused frame of mind, may be more indicative of a psi conducive state. Early work at Maimonides Dream laboratory (Ullman & Krippner with Vaughan, 1973; 1989) indicated that the dream state seemed to facilitate the acquisition and recognition of psi information, and provided the basis for much of the early ganzfeld research. The ganzfeld technique, by reducing the sensory input from the participant's physical environment, induces an internally focused attention state, much like the dream state, which is characterized for most participants by hypnagogic-like imagery. This is supported by the fact that, traditionally, altered states of consciousness have been associated with psi functioning (Parker, 1975b; Tart, 1974).

Internal Attention States

Experimental exploration of psi conducive states has primarily emerged out of converging evidence indicating that certain altered states, and in particular internal attention states characterized by reduced perceptual processing, might facilitate the reception and recognition of psi information (Schechter, 1985; Stanford, 1987). Much of this evidence came from anecdotal claims of psi experiences, such as spontaneous case studies, which dealt with the personal accounts of people who felt they have experienced psi in some form in their daily lives (Rhine, 1962). Other anecdotal evidence has come from cultural practices, such as meditation or hypnosis, which have been reputed to increase the possibility of psi experiences for their practitioners (Mishra, 1967). In addition, psychotherapeutic case studies have often held accounts of patients evidencing dream material, or therapeutic material, which directly related to specific events in the therapists' life (Jung, 1955). C. D. Broad (1953) suggested that psi interactions may occur frequently, perhaps even continuously, on an unconscious level, serving to modulate our moods, dispositions, and behavior in subtle ways, seldom gaining conscious recognition. That psi interactions may frequently occur without cognitive mediation has long been suggested by spontaneous case studies involving intuitive impressions (Stevenson, 1970), psi mediated somatic influences (L. E. Rhine, 1961), and synchronistic episodes (Stanford, 1974).

Reduced sensory functioning is a major characteristic of most internal attention states (Ludwig, 1971; Tart, 1974; Zubek, 1969). Psychophysiological studies of dreaming and of concentrative meditation have shown that the brain is relatively isolated from peripheral receptor inputs in these states (Honorton, 1977; Ullman, Krippner, & Vaughan, 1989). Additionally, increased hypnotizability has been shown to follow periods of sensory deprivation (Sanders and Reyher, 1969; Wickramasekera, 1969). Goodman (1982) hypothesized that perceptual anomalies during sensory deprivation constitute a form of 'waking dream' both from a neurophysiological as well as from a subjective viewpoint. Suedfeld (1969) reviewed the literature on sensory deprivation and found that the lack of informational anchors caused by the situation put the subject at 'loose ends', without guidelines for his behavior, creating a type of stimulus hunger and maximizing the impact and reward of whatever information is made available to him.

Experimental confirmation of psi conducive states has come primarily from studies of psi retrieval in dreams, hypnosis, and meditation. Detailed reviews of altered states and their relationship to psi functioning can be found in Braud, 1975; Honorton, 1974; 1977; and Stanford, 1986. These states appear to be characterized more by holistic than by reductionistic modes of information processing (Braud, 1975; Putoff & Targ, 1976), and by an altered epistemology (LeShan, 1976). Examination of this research indicates that these states enhance the successful detection and retrieval of psi inputs. From these phenomenological, behavioral, and psychophysical findings there emerged a noise reduction model identifying certain antecedent conditions which seemed to facilitate the acquisition and recognition of psi material. These are: a) somatic relaxation; b) reduced sensory processing; c) a sufficient level of cortical arousal to sustain conscious awareness in the absence of patterned sensory input; and, d) the deployment of attention towards internal mentation processes (Honorton, 1978; Braud, 1977). In delineating the factors necessary for detection of psi functioning and the conditions characteristic of psi conducive states, Honorton (1978) cites five ways in which the ganzfeld fits these criteria:

1) The sensory noise level is reduced due to the homogenous visual and auditory stimulus;
2) Attention is directed towards internal mentation process, which may act to mediate the psi input;
3) The homogeneous visual and auditory stimuli act to create a 'stimulus hunger', which may facilitate a link between the receiver and the psi source;
4) Provides for retention of the psi information, by means of the receiver's mentation report, and;
5) Facilitates the establishment of meaningful correspondences between the psi source and the receiver's mentation, by objective measurement.

In his review of internal attention states Honorton (1977) proposes that there are specific conditions under which psi detection is optimized. These are:

1) The receiver influence must be detected. With human receivers, this means that the influence must take the form of a conscious experience which the receiver can and does attend to;
2) The experience must be sufficiently prominent, or carry sufficient impact, to allow the receiver to distinguish it from among the many other (non-psi) inputs which are concurrently influencing him. In this context, normal perceptual, somatic, and cognitive influences on the receiver constitute sources of noise;

3) The experience must be retained and reported prior to receiver-source contact through normal channels; otherwise it is not evidential of psi interaction;
4) There must be subsequent confirmation of a meaningful correspondence between the source output and the receiver output. Such correspondence need not be literal or exact – there may be information loss – but it must be sufficiently accurate and consistent over repeated transmissions to eliminate chance coincidence as a reasonable explanation.

From this, it would appear that the ganzfeld, in the form used by Bertini, Lewis and Witkin (1969), fulfills the psi detection criteria just described. Additionally, the ganzfeld meets the conditions of reducing the sensory noise level through regulation of perceptual input, the deployment of attention towards internal mentation which could serve to carry psi impression, the facilitation (through stimulus hunger) of an effective link between the receiver and the remote information source (either a sender or the target itself), the recovery of target information through the receiver's continuous mentation report, and the confirmation of receiver-sender interaction through objective assessment of target-mentation correspondences.

The Prototypical Ganzfeld Session

Before beginning the review of the published ganzfeld studies, a description of a prototypical ganzfeld session is called for. To this end, a telepathy design ganzfeld session will be used. In telepathy experiments, after the receiver arrives with the sender, they are both shown to the ganzfeld room. The receiver is then asked to lie back in a reclining chair in an acoustically isolated room and prepared for the ganzfeld stimulation period. Halved translucent ping pong balls are carefully taped over the receiver's eyes, and headphones are placed over their ears. A red floodlight directed towards the face and eyes of the receiver produces an undifferentiated visual field and a tape played through the headphones helps the participant to reduce internal somatic 'noise' by undergoing a series of progressive relaxation exercises. Following the relaxation instructions, the tape plays white noise to produce an analogous auditory field. The sender is then escorted to a separate acoustically isolated room, and a visual stimulus, which could be an art print, photograph, projector slide or brief video sequence, is randomly selected, either by computer or by a second experimenter dealing only with the sender, from a large pool of such stimuli to serve as the target for the session. The sender focuses on the target and attempts to mentally transmit the information in the target to the receiver in the other room. During this time, usually for about 30 minutes, the receiver provides a continuous verbal report of their imagery, thoughts, feelings, body sensations, etc., typically referred to as mentation. At the completion of this ganzfeld stimulation period, the judging sequence begins. At this point, the receiver is presented, by someone who is also blind to the target, with a number of targets, usually four (a duplicate of the target shown to the sender, and three decoys), and without knowing which is the actual target, the receiver is asked to rate the degree to which each one matches the imagery reported during their mentation period. If the receiver assigns the highest rating to the actual target, it is scored as a 'hit'. All lower ratings are generally considered to be misses. Ranks may be assigned to the targets on the basis of the target ratings, with the target receiving the highest rating getting a rank of '1', the next highest rating getting a rank of '2', and so on. After the judging has been completed and the data recorded and secured, the sender is notified to rejoin the receiver. It should be noted here that at no time prior to feedback to the participant does the receivers' experimenter know the identity of the target clip.

History of Ganzfeld Research

As it is not possible to adequately review each and every one of the ganzfeld studies published to date, this review will focus on the meta-analyses that have been conducted on this database and the factors that are relevant to the use of the technique in this thesis. A complete listing of the 108 published ganzfeld studies to date (1995), compiled by the author, can be found in Appendix 1. The first published study to use the ganzfeld technique was reported by Honorton and Harper (1974), who used 30 volunteer participants in a ganzfeld setting making use of thematically related, stereoscopic View-Master picture reels as target stimuli. Overall significantly positive results were reported ($p = .017$). However, during this same period, two other experiments using the ganzfeld technique (Braud, Wood, and Braud, 1975; Parker, 1975a) were also being conducted, without the experimenters knowing of one another's work. The study by Braud et al., also achieved significant above chance results while the Parker study did not. There followed a flurry of ganzfeld experiments, and in 1977 Honorton published his first review of the ganzfeld literature. Honorton uncovered 16 experimental ganzfeld-psi studies for this analysis, of which eight provided overall significant psi hitting at the .05 level. Honorton (1977) thus cited a 50 percent success rate for ganzfeld studies whereas only 5 percent should be expected by chance. Additionally, Honorton identified three factors that he felt might contribute to the studies' high success rate: a) laboratory differences (eight of the nine successful studies came from only two labs); b) duration of session, with the mean duration of ganzfeld stimulation for successful studies being 37 minutes, compared with a mean of 22 minutes for nonsignificant studies, a difference of 15 minutes; and, c) the prior involvement of subjects in psi research, with five of the successful studies involving subjects who had participated in prior psi studies in the same laboratory and two other successful studies using subjects recruited from academic courses taught by one of the experimenters. Of the unsuccessful studies, only one involved subjects with prior laboratory psi experience.

In 1978 Honorton made his second review of the ganzfeld literature. Examining 26 studies from 11 different laboratories, Honorton found that 14 gave overall significant results, for a success rate of 54 percent whereas chance would predict only 5 percent spuriously significant studies. In addition, he estimated the probability of this many significant studies out of 26 attempts (14 'hits' in 26 'trials') was $p = 8 \times 10^{-12}$. Honorton stated that this was a conservative estimate, since nine of the 14 studies had achieved significance at the .01 level or lower. While Honorton (1978) admitted that this review did not take into account the possibility of some unknown number of unreported failures, he rejected this possibility on the basis that even if there were ten unreported failures for each reported successful study, the observed results would still be significant at $p = .02$.

It should be noted here that while these reviews did much to promote the use of the ganzfeld technique, they are primarily descriptive in nature and, as such, made no attempt to assess any study flaws. This prompted Kennedy (1979a) to publish an assessment of methodological flaws that can occur in free response research, such as the ganzfeld, and focused on three major areas, that of sensory cues, data selection, and multiple analyses.

By sensory cueing, Kennedy meant those studies that made use of a single target packet for both viewing and judging. This could have resulted in the 'greasy fingers' effect, in which finger prints or other indications of handling may be left on the target picture by the sender and picked up on by the receiver or judge. Of the 26 studies in the 1978 database, three used a clairvoyant design (which invalidates the 'greasy fingers' effect), three did not specify whether or not duplicate targets had been used, and the remaining nineteen used only a single target pack for both viewing and judging. As this flaw was as common in the unsuccessful studies as in the successful ones, it is unlikely that it could have accounted for the high success rate in the latter, but is a valid criticism in terms of poor methodology and easily improved methods.

By data selection, Kennedy was referring to situations where some part of a study's data has been discarded, usually in circumstances where a subject drops out of a study before completing all of the required experimental sessions. Some subjects who score poorly in early sessions may be more likely to not complete their intended sessions than subjects who initially did well, and Kennedy stressed the need for experimenters to report the outcome of the discarded data as well, to avoid creating a biased sample.

In terms of multiple analyses, Kennedy was addressing the problems that arise when more than one statistical test is used to measure the same data. Multiple analyses increases the chances of obtaining a significant outcome for a study by chance, and can be avoided by pre-specifying the primary statistical analyses to be conducted on any study before it is undertaken. Based on these factors, Kennedy concluded that if Honorton had corrected for multiple analyses in the studies in his 1978 review, the figures for the combined results would have been less significant than reported, although he conceded that this may not have been to any large degree. For a discussion of methodological flaws that can occur in free response research see Delanoy 1986; Kennedy, 1979b; and Honorton, 1979.

Other reviews of the ganzfeld database were then undertaken by Sargent (1979) and by Blackmore (1980). Both authors conducted their own 'flaw analysis' on the database, but unfortunately neither of them made clear in their reports which studies they had judged to be flawed. In his review, Sargent found eight of the 26 studies cited by Honorton to contain flaws that he felt rendered the experiments methodologically inadequate, leaving 18 remaining. Nine of the 18 were still judged to have significant results, leading Sargent to estimate the ganzfeld replicability rate to be 50 percent.

Blackmore (1980) felt that the ganzfeld database at that time consisted of 31 studies, of which she considered 12 to be methodologically adequate. Six of the 12 had obtained significant above chance scoring, also leading to an estimate of a 50 percent replication rate. While acknowledging the apparent success of the technique, Blackmore still felt that selective reporting of results may have contributed to this apparent success. To test this possibility she conducted a survey, sending questionnaires to all the members of the Parapsychological Association who had, or may have, conducted ganzfeld experiments. Forty of the questionnaires were returned to her, revealing 32 further ganzfeld studies, 12 of which were reported as not completed. One of the 20 completed studies could not be analyzed, and of the nineteen, Blackmore judged fourteen to have adequate methodology. Of the fourteen studies remaining, five (or 36 percent) had significant results at the .05 level. Blackmore concluded that this replication rate was comparable to that found by Honorton (1978) and Sargent (1979), and that selective reporting was not a major contributor to the overall proportion of significant results in ganzfeld studies.

It became clear to ganzfeld researchers that in order to evaluate the ganzfeld database efficiently, some common ground would have to be found which would allow all ganzfeld studies to be evaluated equally. To this end, meta-analytic techniques were proposed.

A meta-analysis allows for statistical comparison 'across' studies on the basis of study outcomes, allowing for individual designs and procedures (Rosenthal & Rosnow, 1991). The problems involved in conducting a meta-analysis are always complex, and even more so when the studies involved use differing statistics to report results (i.e., direct hits, sum of ranks, etc.) as in the ganzfeld database. In 1981, Ray Hyman, a well known cognitive psychologist and psi skeptic, accepted an assignment to make a critical evaluation of the current state of parapsychology. As a means of doing so, he choose to concentrate on ganzfeld studies and to make use of meta-analytic techniques to evaluate the studies. Hyman contacted Charles Honorton, a parapsychologist and one of the authors of the first published psi-ganzfeld research, and requested a ganzfeld database upon which to conduct this meta-analysis. Honorton supplied Hyman with 42 ganzfeld studies known to him at that time. Hyman, after assigning design and methodology flaws to the 42 studies, found a tendency for the rate of success to increase with the number of assigned flaws. The publication of his findings began a long debate between himself and Honorton, a strong proponent of the ganzfeld research. This debate eventually led to the Hyman-Honorton joint communiqué.

The Hyman- Honorton Meta-Analyses

In 1985 and 1986 a critical examination of the ganzfeld database took place by parapsychologist Charles Honorton and cognitive psychologist Ray Hyman. Both conducted meta-analyses of the ganzfeld database under discussion (Hyman, 1982, 1983a, 1984; Honorton, 1982a, 1983, 1985), a database containing 28 previously agreed upon ganzfeld studies (listed in Appendix 1), and the examinations yielded very different results. In the following flurry of critiques, rejoinders, and commentaries (Alcock, 1986; Child, 1986; Hovelmann, 1986; McClenon, 1986; Stanford, 1986; Palmer, 1986; Rosenthal, 1986; Utts, 1986), the two authors agreed to issue a joint communiqué on their efforts. The major issues and conclusions of the meta-analyses are summarized here.

Hyman's (1982) original meta-analysis covered 42 psi ganzfeld studies reported in 34 separate reports written or published from 1974 through 1981. One of the first problems he discovered in the database was multiple analyses. As noted earlier, it is possible to calculate several indices of psi performance in a ganzfeld experiment and further, to subject those indices to several kinds of statistical treatment. Many investigators reported multiple indices or applied multiple statistical tests without adjusting the criterion significance level for the number of tests conducted. Worse, some may have 'shopped' among the alternatives until finding one that yielded a significantly successful outcome. Honorton agreed this was a problem.

Accordingly, Honorton (1983) applied a uniform test on a common index across all studies from which the pertinent data could be extracted, regardless of how the investigators had analyzed the data in the original reports. He selected the proportion of 'hits' as the common index because it could be found for the largest subset of studies: 28 of the 42 studies. The hit rate is also a conservative index because it discards most of the rating information; a second place rating – a near 'miss' – receives no more credit than a fourth, or last place, choice. Honorton then calculated the exact binomial probability and its associated z score for each study. Of the 28 studies, 23 (or 82%) had positive z scores ($p = 4.6 \times 10^{-4}$ exact binomial test with $p = q = .5$). Twelve of the studies (43%) had z scores that were independently significant at the 5% level ($p = .05$, and $q = .95$) and 7 of the studies (25%) were independently significant at the 1% level ($p = 9.8 \times 10^{-9}$). The composite Stouffer z score (computed by dividing the sum of z for the individual studies by the square root of the number of studies (Rosenthal, 1978)) across all 28 studies was 6.60 ($p = 2.1 \times 10^{-11}$). A more conservative estimate of significance can be obtained by including 10 additional studies that also used the relevant judging process but didn't report hit rates. If these studies are assigned a mean z score of zero, then the Stouffer z across all 38 studies becomes 5.67 ($p = 7.3 \times 10^{-9}$).

Thus, whether we consider only the studies for which the relevant information is available, or whether we include a null estimate for the additional studies where the information is not available, the combined results cannot reasonably be attributed to chance. Further, by design the cumulative outcome in this database cannot be attributed to the inflation of significance levels through multiple analysis.

One objection to estimates like those above is that studies from a single laboratory are not independent of one another (Parker, 1978). This makes it possible for one or two investigators to be disproportionately responsible for a high replication rate while other independent investigators are unable to obtain an effect. The ganzfeld database is susceptible to this possibility. The 28 studies providing hit rate information were conducted by investigators in ten different laboratories. One laboratory contributed nine of the studies; Honorton's laboratory contributed five; two other laboratories contributed three each; two contributed two each; and the remaining four laboratories contributed one each. Hence, fully half of the studies were conducted by only two laboratories, one of them Honorton's own.

In order to examine this, Honorton calculated a separate Stouffer z score for each laboratory. Significantly positive outcomes were reported by six of the ten labs and the combined result across all labs yielded a z of 6.16 ($p = 3.6 \times 10^{-10}$). The more important result to come out of this analysis showed that even if all the studies conducted by the two most prolific labs were discarded from the analysis, the Stouffer z across the eight other laboratories remained significant at $z = 3.67$ ($p = 1.2 \times 10^{-4}$). Four of these studies are significant at the 1% level ($p = .01$, and $q = .99$), and each was contributed by a different laboratory. Thus, even though the total number of labs in this database is small, a majority of them have reported significant studies, and the significance of the overall effect does not depend upon just one or two of them. For a more detailed examination of the study flaws and outcomes assigned by Hyman and Honorton, see Delanoy (1986) whose Ph.D. thesis examined the replication rate controversy in depth.

In 1986 Honorton and Hyman published a joint communiqué providing recommendations which were specific to the ganzfeld psi experiments and its database, and were intended as guidelines for those conducting future ganzfeld experiments. The first of those recommendations concerned controlling for sensory leakage and eliminating all possibilities for sensory communication between sender and receiver, both during the ganzfeld stimulation period and during the judging sequence. Because the ganzfeld itself is a perceptual isolation procedure, it provides a certain amount of safeguarding against potential sensory leakage during the ganzfeld stimulation period of the session. However, potential channels of sensory leakage following the ganzfeld period might occur. For example, if the experimenter who interacts with the receiver knows the identity of the target, they could possibly bias the receiver's target ratings in favor of correct identification. Only one study in the database contained this flaw, a study in which subjects actually performed slightly below chance expectation.

The second recommendation in this category was the use of duplicate target pools to guard against sensory leakage at the time of judging. This was centered around the possibility that if the stimulus set given to the receiver for judging contained the actual physical target handled by the sender during the sending period, there might be cues (e.g., fingerprints, smudges, or temperature differences) that could differentiate the target from the decoys. In addition, the process of transferring the stimulus materials from the sender's room to the receiver's room itself opened up other potential channels of sensory leakage, leading Honorton and Hyman to call for proper attention to be paid to the monitoring and recording of the actual target to undermine the possibility of leakage from the receiver to the sender prior to feedback. Although contemporary ganzfeld studies eliminate both of the foregoing problems by using duplicate stimulus sets, some of the earlier studies did not, although independent analyses by Hyman and Honorton agreed that there was no correlation between inadequacies of security against sensory leakage and study outcome. Honorton even further reported that if studies that failed to use duplicate stimulus sets were discarded from the analysis, the remaining studies would still be highly significant (Stouffer $z = 4.35$, $p = 6.8 \times 10^{-6}$).

The third recommendation in the communiqué concerned adequate randomization of targets. This called for full documentation of the procedures used to select the target, with details of the process to include: a) the person performing the randomization, b) the specific source of the randomness (i.e., random number tables, psuedorandom number generators, hardware number generators, etc) and, c) the method of sampling the random source (i.e., seed numbers, hardware calls to the random number generator, etc). In most psi experiments the issue of target randomization is critically important because systematic patterns in inadequately randomized target sequences might be detected by subjects during a session, or might match subjects' pre-existing response biases. In ganzfeld studies, however, randomization may be considered a less critical issue because only one target is selected during the session and most subjects serve in only one session. The primary concern here is that all targets be sampled about equally over the course of the study. Similar considerations are also true of the second randomization, which takes place after the ganzfeld period determines the sequence in which the target and decoys are presented to the receiver (or external judge) for judging. In this area, Hyman and Honorton disagreed over the findings. Hyman claimed there was a correlation between flaws of randomization and study outcome; Honorton claimed there was not. The sources of this disagreement were in conflicting definitions of flaw categories, in the coding and assignment of flaw ratings to individual studies, and in the subsequent statistical treatment of those ratings. In the following debate on this issue, none of the contributors concurred with Hyman's judgement, whereas four non-parapsychologists – two statisticians and two psychologists – explicitly concurred with Honorton's conclusion (Harris & Rosenthal, 1988; Saunders, 1985; Utts, 1986). In point of fact, Harris and Rosenthal used Hyman's own flaw ratings and failed to find any significant relationship between flaws and study outcomes in each of two separate analyses. For a more detailed exchange over Hyman's analysis, see Hyman (1991), Utts (1991a), and Utts (1991b).

The next recommendation concerned that of judging and feedback. Honorton and Hyman felt that the judging and feedback procedures used in ganzfeld studies needed to be presented in greater detail than had previously been the case, in order to allow clearer flaw assessments in future meta-analyses. Several specific recommendations were provided for this practice. According to their guidelines, ganzfeld reports should explicitly document:

> a) The manner in which persons knowing the identity of the actual target remain isolated from the receiver and receiver's experimenter until completion of the judging sequence;

b) The instructions given to the receiver for judging;
c) How the judging pool is presented to the subject;
d) The manner in which the subject's ranks or ratings are recorded; and,
e) How feedback to the actual target is delivered at completion of the subject's judging.

Hyman and Honorton focused their next recommendation for ganzfeld-psi research on the use of multiple analysis. While recognizing that the problem of determining the size of the total critical region is difficult even when the investigator has conscientiously set out in advance the tests that will be made, Hyman and Honorton still recommended that investigators specify in advance all confirmatory tests, as well as the precise critical region in advance of collecting data, and that such specification of confirmatory tests be explicitly stated in the experimental report. They felt that this practice was not inconsistent with exploratory data analysis, and that when multiple tests were planned, appropriate adjustments could be made to keep the total overall error rate within the commonly accepted region, for example, by using the Bonferroni inequality (Rosenthal & Rubin, 1984). In addition, they suggested that investigators consider increasing statistical power by using, with appropriate adjustments, two or more of the several indices that have been used in earlier psi ganzfeld research, such as the direct hit rate with the binary hit rate, or the direct hit rate and sum of ranks. It is perhaps appropriate here to discuss the use of the 'effect size' in parapsychology when discussing psi results.

Some critics of parapsychology have argued that even if current laboratory produced psi effects turn out to be replicable and non-artifactual, they are too small to be of theoretical interest or practical importance. This does not seem to be the case for the psi ganzfeld effect. In psi ganzfeld studies, the hit rate itself provides a straightforward descriptive measure of effect size, but this cannot be compared directly across studies because they do not all use a four stimulus judging set and, therefore, do not all have a chance baseline of .25. The next most obvious candidate, the difference in each study between the hit rate observed and the hit rate expected under the null hypothesis, is also intuitively descriptive but not appropriate for statistical analysis because not all differences between proportions that are equal are equally detectable (e.g., the power to detect the difference between .55 and .25 is different from the power to detect the difference between .50 and .20). In order to provide a scale of equal detectability, Cohen (1988) devised the effect size index *h*, which performs an arcsine transformation on the proportions before calculating their difference. Cohen's *h* is quite general and can assess the difference between any two proportions drawn from independent samples or between a single proportion and any specified hypothetical value. For the 28 studies examined in the Honorton-Hyman meta-analyses, Cohen's *h* is .28, with a 95% confidence interval from .11 to .45. To understand the significance of this result, it is perhaps instructive to compare the psi ganzfeld effect with the results of a recent medical study that sought to determine whether aspirin can prevent heart attacks (Steering Committee of the Physicians' Health Study Research Group, 1988). The study was discontinued after six years because it was already clear that the aspirin treatment was effective ($x^2 = 25.01$, $p < .00001$) and it was considered unethical to keep the control group on placebo medication. The study was widely publicized as a major medical breakthrough. But despite its undisputed reality and practical importance, the size of the aspirin effect is quite 'small'. Taking aspirin reduces the probability of suffering a heart attack by only .008. The corresponding effect size (*h*) is .068 – about 1/3 to 1/4 the size of the psi ganzfeld effect (Atkinson et al., 1993, p. 236; Utts, 1991b). By comparison, this would seem to indicate that the psi ganzfeld effect is large enough to be of both theoretical interest and potential practical importance. For further information on 'effect size' and Cohen's *h*, see Appendix 11.

The sixth recommendation dealt with the issue of the 'file drawer', or selective reporting. The 'file drawer' problem concerns the likelihood that successful studies are more likely to be reported (and published) than unsuccessful studies – which are likely to be consigned to the file drawers of disappointed investigators (Bozarth & Roberts, 1972; Sterling, 1959). In 1975 the Parapsychological Association Council adopted a policy opposing the selective reporting of positive outcomes and as a consequence, negative findings have been routinely reported at the Parapsychological Associations annual convention and in its affiliated publications for almost two decades. As was indicated in the description of the meta-analyses above, more than half of the studies included there yielded outcomes whose significance fell short of the conventional .05 level. In addition, there is a variant of the selective reporting process that Hyman has termed the 'retrospective study'. In these situations, the investigator conducts a small set of studies, and if they yield null results, they remain 'exploratory' and never become part of the official record. If they yield positive results, they get defined as a study (after the fact), and are submitted for publication. As support for this theory, Hyman noted that there were more significant studies in the database with fewer than 20 trials than one would expect - under the assumption that all other things being equal, statistical power should increase with the square root of the sample size (Hyman, 1985). Although Honorton rightly questioned the assumption that 'all other things' are in fact equal across the studies and disagreed with Hyman's particular statistical analyses, he did agree that there was an apparent clustering of significant studies with fewer than 20 trials. Out of the complete ganzfeld database of 42 studies, eight had fewer than 20 trials, and six of these reported statistically significant results. Because it is impossible, by definition, to know how many unknown studies – exploratory or otherwise – are languishing in file drawers somewhere, the major tool for estimating the seriousness of selective reporting problems has become some variant of Rosenthal's 'file drawer' statistic. This statistic provides an estimate of how many unreported studies with *z* scores of zero would be required to exactly cancel out the significance of the known database (Rosenthal, 1979). For the 28 direct hit ganzfeld studies alone, this estimate is 423 unreported studies, a ratio of unreported-to-reported studies of approximately 15 to 1. When it is recalled that a single ganzfeld session takes over an hour to conduct, it is not surprising that Hyman concurred with Honorton and other participants in the published debate that selective reporting problems cannot plausibly account for the overall statistical significance of the psi ganzfeld database. Their recommendation to counter this problem was for investigators to specify in advance the status (i.e., confirmatory experiment, classroom exercise, etc) of the experiment before it is begun (Hyman & Honorton, 1986).

A further recommendation in the joint communiqué dealt with the issue of statistics. Honorton and Hyman stated that over 20% of the experiments in the meta-analytic sample of 28 studies contained errors in the use of statistical tests. Although some of the errors may not have had serious consequences in individual studies, their existence was felt to be of serious concern for the body of data as a whole. Journals, as well as authors, were charged with insuring the adequacy of statistical tests used in empirical contributions and all were strongly urged to follow these guidelines:

> 1) State concisely the precise statistical formulation of the hypothesis being tested and list it in advance of the results section, and give the type of statistical tests that are planned along with the hypothesis;
>
> 2) For any statistical analysis that was not preplanned, provide a brief statement of why it was done; the probability value should be placed close enough to this statement that its association is obvious;
>
> 3) When statistical analyses are done, report not only the inferential statistics (e.g., *t* values) but also the descriptive statistics for the data evaluated (e.g., group means and standard deviations), as well as reporting the actual values of correlation coefficients, and not simply that a correlation was significant or nonsignificant;
>
> 4) Have the data and statistical analyses independently rechecked before submitting the paper. (Hyman & Honorton, 1986, p. 360)

Full documentation in the published report of the experimental procedure and the status of statistical tests (e.g., planned or post hoc) was prescribed, with the thought that anyone reading it should be able to reconstruct the authors design and procedures from the descriptions provided in the experimental report. As regards to future ganzfeld psi experiments this was carried even further. In addition to the usual procedural details, Honorton and Hyman felt that ganzfeld psi researchers should also routinely provide:

1) Information on the training, supervision, and qualifications of student experimenters;
2) Information on the subject populations, including sources of subject recruitment and prior psi-testing experience;
3) The individual ranks and target selections;
4) The acquaintanceship of sender and receiver;
5) The status of the experiment (confirmatory, exploratory, etc.); and,

6) Any similar information that is germane to the evaluation and replication of the study.

Finally, Honorton and Hyman urged parapsychological researchers to plan and report their experiments with the idea that their single experiment would contribute to future meta-analyses. A summary table of the information that they felt would be necessary for such future meta-analyses can be found at the end of their joint communiqué (Hyman & Honorton, 1986).

Ganzfeld Research at Psychophysical Research Laboratories

In 1983, Honorton and colleagues initiated a new series of ganzfeld studies designed to avoid the methodological problems he and others had identified in earlier studies (Honorton, 1979; Kennedy, 1979a). These studies also complied with all the detailed guidelines that he and Hyman published later in their joint communiqué. The program at Psychophysical Research Laboratories (PRL) continued until 1989, when a loss of funding forced the lab to close. The innovations of this lab – the development of an automated ganzfeld system and the introduction of video clips as target stimuli – as well as the major findings that came out of it, had a profound effect not only on ganzfeld research being conducted at that time in other labs, but continues to exert an influence on ganzfeld research world wide. Because of the importance of this work to the research presented in this thesis, the PRL ganzfeld research will be presented here in some detail, using the information provided in Honorton et al. (1990), and the meta-analysis provided in Bem and Honorton (1994).

The basic design of the automated ganzfeld (autoganzfeld) studies was the same as was described earlier. A receiver and sender are sequestered in separate, acoustically isolated chambers. Following approximately 14 minutes of progressive relaxation, the receiver underwent ganzfeld stimulation while describing his or her thoughts and images aloud for approximately 30 minutes. Meanwhile, the sender concentrated on a randomly selected target. At the end of the ganzfeld period, the judging sequence was initiated and the receiver was shown four stimuli and, without knowing which of the four had been the target, rated each stimulus for its similarity to their mentation during the ganzfeld. The use of four stimulus target pools provides a chance baseline of .25.

The targets consisted of 80 still pictures (static targets) and 80 short video segments complete with soundtracks (dynamic targets) all recorded on video tape. The static targets included art prints, photographs, and magazine advertisements. The dynamic targets included excerpts from motion pictures, TV shows, and cartoons of approximately one minute duration. The 160 targets were arranged in judging sets of four static or four dynamic targets each, constructed to minimize similarities among targets within a set.

The VCR containing the target videocassette was interfaced to the controlling computer, which selected the target and controlled its repeated presentation to the sender during the ganzfeld period, eliminating the need for a second experimenter to accompany the sender. Following the ganzfeld period, the computer randomly re-arranged the four clip judging pool and presented it to the receiver on a TV monitor for judging. The receiver used a computer game paddle to make his or her ratings on a 40 point scale which appeared on the TV monitor after each clip was shown. The receiver was permitted to see each clip and to change the ratings repeatedly until they were satisfied with them. The computer then stored these and other data from the session into a file on a floppy disk. At that point, the sender moved to the receiver's chamber and revealed the identity of the target to both the receiver and the experimenter. It is important to note here that the experimenter did not know the identity of even the target pool until it was displayed to the receiver for judging.

The random selection of the target and sequencing of the judging pool were controlled by a noise based random number generator interfaced to the computer. Extensive testing confirmed that the generator was providing a uniform distribution of values throughout the full target range (1-160). Tests on the actual frequencies observed during the experiments confirmed that targets were selected uniformly from among the four clips within each target set and that the four judging sequences used were uniformly distributed across sessions. A further discussion of the adequacy of the randomization procedures for these studies is provided later in this chapter.

Both the receiver's and sender's rooms were sound isolated, electrically shielded chambers with a single door to each providing access that could be continuously monitored by the experimenter. There was two way intercom communication between the experimenter and the receiver but only one way communication into the sender's room, thus neither the experimenter nor the receiver could monitor events inside the sender's room. The archival record for each session includes an audio tape containing the receiver's mentation during the ganzfeld period and all verbal exchanges between the experimenter and the receiver throughout the experiment.

Experimental Studies

By the time PRL closed its doors in 1989 there had been 354 ganzfeld sessions completed, involving 100 men and 140 women. The participants ranged in age from 17 to 74 years old (mean = 37.3), and boasted a mean formal education of 15.6 years (SD = 2.0). These studies were conducted by eight separate experimenters over the six and a half years of the automated ganzfeld program. The experimental program included three pilot and eight formal studies, with five of the formal studies employing first time (novice) participants who served as the receiver for one session each. The remaining three formal studies employed experienced participants. Each of these studies will be briefly described here followed by a meta-analysis conducted by Bem and Honorton (1994).

The Pilot Studies: These were included in the analyses to ensure that all formal data were included. The three pilot studies did not have preset sample sizes. Study 1 comprised 22 sessions and was conducted during the initial development and testing of the autoganzfeld system. Study 2 comprised nine sessions testing a procedure in which the experimenter served as the judge at the end of the session, rather than the receiver. Study 3 comprised 35 sessions and served as practice for participants who had completed the allotted number of sessions in the ongoing formal studies but who wanted additional ganzfeld experience. This study also included several demonstration sessions when TV crews were present.

The Novice Studies: Studies 101 through 104 were each designed to test 50 participants who had had no prior ganzfeld experience. Each participant served as the receiver in a single ganzfeld session. Study 104 included 16 of 20 students recruited from the Juilliard School of the Performing Arts in order to test an artistically gifted sample. Study 105 was initiated to accommodate the overflow of participants who had been recruited for Study 104, including the four remaining Juilliard students. Sample size for this study was set to 25, but only six sessions had been completed when the laboratory closed. For purposes of exposition, the 56 sessions from Studies 104 and 105 were divided into two parts: Study 104/105(a) comprised the 36 non-Juilliard participants and Study 104/105(b) comprised the 20 Juilliard students.

Study 201: This study was designed to retest the most promising participants from the previous studies. The number of trials was set to 20, but only seven sessions with three participants had been completed when the lab closed.

Study 301: This study was designed to compare static and dynamic targets. Sample size was set to 50 sessions. Twenty-five experienced participants each served as the receiver in two sessions. Unknown to the participants, the computer control program was modified to ensure that they would each have one session with a static target and one session with a dynamic target.

Study 302: This study was designed to examine a dynamic target set which had yielded a particularly high hit rate in the previous studies. The study involved experienced participants with no prior experience with this particular target set and who were unaware that only one target set was being sampled. Each served as the receiver in a single session. The design called for the study to continue until 15 sessions were completed with each of the targets, but only 25 sessions had been completed when the lab closed.

According to Bem and Honorton (1994), the 11 studies just described comprise all of the sessions conducted during the six and a half years of the program, with no 'file drawer' of unreported sessions. Additionally, Bem and Honorton presented a meta-analysis of the complete PRL results as evidence for a replicable anomalous process of information transfer. As in the earlier meta-analysis conducted by Hyman and Honorton (1986), receiver's ratings were analyzed by tallying the proportion of hits achieved and calculating the exact binomial probability for the observed number of hits compared with chance expectation of .25. As noted earlier, 240 participant's contributed 354 ganzfeld sessions. Study 302 was analyzed separately due to the possibility of an inflated hit rate owing to response biases. This will be discussed in greater detail later in this chapter.

There were 106 hits in the 329 sessions comprising studies 1 through 301. These sessions yielded a hit rate of 32% (p = .002, one tailed) with a 95% confidence interval (CI) from 30% to 35%, and an effect size (π) of .59, with a 95% CI from .53 to .64 (the effect size π is discussed further in Appendix 11). Additionally, when studies 104 and 105 are combined and re-divided into the non-Juilliard and Juilliard samples, nine of the ten samples yield positive effect sizes, with a mean effect size (π) of .61, $t(9) = 4.44$, $p = .0008$, one tailed. This effect size is equivalent to a four alternate hit rate of 35% and is identical to that found across the 28 studies of the earlier meta-analysis. Bem and Honorton note at this point in their description of the meta-analytic results that if one were to assume that the remaining trials in Studies 105 and 201 would have yielded only chance results, this would reduce the overall z for the first ten autoganzfeld studies from 2.89 to 2.76 ($p = .003$). Thus, inclusion of these two incomplete studies does not pose an optional stopping problem.

Considered together, sessions with novice participants (Studies 101 – 105) yielded a statistically significant hit rate of 32.5% (p = .009), which is not significantly different from the 31.6% hit rate achieved by experienced participants in Studies 201 and 301. And finally, each of the eight experimenters also achieved a positive effect size, with a mean π of .60, $t(7) = 3.44$, $p = .005$, one tailed.

The Juilliard Sample: In order to explore the relationship between creativity and psi performance, ten male and ten female undergraduates were recruited from the Juilliard School in New York City. Each served as the receiver in a single session in Studies 104 or 105. These students achieved a hit rate of 50% (p = .014), which is one of the five highest hit rates ever reported for a single sample in a ganzfeld study. The musicians were particularly successful, with six of the eight (75%) successfully identifying their target (p = .004). Due to the extreme significance of this study to the work presented in this thesis, this study will be discussed in greater detail in chapter 3.

There is a significant negative correlation across the ten studies (1 through 301) between the number of sessions in a study and its effect size (π): $r = -.64$, $t(8) = 2.36$, $p < .05$, two tailed. This is reminiscent of Hyman's discovery that the smaller studies in the original ganzfeld database (Hyman, 1985) were disproportionately likely to report statistically significant results. However, Hyman interpreted this as evidence for the file drawer effect, or a bias against the reporting of small studies that failed to get significant results. A similar interpretation cannot be applied to the PRL autoganzfeld studies, because there are no unreported sessions. The negative correlation springs primarily from the two studies with the largest effect sizes: the 20 sessions with the Juilliard students and the seven session of Study 201, the study specifically designed to retest the most promising participants from previous studies. Accordingly, it seems likely that the larger effect sizes of these two studies, and therefore the significant negative correlation between number of session and effect size, reflect genuine performance differences between these two small, highly selected samples and other autoganzfeld participants.

Study 302: Although all of the other studies in the autoganzfeld database sampled randomly from a pool of 160 static and dynamic targets, Study 302 sampled from a single dynamic target set within that 160. This target set was one which in previous studies had yielded a particularly high hit rate. The experimental design called for the study to continue until each of the four clips had served as the target 15 times. Unfortunately, the premature termination of this study at 25 sessions left an imbalance in the frequency with which each clip had served as the target. This meant that the high hit rate observed (64%) could well be inflated by response biases. For example, the four film clips in this set consisted of a scene of a tidal wave from the movie '*Clash of the Titans*', a scene of various snakes from the TV documentary '*Life on Earth*', a high speed sex scene from '*Clockwork Orange*', and a scene from a '*Bugs Bunny In Space*' cartoon. Receivers in the ganzfeld frequently report water imagery but rarely report any type of sexual imagery, in all probability due to the embarrassment of voicing aloud such imagery. If a video clip containing popular imagery, like water, happens to appear as the target more frequently than a clip containing unpopular imagery, like sex, a high hit rate might simply reflect the coincidence of those frequencies of occurrence with participants' response biases. An analysis examining this possibility was conducted by Bem and Honorton (1994) who found that the frequency with which each clip was ranked in first place closely matched the frequency with which it appeared as the target. To adjust for this problem, they used the observed frequencies of each clip as target and each clip's frequency of being ranked first to compute the hit rate if there were no psi effect by multiplying each proportion in the first case (clip as target) by the corresponding proportion of that clip's frequency of being ranked first, and then summing across the four clips. This computation yields an overall expected hit rate of 34.1%. When the observed hit rate of 64% for this target pool is compared with this baseline, the effect size (h) is .61. This is equivalent to a four-alternative hit rate of 54% or a π value of .78 and is highly statistically significant ($z = 3.04, p = .0012$).

This psi effect can be demonstrated even more clearly when examining the differential popularity of the imagery in the clips by displaying how frequently each was ranked in first place when it was the target compared to how frequently it was ranked in first place when it was one of the control clips (a decoy). Results of this analysis show that each of the four clips was selected as the target relatively more frequently when it was the target than when it was a decoy, a difference that is significant for three of the four clips. On average, a clip was identified as the target 58% of the time when it was the target compared with only 14% of the time when it was a decoy.

The high success rate of Study 302 (64%), raised the question of whether dynamic targets are more effective than static targets. This possibility was also suggested by the earlier meta-analysis, which found that studies using multiple image targets, such as the View Master stereoscopic slide reels of early ganzfeld work, obtained significantly higher hit rates than did studies using single image targets. The ten autoganzfeld studies that randomly sampled from both dynamic and static target pools yielded 164 sessions with dynamic targets and 165 sessions with static targets. As predicted, sessions using dynamic targets yielded significantly more hits than did sessions using static targets (37% vs. 27%), Fisher's exact $p < .04$. However, an analysis by Dalton and Utts (1995) on sender-receiver relationship and target type in the PRL ganzfeld database showed that while success rates for dynamic targets hovered around 41% regardless of the sender-receiver relationship, the hit rate for static targets when the sender was a friend was actually 31.2%. Further, trials with static targets and laboratory staff as senders resulted in only 20.7% hits. Thus, while laboratory staff and friends work equally well for dynamic targets, using friends as senders with static targets apparently will actually yield better results. However, there are several advantages to using dynamic targets over static targets: Dynamic targets contain more information, involve more sensory modalities, evoke more of the receiver's internal schemata, are more life-like, have a narrative structure, are more emotionally evocative, are more engaging of the sender's attention, and are 'richer' in other, unspecified ways. Although efforts to define what constitutes a good target have involved both psychological and physical properties of targets, there is not much progress to date (Delanoy, 1988; Watt, 1988).

In reviewing the Bem-Honorton report, Hyman (1994) again had criticisms of the ganzfeld procedure, this time focusing on claimed inconsistencies with earlier manual ganzfeld studies and tests of the randomization procedure for the automated ganzfeld. One such inconsistency with earlier ganzfeld studies that Hyman felt noteworthy was that of sender/receiver pairing. The Bem-Honorton report preformed a Fisher's exact test to the hit rates for friend senders vs. 'other' senders (i.e. laboratory staff members), and concluded that the sender/receiver pairing was not a significant correlate of psi performance in the autoganzfeld studies. Hyman views this "failure to get significance as a noteworthy inconsistency" (Hyman, 1994, p. 20). He goes on to cite as a further problem the absence of any post hoc analyses on the random number generator showing that the distributions of targets and judging orders are consistent with the underlying probability model. He conducted an analysis on hit rate and target frequency in the autoganzfeld database and upon finding a relationship, tested for a linear trend among the proportions (Snedecor & Cochran, 1967, pp. 246-248) which he states was positive and significant, (p = .01, two tailed), indicating that targets that occurred more than two times were more likely to correctly be chosen as the target. In trying to account for this relationship, Hyman conducted a multinomial analysis of variance (Woodward, Bonnett, & Brecht, 1990). In this analysis he used the hit rate as the dependent variable, with 3 two-level factors as the independent variables: target type (static or dynamic), target occurrence (first, latter), and experimenter prompting (yes, no). Of the interactions, only that between target occurrence and experimenter prompting was significant, $x^2(1, N = 330) = 6.83, p = .009$. The difference between the hit rate for dynamic targets (.356), and that for static targets (.249), did not interact with the other two factors to any significant degree, and therefore were not discussed further by Hyman. The remaining two main effects were significant, target type, $x^2(1, N = 330) = 4.76, p = .030$, and for target occurrence, $x^2(1, N = 330) = 11.56, p < .001$. In his estimation, Hyman felt that the autoganzfeld studies failed to replicate key findings of the original ganzfeld experiments, and that the positive effect size and significance depended on a new type of target (and target presentation), and on target repetition and experimenter coaching.

In his reply to Hyman, Bem (1994) first noted that he and Honorton had not claimed a replication of the earlier ganzfeld studies effect size, in fact were careful not to do so, but had simply observed that earlier studies had achieved an overall hit rate of about 33% and noted that the autoganzfeld experiments had achieved approximately the same effect size. Continuing on, Bem points out that in previous ganzfeld studies, receivers permitted to bring in friends to serve as senders obtained higher hit rates than did studies that used only laboratory senders, but as was stated in their article, there is no record of how many participants in the former studies actually brought in friends. Hence, these studies do not provide a clean test of the sender/receiver variable. In the autoganzfeld studies, all participants were free to bring in friends as senders, and those pairs did in fact achieve higher hit rates than sender/receiver pairs who were not friends (35% vs. 29%). But, Bem notes, this finding is equivocal. For example, in the archival publication of the autoganzfeld studies, Honorton et al. (1990) presented the sender/receiver relationship finding as a marginally significant point-biserial correlation of .36 (p = .06). With the Fisher's exact test applied to this relationship the result is a nonsignificant p which Bem and Honorton prudently chose to report as indicating that sender/receiver pairing did not play a significant role in psi performance in the automated ganzfeld studies. Hyman, in this case, was in error when he stated that the earlier database yielded a significant difference in performance between pairs of friend and non-friend pairs. At best, this was an indirect inference.

Bem acknowledges that the problem of target randomization is critical in many psi experiments because systematic patterns in inadequately randomized target sequences might be detected by subjects during a session or might match their pre-existing response biases. However, as was pointed out earlier, in ganzfeld studies randomization is less problematic because only one target is selected during the session and most subjects serve in only one session. The primary concern then becomes that all targets are sampled about equally over the course of the study. In relation to the determination of the sequence in which the target and decoys are presented to the receiver for judging, similar considerations hold. In the PRL autoganzfeld experiments, 160 video clips were sampled for a total of 329 sessions. Therefore, any given clip would be expected to appear as the target in only about two sessions. Bem (1994) points out that this low expected frequency meant that it was not possible to statistically assess the randomness of the actual distribution observed. As noted in Honorton et al. (1990) several large scale control series were run to test the output of the random number generator, which confirmed that it was a uniform distribution of values through the full target range. Statistical tests that could be legitimately performed on the actual frequencies observed confirmed that targets were selected uniformly from among the four possibilities within each target set, and that the four possible judging sequences were uniformly distributed across the sessions.

Since the adequacy of target randomization could not be statistically assessed due to the low expected frequencies, Bem (1994) acknowledged Hyman's concern that the unequal distribution of targets could have interacted with receivers' content preferences to produce artifactually high hit rates. In order to respond to this, Bem undertook two analogous analyses on the autoganzfeld database (excepting Study 302), treating the four clip target set as the unit of analysis and not requiring that the null baseline be fixed at 25% or any other particular value. In the first analysis, the actual target frequencies observed were used in conjunction with receivers' actual judgements to derive a new, empirical baseline for each target set. Across the 40 sets, the mean adjusted hit rate was 31.5%, significantly higher than 25% (one-sample $t(39) = 2.44, p = .01$, one tailed). The new bias adjusted hit rate was found to be virtually identical (30.7%, $t(39) = 2.37$, $p = .01$) and not significantly different from the unadjusted value ($t_{diff}(39) = .85$, $p = .40$), indicating that unequal target frequencies were not significantly inflating the hit rate.

The second analysis treated each film clip as its own control by comparing the proportion of times it was rated as the target when it was the target, with the proportion of times it was rated as the target when it was a decoy. Bem first calculated these two proportions for each clip and then averaged them across the four clips in each target set. Results clearly showed that across the 40 target sets, clips were rated as targets significantly more frequently when they were targets than when they were decoys, 29% vs. 22%, (paired $t(39) = 2.03, p = .025$, one tailed).

Hyman (1994) was also concerned about the randomization of the judging sequence, citing the fact that items to be judged are presented sequentially, and personal response biases indicate a strong tendency to select the first or second items in the judging series. Bem (1994) found this hypothesis to be true, noting that receivers did display a positive bias in their judgements, tending to identify as targets the clips that appeared either first or last in the judging sequence. Moreover, he found that the actual distribution of targets across the judging positions also departed significantly from a uniform distribution, with targets occurring most frequently in the third position. In order to determine whether the conjunction of these two unequal distribution might have contributed artifactually to the hit rate, Bem again combined the observed frequencies to derive an empirical baseline. The expected hit rate across all four judging positions was 24.7%. This is actually lower than the 25% that would have been obtained if the target positions had been uniformly distributed across the sessions. In other words, Bem found that the conjunction of receivers' position biases with the imperfect randomization of target positions worked against successful psi performance in the PRL data, concluding that inadequate randomization could not have contributed artifactually to the hit rates. For a complete discussion of the intricacies involved in this exchange, see Bem and Honorton, 1994; Hyman, 1994; Bem, 1994.

In addition to producing one of the most successful databases in parapsychology, PRL also strove to identify individual differences and characteristics associated with successful ESP ganzfeld performance. In an initial exploratory analysis of performance correlates for the first two PRL novice series (Series 101 and 102, hereafter designated as PRL-1), Honorton et al. (1986) found that initial ganzfeld success was positively and significantly related to four specific factors: 1) Prior psi experiences; 2) the practice of some mental discipline; 3) prior laboratory psi testing; and, 4) Feeling/Perception (FP) preferences on the Myers Briggs Type Inventory (MBTI). In a more complete analysis of the entire autoganzfeld database following PRL's closure in 1989, Honorton (1992) compared the results for the then just completed PRL Series 103-105 (hereafter designated as PRL-2) with those of PRL-1 as a means of estimating the overall magnitude and consistency of the four predictors. It is the results from this more complete analysis which will be discussed here. Let us address each of the four factors individually for this database before looking at the combined predictor factors.

The Participant Information Form (PIF) used by PRL contained a question on prior psi experiences which asked: "If you have had experiences which you thought involved psi, which of the following do you feel you have experienced (please check)." One point was given for each of the checked items (telepathy, clairvoyance, precognition, and psychokinesis), and their sum constituted the psi experiences predictor. Honorton (1992) reported a significant positive correlation between the number of types of psi experiences and psi ganzfeld performance in the form of session z scores but not direct hits, using a one-way ANOVA using linear contrasts (Rosenthal & Rosnow, 1985), for both PRL-1, F = 7.41, 1/86 df, $p = .004$ ($r = .28$), and for PRL-2, F = 2.86, 1/99 df, $p = .04$, $r = .17$. In the second study, the Juilliard students tended to report significantly fewer types of psi experiences ($p = .009$, two tailed; Schlitz & Honorton, 1992), and Honorton notes that when they are excluded from the PRL-2 analysis in the post hoc examination, the relationship between psi performance and psi experiences is nearly identical to that obtained in PRL-1, F = 6.29, 1/79 df, $p = .007$, $r = .27$. Combining the two PRL studies gives also gives a highly significant outcome, F = 9.37, 1/190 df, $p = .001$, $r = .24$.

The question on the PIF regarding prior psi testing asks: "Have you ever participated in formal laboratory testing of psi phenomena – Yes / No?". By definition, none of the novices had previous ganzfeld experience, and only 16% of them had participated in other types of psi research. A hit rate of 50% was achieved by the novices in PRL-1 who had previously participated in other, non-ganzfeld, psi experiments (N = 20, $p = .01$, $z = 2.20$, $h = .52$), while only 26% of those with no prior psi testing achieved hits, yielding 19 hits and 53 misses (N = 72, $p = .437$, $z = .16$, $h = .03$). Using the Overall-adjusted Fisher exact test the distribution of hits and misses for this population in relation to prior testing was significant ($p = .02$). In PRL-2, 67% of those with previous psi testing had hits (N = 12, $p = .003$, $z = 2.77$, $h = .86$), while only 32% of participants with no prior testing history did (N = 92, $p = .09$, $z = 1.31$, $h = .15$). The Overall-adjusted Fisher exact test of the distribution of hits and misses for PRL-2 was also significant, $p = .02$.

In relation to the factor of displaying Feeling/Perception (FP) preferences on the Myers Briggs Type Inventory (MBTI), participants were classified as FP if their continuous scores on the TF and JP Scales were both above 100. In PRL-1, 50% of the participants classified as FP on the MBTI obtained hits (p = .0005, z = 3.25, h = .52) compared to 18% of those classified non-FP (N = 44, p = .892, z = -1.24, h = -.17. The distribution for hits and misses in relation the FP factor was significant, Overall-adjusted Fisher exact p = .001. In PRL-2, 36% of the FP participants produced hits (N = 44, p = .07, z = 1.44, h = .23) and 35% of the non-FP participants were successful (N = 60, p = .05, z = 1.61, h = .22). The Overall-adjusted Fisher exact p = .472.

The PIF question used to assess the practice of a mental discipline asked: "Have you ever practiced any form of mental discipline, e.g., meditation, biofeedback, hypnosis, relaxation exercises – Yes / No?". Hits were obtained by 36% of those in PRL-1 reporting some experience involving mental disciplines (N = 72, p = .02, z = 1.98, h = .24) and by 16% of those reporting no involvement with mental disciplines (N = 19, p = .89, z = -1.22, h = -.23). In PRL-2, 33% of participants reporting mental disciplines obtained hits (N = 83, p = .07, z = 1.44, h = .17) and 48% of the nonpractitioners did so. The latter outcome is largely due to the Juilliard nonpractitioners who had a success rate of 71% (N = 7, p = .01, z = 2.23, h = .97). In fact, the distribution of hits in relation to mental disciplines for the Juilliard students showed a nearly significant reversal of the PRL-1 pattern (the Overall-adjusted Fisher exact p = .09).

In relation to the combined predictor factors, in PRL-1 six of the seven participants meeting all four factors obtained hits (p = .001, z = 3.00, h = 1.32). Three out of the four participants meeting all four factors in PRL-2 were successful (p = .05, z = 1.64, h = 1.05). Due to the very small number of participants satisfying the four factor predictor model, Honorton (1992) focused on a three factor model, excluding the factor of prior psi testing. There were 34 participants in PRL-1 meeting the three factor model, achieving a success rate of 56%, p = .0001, z = 3.67, h = .64 (95% confidence interval from 41% to 70%). Of the 49 PRL-1 participants not satisfying the three factor model (but for whom data on all three factors is available) an 18% success rate was achieved (p = .89, z = -1.26, h = -.16, 95% CI from 6% to 31%). Honorton (1992) reported an unexpected reversal of this pattern in PRL-2 with a success rate of 32% for those satisfying the three factor model (N= 37, p = .194, z = .86, 95% CI from 19% to 46%), and a success rate of 37% for those who did not satisfy it (N = 67, p = .01, z = 2.12, h = .27, 95% CI from 27% to 48%), but did not elaborate on this difference. Combining the total number of participants at PRL who met the four factor model (N = 71) yields an overall success ratio of 44%, p = .001. Honorton felt that this four factor model could be used by other ganzfeld researchers to pre-select ganzfeld participants and raise the chances of a statistically successful ganzfeld study. He encouraged the examination of this model in other ganzfeld databases to evaluate its usefulness.

A report by Broughton, Kanthamani and Khilji (1989) in which they assessed the four factor success model on their manual ganzfeld database provided additional support for the model put forth by Honorton (1992). The Broughton et al. manual ganzfeld database, which at the time consisted of four separate series with a total of 144 participants, made use of static targets rather than the dynamic targets found at PRL. The analysis for the model was limited to the pool of 120 novice ganzfeld participants having the relevant personal data. Because there were very few participants who could claim prior psi testing (n = 4) the researchers chose to focus on the remaining three factors of the model in their analyses: prior psi experience + practice of a mental discipline + FP on the MBTI. Of the subset of 28 participants who met all three of these criteria, 12 had scored direct hits, a hit rate of 43%, yielding an exact binomial p = .03. However, these results should only be viewed as an interim report. A more complete report was forthcoming in 1994 when, at the conclusion of the manual ganzfeld series, Kanthamani and Broughton (1994) presented this database in full, with 352 trials contributed by 206 participants in eight different series. Rather than detail each study, the overall results will be discussed here, in light of their relationship to the PRL four factor success model. The overall scoring rate for this manual database was 27.6% which compares well with the PRL data relating to the static targets (27%) in their automated ganzfeld series. In examining only the participants who met all the predictors for the four factor success model, a subset of 46 participants were isolated who yielded a hit rate of 41.3%, p =

.01. Thus, Kanthamani and Broughton concluded that the PRL success model was fully confirmed in their database.

Bierman, Bosga, Gerding and Wezelman (1993) examined the results of their first two novice series with a manual ganzfeld using two of the four factor model (mental discipline and prior psi experiences) and reported somewhat mixed results. While the overall hit rate for the study was exactly at chance (25%), over 50% of the participants reported the practice of a mental discipline, and these subjects scored at 32.1% over both series (x^2 = 2.5; p = .11) which is consistently above chance. However, while subjects who reported having previous psi experiences did score slightly better than subjects who did not report such, it was not significantly so (27.3% vs. 0% in series I and 27.5% vs. 20% in series II). There were 48 participants who reported both practice of a mental discipline and prior psi experiences. These participants achieved 16 hits in 48 trials for a hit rate of 33.3%, which is similar to the hit rate for the PRL population overall. But the question remains as to why these factors would contribute to the success of the ganzfeld participant. Let us address each of these factors in turn.

The first factor in the four factor success model is that of having had prior psi experiences. It can be argued that participants who have had prior psi experiences may be better at recognizing the psi material, possibly at a subconscious level, when it appears in the ganzfeld. They may also feel less threatened by being successful at the psi task in a new study than participants who have never encountered or experienced psi phenomena. Participants who have reported experiencing some form of what they feel to have been a psi experience have tended to consistently produce higher rates of success in the ganzfeld than those who have not had psi experiences (Broughton, Kanthamani & Khilji, 1989; Honorton, 1992; Honorton, Berger, Varvoglis, Quant, Derr, Schechter & Ferrari, 1990; Kanthamani & Broughton, 1994).

The second factor is the practice of a mental discipline, such as meditation or bio-feedback. The success for this factor may lie in that these participants are accustomed to attending to internal mental processes and are therefore more familiar with internal sources of noise, making the psi information more easily recognizable when it appears. Or that they are able to obtain a calm, passive state more rapidly than non-meditators which may give them an added edge in receiving and processing the psi information (Bierman, Bosga, Gerding & Wezelman, 1993; Broughton et al., 1989; Honorton, 1985, 1992; Kanthamani & Broughton, 1994; Morris et al., 1993).

The third factor presented by the PRL model is that of having prior laboratory psi testing, other than the ganzfeld (Honorton, 1992; Honorton & Schechter, 1986; Kanthamani & Broughton 1994). This variable is harder to find in most populations, as often their participation in the ganzfeld is the first encounter with laboratory psi testing of any type. The reason for the success of this variable may relate directly to the participant's prior familiarity with the laboratory environment. This familiarity with the laboratory environment may lead to a reduction of the stress or anxiety which can be caused by encountering a potentially frightening or unknown situation, such as entering into research that has been linked with the occult in the public mind. In comparison to this point is the use of experienced participants in ganzfeld research. Experienced participants are those who have had a prior ganzfeld session and therefore know what to expect from the experience. Ganzfeld research with experienced participants has tended to produce a higher success rate than research designs using strictly novices, or inexperienced participants (Honorton et al., 1990; Sargent, 1980; Sargent, Bartlett, & Moss, 1982). Again, this response may be related to the higher degree of comfort and familiarity with a procedure that initially may seem strange or bizarre for the participant. This familiarity may contribute to the participant's ability to relax in a 'safe' environment and facilitate deconstruction of psychological barriers.

The last factor put forth by the PRL model is that of participants who demonstrate Feeling/Perception (FP) preferences on the MBTI. The description of the FP respondent on the MBTI is someone who is: Flexible and adaptable; has interpersonal sensitivity; seeks new experiences; and analyzes subjective activity. The superior performance of FP's may be related to their adaptability to new situations and motivation for new experience. An evaluation of the MBTI in relation to the five factor model of personality (McCrae & Costa, 1989; Costa & McCrae, 1992b) by Honorton (1992) indicated that the 'F' of the Thinking/Feeling (TF) scale of the MBTI correlated positively with Agreeableness, and the 'P' of the Judging/Perceiving (JP) scale correlated negatively with Conscientiousness (i.e., orderliness) and positively with Openness to Experience (Broughton et al., 1989; Honorton & Schechter, 1986; Honorton, et al., 1990, Kanthamani & Broughton, 1994). The studies of van Kampen, Bierman, and Wezelman, (1994) and Broughton and Alexander (1995) found positive correlations with psi hitting and the Openness scale of the NEO-PI (a personality scale using the five factor model devised by Costa & McCrae, 1985) in their ganzfeld studies which is interpreted by this author as providing support for the view of the successful participant as flexible, sensitive, and open, as seems to be indicated by the FP aspect of the four factor model.

While there have been many reports of significant psi results using the ganzfeld following the original meta-analysis and debate of Hyman and Honorton in 1985 (i.e., Bem & Honorton, 1994; Bierman, 1995; Broughton & Alexander, 1995; Johansson & Parker, 1995; Morris et al., 1993; Schlitz & Honorton, 1992), not all studies have been so successful. Murre, van Dalen, Dias and Schouten (1988) contrasted participants' performance in ganzfeld and non-ganzfeld conditions in order to explore the 'psi conduciveness' of the ganzfeld technique. This was undertaken at least in part due to the skeptical attitudes of the experimenters involved towards any psi effect. Forty-one subjects were tested for GESP in a manual ganzfeld and non-ganzfeld condition. Results were not only at chance for both conditions but also showed no significant differences between the two conditions.

Twenty participants took part in a manual ganzfeld study by Houtkooper, Gissurarson and Haraldsson (1988-89) exploring observational theory and percipient order effect. Participants operated in pairs, and with each participant acting twice as the sender and twice as the receiver, completed two ganzfeld sessions each, for a total of 40 sessions. To test the percipient order effect, in one condition the sender observed the session outcome first (hit or miss) and in the other condition the receiver observed session outcome first. Overall psi results for this study were exactly at chance, with no significant differences between conditions.

An examination of the mentation of both the subject and the sender in a manual ganzfeld situation was conducted by Delanoy (1988-89) as part of her Ph.D. thesis. In addition to the taped recording of the receiver's mentation, a record of the sender's thoughts, experiences, emotions, and sensations was also made during the sending period. Twenty participants took part in the study, with the experimenter serving as the sender for all of them. Blind judging was used in addition to the subjects' rankings, and a sum of ranks analysis performed on the data. Results for both subjects and blind judges were at chance levels. Analyses of the 15 mentation types for the subject showed only the category of 'undeveloped imagery' (i.e., unrecognizable images) to convey a significantly greater proportion of target related information (p = .04). Analyses of the 25 mentation categories for the sender showed four categories to correspond significantly to the subject making target related responses: 1) Active sending; 2) experiencing mental imagery; 3) when the color of an object was focused on, and; 4) experiencing vague mental imagery or thoughts. Due to the large number of analyses conducted on this data, these results can only be viewed as exploratory in nature. However, they do serve to focus on an important factor – that of understanding the role of the sender in the ganzfeld.

The Sender Debate

The previous study serves to illustrate what has become an important factor in the area of ganzfeld-psi research: Does the presence of a sender increase successful psi functioning in the ganzfeld? Virtually nothing is known about the characteristics of a good sender or about the effects of the sender's relationship to the receiver. The initial suggestion from the meta-analysis of the original ganzfeld database indicated that psi performance might be enhanced when the sender and receiver are friends, but was not replicated at a statistically significant level (p = .06) in the autoganzfeld studies. A number of parapsychologists have entertained the more radical hypothesis that the sender may not even be a necessary element in the psi process. The standard sender-receiver procedure tests for the existence of telepathy, but if in fact the receiver is somehow picking up the information from the target itself, it would then be considered clairvoyance, and the presence of the sender would be irrelevant. Attempts to devise pure telepathy or pure clairvoyance procedures revealed how difficult it was to rule out alternative information flow pathways (Morris, 1975). Comparing studies with and without senders is difficult, due to potential confounding variables in terms of procedure, treatment of participants, etc. There have been few studies that attempted to incorporate a no sender comparison condition within the study confines (Bierman, Berendsen, Koenen, Kuipers, Louuman, & Maissan, 1984; Braud, Ackles, & Kyles, 1984; Braud & Wood, 1977; Dunne, Warnock, & Bisaha, 1977; Kanthamani, Khilji, & Rustomji-Kerns, 1988; Sargent, Barlett & Moss, 1982). Surveys of the literature (e.g. Carpenter, 1977; Palmer, 1978) indicate mixed results, tending to be somewhat better when senders are present rather 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 which he thought were all GESP. This was especially striking because previously he had scored equally high under both conditions when he was aware of the condition. Thus there is some evidence from high scoring participants that the presence of a sender may exert an influence upon the results even though psi may not manifest itself to a high degree. Carpenter (1977) provides an excellent summary of additional evidence that sender variables may affect results, citing, for example, the results from Soal's subjects Stewart and Shackleton dropping abruptly to chance when clairvoyance conditions were substituted for GESP conditions, even when subjects were not aware of the change (Soal and Bateman, 1954). However, L. E. Rhine (1956) concluded from her spontaneous case collection that the apparent motivation for the experience (its 'need' value) was greater for the experiencer than the agent, making the experiencing person the active member and the target person (agent) no more than an ESP target, more or less like any other.

To answer the sender question, Honorton (1995) conducted a meta-analysis of all 'real time' ganzfeld imaging studies published in the English language parapsychology literature between 1974 and 1991, which included doctoral theses and abstracts of otherwise unpublished studies. The report focused on two aspects of a larger meta-analytic study of anomalous communication in the ganzfeld: Estimates of the main effect (overall magnitude) and the impact of the presence or absence of a target observer or sender. Sadly, this report was published only after his death in 1992.

A total of 73 studies were retrieved, contributed by 21 independent research teams and involving 4,155 trials contributed by 1,762 subjects. The mean effect size (Cohen's h) for all studies combined was .16, $p = 4.75 \times 10^{-9}$ (95% CI .06 to .26), equivalent to a success rate of 32.2% in the standard four-choice situation. Honorton used Rosenthal's (1991) 'Fail-Safe N' to estimate that approximately 11 unreported studies averaging null outcomes would be needed to reduce the overall significance of the retrieved studies to $p = .05$. Honorton also broke the study database down into the type of analysis performed, and found that the largest subset of data was that for direct hits. The Cohen's h effect size of .23 for these studies is equivalent to an average success rate of 35.5% in the typical four-choice situation ($p = 7.43 \times 10^{-12}$, 95% CI = .13 to .33). The 'Fail-Safe N' estimate for these studies indicated that approximately 16 unretrieved studies averaging null outcomes would be necessary to reduce the significance of this subset.

Senders were employed in 61 studies (3,684 trials) by 20 independent investigators. The combined z score for this is 5.70 ($p = 7 \times 10^{-9}$). The mean Cohen's h effect size of .17 is equivalent to a success rate of 32.5% (95% CI = .07 to .27). Rosenthal's 'Fail-Safe N' indicates that approximately 11 unreported studies averaging null outcomes would be required to reduce the overall significance of the sender studies to $p = .05$.

The remaining 12 studies (470 trials) in the sample did not employ senders. These studies, contributed by seven independent researchers, have a combined z score of $z = 1.31$ ($p = .095$). The mean Cohen's h effect size is .10 (95% CI = -.10 to .30). Consequently, the studies without senders showed no overall evidence for psi in the ganzfeld. Honorton then transformed the mean effect sizes for studies with, and without senders, back into proportion of hits, and tested the difference between the two conditions using the z test for differences between binomial proportions. The resulting z of 1.49 was nonsignificant (p = .137, two tailed), and effect size for the difference was .023. While this difference was not significant, it is of interest that only the studies with senders showed a significant overall psi-ganzfeld effect.

Because the sender/no sender comparison had been between rather than within studies (i.e., not based on systematic within study comparison of sender impact), the observed difference could be due to other factors than the presence or absence of senders. Individual researchers use a variety of different target stimuli, sample from different populations (i.e., students, paid volunteers, etc.), give diverse instructional sets, and implement experimental procedures in various ways. It is conceivable that such variations could account for the observed differences.

To assess this possibility, Honorton performed an analysis on the subset of five investigators who contributed studies both with senders and without senders. This subset comprised only about 20% of the investigator base, but 405 of the total number of trials (N = 1,666). There were 25 studies with senders (N = 1,497, mean effect size for Cohen's h ((designated ES(h) as discussed in Appendix 11)) is = .301, SD = .420, combined z = 5.84, $p = 3.15 \times 10^{-9}$), equivalent to a hit rate of 38.9% in the typical four-choice judging situation. There were seven studies without senders which yielded a mean Cohen's h of ES(h) = .017 (N = 169, SD = .351, combined z = .31, p = .378), or 25.7% hits in the four-choice situation. For this subset the difference in the proportion of hits with and without senders is significant (z = 3.39, p = .0007, two tailed, 95% CI from .06 to .20). The effect size of the difference is ES(h) = .083. This analysis indicated that sender/no sender differences in performance were not likely to be the result of differences in laboratory or investigator style factors.

Honorton concluded from his meta-analysis that:

> 1) The combined evidence across 73 studies and 21 independent investigators provides strong evidence for anomalous communication in the ganzfeld: The null hypothesis is highly implausible given the overall probability of 4.75×10^{-9}.

> 2) The Fail-Safe N estimates render alternative explanations based on selective reporting of positive results untenable. The overall observed outcome would remain statistically significant even if there were 25,696 unretrieved ganzfeld trials, averaging null outcomes.
>
> 3) Statistical power analysis indicates that the observed number of statistically significant ($p \leq .05$) studies is consistent with the overall effect size estimate for all studies and direct hit studies.
>
> 4) The meta-analysis fails to support the advantage of nondirect hits analysis methods.
>
> 5) The power analysis indicates that anomalous communication effects should be detectable at conventional significance levels in 95% of ganzfeld studies employing direct hits analysis and sample sizes $\geq$ 200 trials. (Honorton, 1995, p. 137).

However, Honorton noted that due to the small number of studies without senders, the meta-analysis was less clear concerning the moderating effect of the sender. He felt that the strongest evidence regarding sender impact came from the analysis of the subset of five investigators who each contributed studies with and without sender (hence holding sampling, laboratory, and investigator style factors constant). In Honorton's assessment the meta-analysis indicated that the presence of a sender results in significantly superior anomalous communication effects, though the magnitude of the difference is small. Further, he points out that as, with one exception (Raburn, 1975), the primary studies were not designed to systematically assess sender versus no sender conditions, his meta-analysis could not address the underlying source of this difference. Morris (1995) went on to point out that studies which incorporated a no sender design only produced better results than those studies which attempted a combination of the two.

Discussion and Conclusions

The different meta-analyses presented have seemed to indicate two things: 1) the induction of an internally focused altered state is conducive to psi functioning, and 2) that the ganzfeld overall is a successful method of exploring process oriented questions related to psi functioning.

However, the review of these meta-analyses has also raised questions about the efficacy of its use. Honorton's approach in his earlier studies (1978), of evaluating a line of research based upon its results without also evaluating that research for methodological flaws, allows only suggestive conclusions to be drawn, at best. A meta-analysis conducted to analyze whether methodological flaws are related to study outcome would appear to be a better approach to this problem. However, differences in opinion in defining and assigning flaws may occur, as illustrated by the 1985 Hyman-Honorton debate, which may then result in substantially different outcomes (as it did in this instance). The problem of differing interpretations of the database is a potential difficulty in any meta-analysis, but this was compounded in the case of the Hyman-Honorton meta-analysis as the size of the database (28 studies), was too small to allow for a meaningful factor analysis from which overall conclusions could be drawn. Additionally, several of the factors under examination did not apply to enough of the studies to permit these factors to be included in any analysis. It is a credit to the perseverance of the two authors that they not only issued a joint statement with guidelines for future ganzfeld research, but also reached the same conclusion that, "there is an overall significant effect in this database that can not reasonably be explained by selective reporting or multiple analysis" (Hyman & Honorton, 1986, p. 351).

Perhaps some of the most important findings to come out of these meta-analyses have been the identification of procedural factors, or participant characteristics, that may facilitate success in the ganzfeld. One of the factors that Honorton identified early on as being associated with session success was that of session duration. In particular, Honorton was interested in finding out whether the length of time that participants spent in the ganzfeld had an impact on its successful outcome. Honorton found, in his 1977 meta-analysis, that those studies with a mean duration of 37 minutes of ganzfeld stimulation reported a higher success rate compared to studies with a mean duration of 22 minutes, a difference of 15 minutes. Further, in her review of session duration, Delanoy (1986) also found that the successful studies generally reported a longer duration of ganzfeld stimulus. In this analysis, she found that 82 percent of the significant studies utilized a ganzfeld stimulus period of 32 minutes or more, while 60 percent of the unsuccessful studies averaged 26 minutes or less. For this reason, a ganzfeld stimulation period of approximately 33 minutes was used for all experiments reported in this thesis.

The various meta-analyses that have been presented here, and in particular the Hyman-Honorton debate, have served to illustrate one of the problems plaguing not only ganzfeld-psi research but most fields of science: the need to eliminate design and procedural flaws. While Hyman and Honorton agreed that the effect in the psi-ganzfeld data could not reasonably be explained by selective reporting or multiple analysis, they still disagreed as to the extent that other methodological problems, such as inadequate randomization or feedback procedures, could have contributed to the successful outcome of a study. They concluded on this issue that "the final verdict awaits the outcome of future psi ganzfeld experiments – ones conducted by a broader range of investigators and according to more stringent methods." (Hyman & Honorton, 1986). As part of the research conducted in this thesis, a new automated ganzfeld system was developed which incorporates improved security measures designed to address the procedural flaws identified by Hyman & Honorton (1986). A further discussion of the problems specific to automated ganzfeld research will be discussed in chapter 6, and the improved methodology and security measures of the automated ganzfeld system developed for this thesis will be presented.

The PRL analyses (Bem & Honorton, 1994) demonstrated how successful an automated ganzfeld system can be, particularly when attention is paid to psi facilitative aspects of participants' characteristics. One population of participants in particular that did exceptionally well were the Juilliard students, who achieved one of the five highest hit rates ever reported for a single sample in the ganzfeld. The aspect of creativity, and the role it may play in psi functioning, is covered in more detail in chapters 3 and 4. In addition, it is the author's opinion that part of the successful nature of the autoganzfeld studies may be related to the use of dynamic targets. Therefore, the ganzfeld studies in this thesis have all made use of a creative population as participants, with a target pool composed of dynamic target clips.

Detailed information on target stimuli, target presentation and target selection is provided in chapter 6.

In their efforts to distinguish success characteristics of first time ganzfeld participants, PRL identified four factors in their database which seemed to characterize those participant's achieving a high level of success (Honorton, 1992). The four factors in this success model were: 1) Prior psi experiences; 2) the practice of some mental discipline; 3) prior laboratory psi testing; and, 4) Feeling/Perception (FP) preferences on the Myers Briggs Type Inventory (MBTI). Broughton et al. (1994) found support for this model in their manual ganzfeld series, and Bierman et al. (1993), reported significant findings when examining two of the four factors (mental disciplines and prior psi experiences) in their ganzfeld series. Therefore, it was decided to select participants who met the criterion of possessing as many of the four factors for success as possible for the studies reported in this thesis.

The sender/no sender meta-analysis by Honorton (1995) is, at best, inconclusive. In Honorton's own assessment the meta-analysis indicated that the difference between the presence or absence of a sender was small, and pointed out that, with one exception (Raburn, 1975), the primary studies were not designed to systematically assess sender versus no sender conditions. Thus, it was not possible for his meta-analysis to truly address the underlying source of even this small difference. Based on the information gleaned from Honorton's analysis, it seems clear that a study specifically designed to compare sender/no sender effects (holding sampling, laboratory, and investigator style factors constant), is needed to assess the extent to which the sender's influence is instrumental or peripheral. The first experiment presented in this thesis (chapter 7) uses a creative population in systematically comparing sender with no-sender conditions. Both the receiver and the experimenter were kept blind to the condition of the current session in order to assess the extent to which the sender's influence is intrinsic to the communication process or based on psychological or motivational factors.

In conclusion, while the ganzfeld appears to be a psi facilitative technique, prior research indicates that certain personality or background factors may influence participants' ganzfeld success. In particular, the Juilliard study conducted at PRL (Schlitz & Honorton, 1992) yielded one of the highest hit rates ever recorded in ganzfeld research. Are there, then, some intrinsic attributes of the creative individual that would allow us to further define and distill the 'psi conducive personality' and perhaps lead to a greater understanding of the psi process itself? Chapter 3 is concerned with a review of the creativity-psi literature, and a further exploration of psi conducive correlates that appear to be inherent to both creative individuals and successful ganzfeld candidates. To enhance our understanding of the response of the creative individual in the ganzfeld, an in-depth examination of the highly successful Juilliard study (Schlitz & Honorton, 1992) is also presented.

The Creativity – Psi Correlation

Chapter 3

In endeavors to identify correlates of successful psi performance, theoretically leading to an understanding of how psi operates, parapsychologists have related various measures of personality and cognitive style to psi performance. For example, anxiety has been shown to correlate negatively with psi, with those less anxious tending to score more highly on psi tasks (e.g. Palmer, 1978; 1982). Schmeidler's (1988) evaluative summary of the anxiety/neuroticism literature found a clear trend toward higher psi scores for better adjusted or less anxious subjects than for more neurotic or more anxious subjects. In a further distillation of this information, she was able to discover that it was only when subjects indicated that they cared about what they were doing in relation to the psi task, (in this case by returning a ten page questionnaire promptly), that their tendency towards anxiety was likely to relate to their psi performance. A clear implication of this for psi research was the necessity of making the psi task one that appeals to the participant's tastes and motivations without causing undue anxiety over the task, while making the testing environment one of comfort, thus putting participants at ease. These innovations are now standard fare in most parapsychological testing situations. As chapter 1 pointed out, another topic that has excited much interest is the exploration of creativity and psi, especially in relation to participant characteristics and attributes that contribute to success in the ganzfeld.

Frederic Myers (1903) was among the first to make a connection between exceptional human abilities, such as genius and creativity, and psi experiences. Based on his observations of spontaneous cases, he argued that genius, creativity and psi are all characterized by an uprush from the subliminal mind to consciousness. Both, according to Myers, provide expressions of the same potential subliminal materials and the impulse to fulfill them through contacts with the outer world. In both cases, mental imagery is a mediating vehicle for the transition of information from the unconscious mind into conscious awareness. There is considerable evidence that much of our everyday thinking is based on the formation and transformation of visual images (Cooper, 1990; Finke, 1989; Finke & Shepard, 1986). Moreover, there are many accounts of the role that visualization plays in the creative process. For example, many scientists have described how mental imagery contributed in an essential way to a key discovery or insight (Koestler, 1964; Miller, 1984; Shepard, 1988). 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. It may be that the creative individual makes use of a less restricted, and thus larger, internal perception system than does the non-creative person. In many respects, creative people appear to constantly monitor their environment on both a conscious and non-conscious level for material which they can use in the expression of their creative talent. Thus, creative people may be better at separating the psi signal out of a mass of sensory signals because they are better at focusing on and monitoring the information that is coming to them internally - information that they tend to filter less, and analyze the origin of less, than do non-creative people. In this regard, creative people may reveal themselves to be more open to, and accepting of, information from a variety of sources, including non-physical, that the non-creative person automatically censors out. Anderson (1962) claimed that the desire to express something and the need to actualize one's potentials was often the motivating force behind both psi and creativity.

While the literature is not extensive, a systematic exploration of the creativity-psi literature does provide some support for a relationship between creativity and psi functioning in experimental investigations. According to a review conducted by Schmeidler in 1988, 14 formal studies had been reported. While she did not provide the probability values or significance levels associated with these studies, she noted that nine reported a positive relationship between creativity and psi, three obtained virtually no correlation, and two found a negative relationship. While efforts were usually made to measure creativity, the standardized assessments differed from study to study. In this regard, the investigators may not have measured the same underlying dimensions (Palmer, 1978; Sondow, 1987). In addition, there is the question of whether standardized creativity assessments are really measuring creativity at all. In view of this, it should be noted that not all of the creativity and psi studies reviewed here relied on standardized assessments of creativity. Some studies used creativity assessments devised by the experimenters or self report scales. While most of the studies presented here used general populations completing creative assessments, five investigated psi abilities within artistically gifted populations with subjects who were professional artists (i.e., musicians, actors, art students, writers, etc.). These last experiments provide the most direct test of anecdotal reports linking psi experiments to people known for their exceptional abilities.

The Creativity-Psi Literature

In reviewing the studies bearing on the relationship between psi and creativity, I will mention all measures used to define creativity, but point out that they differ from study to study, and may not always have been tapping the same underlying dimensions. Nevertheless, unless otherwise indicated, a positive relationship between psi and creativity measures is the characteristic prediction.

Levine and Stowell (1963) briefly reported two exploratory studies investigating the relationship between creativity and clairvoyance. In the first study, all subjects were 'sheep' (i.e. they believed in the possibility of ESP), and the psi task was a series of clairvoyant choices between two geometric forms. Creativity was operationally defined as the number of uses the subject could find for a brick and for a wire coat hanger, these being a pair of timed divergent thinking tasks adapted from Guilford's (1959) Classes of Uses Test. ESP scores did not differ significantly from chance. The second study made use of the 'brick' creativity measure only, and subjects were divided into 'sheep' and 'goats' (no belief in ESP). The psi task used standard ESP cards. The prediction for this study was that sheep would give a positive correlation between creativity and clairvoyance and the goats a negative one. All correlations were in the predicted direction but non-significant. When corrected for attenuation the correlations became, in the author's terms 'suggestively significant'. The report does not give the number of subjects or trials.

Schmeidler (1963) reports a pilot study in which 25 college students were given first a battery of six of Guilford's tests of divergent thinking, then a psi task consisting of 36 clairvoyance trials with clock cards, followed by another eight item creativity test measuring independence of judgement devised by Barron (1958). A comparison of those who scored above MCE versus those who scored at or below MCE for sheep versus goats was significant (Fisher Exact $p = .05$), implying a psi effect in the data, although overall psi effects were at chance. However, the correlation between the pooled creativity measures and psi scores was negative ($r = -.41$), indicating that those who scored higher in creativity scored lower on ESP. While the surprising direction of the correlation may have resulted from the order in which the tests were administered, another possibility may involve the attitude of the class instructor towards ESP, who Schmeidler describes as 'unsympathetic to parapsychology' (Schmeidler, 1988). She also speculates that more creative subjects feel constrained by forced choice tests, and feels that this explanation could also apply to her second study.

Schmeidler's second study (1964) was part of a larger investigation to re-examine the effects of feedback to both subjects and experimenter in a precognition design. All 75 subjects completed the Barron Scale (1958; measuring independence of judgement) while the other creativity measure, a Classes of Uses test (Guilford, 1959), was given only to the last 42 subjects. The creativity tests were administered after they had participated in a precognition test where each had guessed three runs of 25 ESP symbols and colors, making 150 targets for each subject. These were later selected and scored by computer, which kept a record of the total hits for each subject. Subjects were not given feedback at the time of their trials, and each later received feedback about only 50 of their trials, the experimenter another 50, and no one ever saw the detailed hit and miss pattern of the third 50. Although the first such experiment had found significant psi hitting ($p = .003$), this replication attempt showed overall psi missing ($p = .04$). The originality measures correlated significantly negatively with psi scores ($r = -.33$, $p = .04$), most strongly when subjects received feedback on their psi scores ($r = -.43$, $p = .006$). A canonical correlation weighting all psi scores against all creativity measures was significant (p

= .01), implying some common factors operate in both creativity and ESP. For this second study in the series the experimenter was blind as to which 50 was going to be fed back to whom, and reported feeling less enthusiasm and more withdrawal during the course of the experiment, and speculated that this may have influenced the direction of the scoring.

This is not inconceivable in light of the evidence that a negative atmosphere or mood can cause psi missing. For example, Honorton, Ramsey and Cabibbo (1975) demonstrated the effect on the psi performance of an experimental manipulation of mood, where the experimenter treated subjects in one group with respect and warmth, while those assigned to the other group were treated with rudeness and hostility, producing predicted significant psi hitting in the former and significant psi missing in the latter. If psi is an unconscious process, a negative situation that elicits unconscious resistance would be expected to produce psi missing. The task of making psi more predictable may therefore be one of not only finding variables that enhance or facilitate the production of psi, but of removing or eliminating all sources of potential psi missing variables.

In five series of precognitive standard ESP card guessing tests with groups made up of teenagers, Honorton (1967) looked at the psi creativity relationship with high school students using Torrance's (1963) creative motivation scale, the Personal-Social Motivation Inventory (structured to 'develop items which would show an inquiring, searching, reaching-out and courageous attitude'). Additionally, in two of the series, he also used the Ice Question Test (Burkhart & Bernheim, 1963), which measures originality and fluency and involves having the subject generate as many interesting questions about ice as they can in a ten minute period. There was a trend for psi missing overall. Those scoring high on the creativity measures scored inconsistently and non-significantly on the psi task, while those scoring low on the creativity measures psi missed significantly. Differences in psi scoring between those high and low on the two creativity measures abounded in the predicted positive direction, and were highly significant ($p < .01$), but most of the differences were contributed by the psi missing of those scoring low on the creativity measures (x^2 =

4.90 (1df); $p < .03$). It can be noted here that the high creatives may have disliked and resented the repetitive psi task more, since neither originality nor fluency could be used in it, or that those with the least 'searching and courageous attitudes' were most inhibited in the fluency and originality of their creativity responses, especially in a group test situation such as this, and most resentful and resistant to the entire test procedure, using psi unconsciously to avoid the ESP targets.

A study making use of only 16 subjects was briefly reported on by Pang and Frost (1967). Students from an introductory sociology class each contributed four runs in a GESP study using standard ESP symbols. The Barron-Welsh Art Scale (1963) was used as an index of creativity. Psi results did not differ from chance, although the authors note that subjects scoring higher on the Barron-Welsh Art Scale tended to produce higher ESP scores than their counterparts, albeit not significantly so.

Anderson (1966) asked elementary school teachers to rate their students' level of creativity, (defined as originality, spontaneity, freshness, and unstructured behavior in approaching both curricular and extracurricular school activities), and to rate each student as being either: 1) highly creative; or 2) showing some sporadic signs of creativity (somewhat creative); or 3) showing no signs of creativity (uncreative). A forced choice clairvoyance test in the form of an elaborate fantasy involved the entire school, where each call was imbued with significance within the fantasy, and tailored to each grade level. Results showed that of the 591 students, the 145 students given a high creativity rating scored significantly positive on the psi test ($p = .005$), the 361 students rated somewhat creative scored significantly negatively ($p = .001$), while the 85 students judged uncreative scored very close to chance. A speculation here is that the students in this study who were showing sporadic signs of creativity were just emerging as creative individuals seeking self expression and thus may have found the forced choice aspect of this task too restrictive and confining for their newly surfacing creative abilities.

While undeniably useful, forced choice tests are often perceived as dull and repetitive. As such, they may not provide the best technique for examining the relationship of psi and creativity. The following three experiments used selected subjects and free response procedures. Because the free response targets are more stimulating, they may be better suited for research involving highly creative individuals. Each of these studies supports the hypothesis that psi functioning is associated with exceptional human abilities, in this case, creativity.

Moss and Gengerelli (1968) reported a free response telepathy experiment with emotionally charged multi-media targets. Sender-receiver teams were composed of participants in which one or both was a professional artist (there were 38 artists and 5 professional 'sensitives' in the sample of 144 volunteers). The teams made up of one or two artists performed better than those involving a professional sensitive. A post hoc analysis found highly significant positive psi for teams involving artists ($p = 5 \times 10^{-6}$), and chance scores for teams in which neither sender nor receiver was an artist.

In a study planned to replicate this post hoc finding, Moss (1969) classified subjects as artists if they worked professionally as writers, actors, composers, painters, etc., and classified them as non-artists if their profession was considered to be 'less creative', e.g., engineers, housewives, secretaries, teachers, psychologists, etc. The 30 artist teams scored significantly positive on the psi task ($p = .003$, 1 tailed) while the 43 non-artist teams scored at chance. A chi square test of those who scored above chance versus those who scored below, artist versus non-artist, was significant at $p = .05$. It is perhaps unfortunate that the experimenter was not blind as to who was classified as an artist or a non-artist, as one can then argue that these results, although still attributable to psi, might be partially explained away by unconscious differential treatment of artist and non-artist teams.

In an attempt to replicate Moss's results, Gelade and Harvie (1975) tested 40 sender-receiver teams. All receivers were artists (e.g., painters, poets, composers, actors, and musicians), as were 15 of the senders, although no information was given as to how the designation of artist or creative was assigned (i.e., profession, self-report, etc.) nor were any creativity assessments reported. The report describes the targets as emotionally arousing 'episodes' consisting of a themed sequence of slides and a soundtrack, arranged in packs of two (MCE = .50). Each session consisted of five consecutive trials, with feedback given to both receiver and sender after each trial. Although the artist-artist teams scored more positively than the others, with 39 hits in 65 trials, their results were not independently significant and overall chance results were reported on the psi task. However, Palmer (1978) computed a chi square analysis based on the data reported, of hits versus misses with artists versus non-artists, and found significantly more hits in pairs composed of two artists than in other pairs. It should be noted that in the last two studies, while occupation can be considered a fairly crude method of assigning creativity to individuals, the results from these studies may still be viewed as lending support to the hypothesis of a link between creativity and psi performance.

In further creativity and psi research, McGuire, Percy, and Carpenter (1974) examined a battery of personality and mood tests in relation to a clairvoyance test of standard ESP symbols (ten runs of 25 trials each). Thirty-three subjects each had their own target order, and completed Nowlis' Mood Adjective Check List (Nowlis, 1965), a sheep-goat question, the California Psychological Inventory (Gough, 1987), the Welsh Figure Preference Test (Welsh, 1980), and a number of other measures. The only prediction was that those subjects who were categorized as 'Type 2' (creative and intuitive) personalities on the four-fold typology of the Welsh Figure Preference Test would score higher on the clairvoyance measure than other subjects'. A Type 2 person was indicated by high scores on the origence (liking for conceptual change) and intelligence (cognitive abstractness) scales of the Welsh Figure Preference Test (Welsh, 1980), believed to indicate a more creative and intuitive mode of functioning for these people. All measures were included in stepwise multiple linear regression analyses predicting total hits in the clairvoyance task, as well as two forms of variance. The authors report that both scales of the Welsh Figure Preference Test indicating the Type 2 personality were positively correlated with psi hitting, and that both loaded positively on the regression equation, although no statistical values were given for these.

Barron and Mordkoff (1968) reported on two exploratory studies attempting to relate creativity, as measured by a composite index of originality (Guilford's Unusual Uses, Consequences, and Plot Titles, 1959), to what they termed 'extrasensory empathy' in nine pairs of female identical twins. Skin resistance was measured simultaneously for both twins as one of the pair was shown a traumatizing film, while the other was sensorily isolated in another room and asked to try to imagine what her sister was seeing and report her impressions. In the first study, four sets of twins, two high on the creativity measure, and two low, participated as both sender and receiver. Unfortunately, when roles were reversed for each pair, they were told a different film would be used, but in fact, the same traumatic film was used again. In other words, there was an attempt at deception by the experimenters. Not surprisingly, the authors report that only for one of the four pairs was there any suggestion of synchronous changes in autonomic arousal. The 18 minute film had four emotional arousal points which typically produced skin conductance changes in the viewer. Arousal was displayed in the non-viewing twin within 60 seconds three times out of the eight possible arousal periods, for one of the two 'high creative' pairs. Unfortunately, both twins were silent during the impression recording periods, as were most of the subjects in the experiment. It is not possible to tell to what extent the use of deception by the experimenters impeded the atmosphere of trust that is essential for sharing impressions, and to what extent the traumatic nature of the material may have in itself been an inhibitor, first as an aversive 'message' in the first trial, and then being in memory when the second of the pair was 'receiving'.

In the second experiment reported in the same paper, a fifth set of twins, who were described as being 'strikingly original, being far superior to the rest of the twin sample', and who claimed to have had 'a history of spontaneously occurring telepathic communications between the two of them since early childhood', were also tested with Thematic Apperception Test (TAT) cards, where the receiver was to make up a story without seeing the cards her sister was responding to, and both stories were recorded. The authors report that they looked for 'coincidences' in 15 second intervals in the pairs of stories, but found only general common themes that related to common recent experiences, worries, or preoccupations. No evidence of coincidences in the autonomic measure was found. Four more sets of twins were run only with TAT cards, with similar results. The authors concluded that the experimental situation employed was unfavorable to psi detection, as most of the subjects were apprehensive to begin with, and none appeared to get into the sort of mood that, to the experimenters, seemed to facilitate intuition, imagery and the relaxation of ego controls.

Moriarty and Murphy (1967b), in their work with 42 teenage subjects, found a non-significant positive relationship between ten measures of creativity and clairvoyance scores. However, their method of judging the correspondences between target drawings and the drawings made by the subjects was a poor one at best, where independent judges rated on a five point scale the degree of similarity between an ESP response and both a target and a randomly matched control. Ratings of similarity by the judges were made 'intuitively' and the agreement between raters was poor. This would seem to indicate that a rank ordering of each response against a small pool of dissimilar pictures would have been a more appropriate approach to the judging task, and might have produced clearer results.

In a forced choice test design, Jackson, Franzoi, and Schmeidler (1977) used 40 college students in making clairvoyant calls for six runs of standard ESP symbols. Half of the subjects were unselected psychology students, the other half were music students. While there was no overall evidence of psi and no significant difference between musicians and non-musicians, the music students did, however, score higher on the psi task than did the unselected students.

Braud and Lowenstein (1982), in keeping with the idea that creativity may be closely related to imagery and spontaneous mental shifts, used a free response psi procedure, 'altered state' induction, and pictures as targets to investigate the relationship between psi success and creativity as measured by the Alternate Uses test (Guilford, 1959). Twenty teenaged girls were tested as a group. The creativity test preceded the psi task, in which subjects attempted to gain clairvoyant impressions of the randomly selected target of their separate target pack of four pictures. A five minute impression period followed a 45 minute 'psi conducive' tape which included relaxation exercises, autogenic exercises, music, natural sound effects, meditation, imagery, mind blanking, and other 'right hemispheric' instructions. Each subject recorded her own impressions, and ranked her four pictures. The creativity tests were scored blind to the psi scores. Although overall psi results were at chance, a comparison of the creativity scores of those who ranked the target a 'hit' with those who ranked it a 'miss' by a Mann-Whitney U test showed that those more successful at the psi task had significantly higher creativity scores ($p < .05$, 2 tailed).

Sondow (1986) used the ganzfeld technique as a free response psi task (see chapter 2) in her exploration of hypnotizability, creativity and psi. In looking at creativity as it occurs naturally in a general population, Sondow used a subject population made up of 60 adult volunteers, 30 men and 30 women who completed two sessions each. All participants also completed four measures of creativity: the Barron-Welsh Art Scale (1963), an eight item Independence of Judgement Scale (Barron, 1958), a Tolerance for Ambiguity Scale (Budner, 1962), and a self report as to their own perceived level of creativity. Participants then took part in a telepathy ganzfeld session making use of picture targets, with either an assigned sender or a friend as sender. Psi scoring was nonsignificant overall, and after correction for selection, none of the creativity measures correlated significantly with psi success.

Possibly one of the most well known ganzfeld studies to date is that conducted by Schlitz and Honorton (1992) using students from the Juilliard School of the Performing Arts. Twenty Juilliard students, ten drama, eight music and two dance majors, took part in a automated ganzfeld telepathy experiment. Prior to their ganzfeld session all twenty completed the figural form of the Torrance Assessment of Creative Thinking (1990), which is designed to evaluate fluency, flexibility, originality and elaboration. Psi results were highly positively significant, with the Juilliard students as a group achieving a significant success rate of 50% ($p = .004$), with the musicians producing the highest success rate of 75% ($p = .004$), followed by the drama students who obtained a 40% hit rate ($p = .22$), and neither of the two dance students correctly identifying their targets. Unfortunately, no significant relationships were observed between ESP performance and the creativity measures. However, two of the highest creativity subjects were significant outliers on the combined creativity measure; their creativity scores were two standard deviations above the group mean, and they both evidenced very low psi scores. If these two outliers are removed, then the correlation with creativity for the group is positive and statistically significant ($r = .41$, $p = .045$). Additionally, correlation analysis of the ESP z scores in relation to the four creativity subscales (Fluency, Flexibility, Originality, and Elaboration), with the two outliers excluded, indicates that Flexibility and Elaboration correlated suggestively with ESP performance. A comparison of the Juilliard creativity scores with the normative data for the Torrance scale (1990) showed that the Juilliard students scored in the 40th percentile when compared with other college students. Schlitz speculated that this may have been due to the fact that the creativity assessment was almost solely visual, whereas the population of music, dance, and drama students from Juilliard were largely audio or kinesthetically oriented in their preferred mode of communication.

Following on this study, an attempted replication by Cunningham (Morris, Cunningham, McAlpine, & Taylor, 1993) involved 16 pairs of artistic or musical receivers with a semi-automated ganzfeld system using dynamic targets. Participants were grouped in pairs with each pair participating twice and each subject serving once as a sender and once as a receiver. Participants completed a self report on level of perceived creativity prior to the ganzfeld session. Overall psi results were again quite significantly positive, producing a hit rate of 40.6%, ($p < .05$), with highly creative individuals scoring significantly better than others ($t = 2.20$, $p < .025$). An interesting note here is that the first session for each sender/receiver pair was better than the second ($t = 2.13$, $p < .05$). This may indicate a certain amount of ego involvement, or pressure, on the second person in the pair to 'perform' as well as the first receiver did, a condition that we know is not conducive to the passive attitude that seems to be most successful for ganzfeld situations.

The creativity and psi database provides support for a relationship between psi functioning and artistic abilities. At the least, it indicates that the artistically gifted represent an important population with which to carry out process oriented work. The studies by Moss et al., (1968), Moss (1969), and Braud and Lowenstein (1982) suggest that free response tests may be more sensitive to positive manifestations of psi in a population high on originality, perhaps because free response allows more creative expression and seem to be more enjoyable than are forced choice ESP tasks. Although finding reliable measures of either one's capacity for creativity or one's psi ability is dubious, the relation of creativity measures to psi scores deserves further study. The free response experiments described in chapters 7 through 10 were designed as explorations of the relationship between psi and exceptional human abilities (i.e. creativity), focusing on the populations of subjects renowned for their outstanding artistic talents. Several standardized personality and creativity assessments were used to identify characteristics of creative populations that may shed light on the psi process. In addition, three other participant variables - openness, extraversion, and dissociation - have given some indications of being associated with success in the ganzfeld and will be reviewed here.

Openness and Psi

As a trait that has recently been receiving attention in psychology as well as psychology, Openness (to experience) is one of the factors used to describe personality (McCrae, Costa, & Busch, 1986) and, along with Neuroticism, Extraversion, Agreeableness, and Conscientiousness are part of the well established 'Big Five' factors of personality (John, 1990; Digman, 1990; McCrae & Costa, 1989, 1997). As noted by Costa and McCrae (1992b), although openness is recognized as a major dimension of personality, it is less well known than either neuroticism or extraversion. The six subfactors associated with openness – active imagination, aesthetic sensitivity, attentiveness to inner feelings, preference for variety, intellectual curiosity, and independence of judgement – could also serve as descriptors for the creative personality. Costa and McCrae (1992b) define the aspect of 'openness to experience' as measured by the NEO personality inventory as:

> "Open individuals are curious about both inner and outer worlds, and their lives are experientially richer. They are willing to entertain novel ideas and unconventional values, and they experience both positive and

negative emotions more keenly than do closed individuals." (Costa & McCrae, 1992b, p. 15)

Openness has modest associations with education and measured intelligence, and is especially related to aspects of cognitive style that contribute to creativity, such as divergent thinking (McCrae, 1987). However, this should not be taken to mean that openness is equivalent to intelligence; in a factor analytic sense, measures of cognitive ability by Costa and McCrae (1992a) formed a sixth, independent factor that they regard as being outside of the domain of personality proper. Thus, while the openness scale may be seen as measuring a kind of 'intellectual openness', in actuality it is measuring the openness of the individual to the experience of new ideas, values or experiences. In fact, the six subscales for the facet of openness on the NEO-PI are: openness to fantasy, aesthetics, feelings, actions, ideas, and values.

Two studies by L. Braud designed specifically to explore openness vs. closedness in relationship to psi found significant results for this relationship. In the pilot study L. Braud (1975) used 32 undergraduates who completed three major scales that she had developed: Openness to unusual experiences and altered states of consciousness (Scale I); Openness and tolerance of different attitudes, cultures, races, religions, nationalities, political and economic views, behavior, and change and flexibility (Scale II); and Openness to aspects of the self, non-defensiveness and a willingness to disclose aspects of self with relevant others (Scale III). In a classroom setting, participants listened to a 25 minute relaxation tape in a dimly lit room. This was followed by a five minute clairvoyant impression period in which they attempted to gain information pertaining to a picture in an assigned envelope, with a rank of one or two counted as correct, giving MCE of .50. Significant psi hitting was obtained (p = .05) and while several of the openness scales showed promising trends in the direction of psi hitting being associated with greater openness, none were significant.

In the confirmatory study, L. Braud (1976) used the same three openness scales with 68 undergraduates. The only difference in the procedure was the use of a 45 minute tape instead of the previous 25 minute one, and MCE was once again set at .50. Psi results were even better for this study, with significant psi hitting demonstrated at the

.01 level. Again, all openness scales were in the predicted direction, however, no single one was significantly so.

An evaluation of the MBTI in relation to the five factor model of personality by Costa and McCrae (1992a) indicated that the Thinking/Feeling (TF) scale of the MBTI was directly related to Openness to Feelings. The four factor model of success put forth by Honorton (1992), and supported by the ganzfeld research of other experimenters (Bem & Honorton, 1994; Broughton et al., 1989; Honorton & Schechter, 1986; Honorton, et al., 1990, Kanthamani & Broughton, 1994) found a strong correlation between participants who scored highly on the Feeling aspect of the TF scale and psi hitting in the ganzfeld. The ganzfeld studies of van Kampen, Bierman, and Wezelman, (1994) and Broughton and Alexander (1995) also found positive correlations with psi hitting and the Openness scale of the NEO-PI (Costa & McCrae, 1985). However, a follow on study conducted by Bierman did not exhibit this trend. In the third study in the series originally presented by van Kampen et al., (1994), Bierman cites a nonsignificant difference on the openness scores for 'hitters' (mean score of 16.7) vs. 'missers' (mean score of 12.5), although the scores were in the predicted direction (1995). However, for study four, a significant reversal of this trend was seen, with 'missers' actually scoring better than 'hitters' on the openness scale, with a mean score of 35.8 for 'missers' and 24.5 for 'hitters' ($t(34) = -2.09$; $p = .04$, two-tailed).

Openness and Creativity

After reviewing 15 years of research on personality characteristics, Barron and Harrington (1981) compiled a comprehensive list of core attributes they felt were common to creative individuals:

> "High valuation of aesthetic qualities in experience, broad interests, attraction to complexity, high energy, independence of judgement, autonomy, intuition, self-confidence, ability to resolve antinomies or to accommodate apparently opposite or conflicting traits in one's self-concept, and finally, a firm sense of self as 'creative'." (p. 453)

As is readily apparent, this description bears a striking resemblance to the description provided by Costa and McCrae (1992b) of the 'open' person as evaluated by the NEO five factor personality inventory. Within the NEO, individual differences in originality, sophistication in the arts, and concern for aesthetics are accounted for by the openness to experience factor. This link between openness to experience and creativity is not only theoretical but empirical as well. In a study by McCrae (1987) using Gough's Creative Personality Inventory, the NEO and measures of divergent thinking, all relevant facets of openness to experience were significantly positively correlated with measure of creativity and divergent thinking. These results caused some to question the discriminate validity of the openness construct. Items in self report measures of openness are sometimes synonymous with creativity, rather than indicative of it. Martindale (1989) asserted "openness to experience and creativity would seem to be synonyms that are used to describe the same set of traits. If so, openness cannot be said to explain anything about creativity" (p. 224). However, McCrae (1987) has distinguished between openness and creativity by focusing on the roles that each might play in creative activity. McCrae suggested that divergent thinking might indicate aptitude for creativity, while openness to experience is the catalyst that leads to creative expression and exploration. This conceptualization indicates that we might expect creative ability and openness to interact to predict creative productivity. A multivariate analyses of creativity scores in relation to the five factors of the NEO by King, Walker, and Broyles (1996) showed that only openness was predictive of creative ability and creative accomplishments independent of the other four personality factors. From this then, we might expect that if creative ability is positively correlated with psi success, then so too would openness be positively correlated to psi success.

Schmeidler (1988) notes that openness has traditionally been associated with being imaginative rather than down to earth, preferring variety to routine, being independent rather than conforming, etc.; all attributes that have traditionally been used to describe the highly creative individual. According to Moriarty and Murphy (1967a), both psi and creativity are characterized by a demand for openness to new and unusual experiences and tolerance for the unrealistic, and the word 'openness' has often been applied to both the creative and the psychic (Anderson, 1962; Krippner, 1963). Getzels and Jackson (1962) found that the most highly creative students in their study (discussed earlier) came from homes in which "openness to experience" was highly valued. Leary (1963) claims that the ability to relinquish the structure of the ego, and remaining 'open' to the influx of new ideas, experiences and feelings, is basic to the functioning of creativity. Dellas and Gaier (1970), after evaluating more than two dozen studies of personality characteristics of creative persons, state that "An openness to internal and external stimuli is also indicated as a salient characteristic, and this is manifested in various forms." (p. 68).

Tauber and Green (1959), in their examination of creative individuals' thought processes, summed up their findings by stating that there seemed to be some evidence that highly creative people are more mindful of, and comfortable with, the emergence of subthreshold (subconscious) perception material into awareness (showing a high degree of openness), than the more conventionally oriented person who 'reflexly' disowns any responsiveness to his or her own emergent inner self, thus showing a high level of defensiveness or repression. Repression is defined in this instance as the Freudian concept of repression, that is, the denial of entry into consciousness. There is additional collaborating evidence that creative people either do not have or cannot use the defense mechanism of repression (Barron, 1955; Fitzgerald, 1966; Myden, 1959).

A study by Sondow (1987) exploring hypnotizability and creativity in the ganzfeld was based on the assumption that psi information first entered the mind at an unconscious level, therefore:

> "Openness to the unconscious should aid in the psi task, while personalities that habitually censor, repress, or inhibit unmodified unconscious material might also habitually repress intrusions of psi information into consciousness." (p. 42).

This would imply then, that as expressions of deep-seated dynamic principles, both creativity and psi phenomena are dependent upon both conscious and unconscious motivational forces.

In a strange reversal of the relationship between openness and creativity, the study by Schlitz and Honorton (1992) with the Juilliard students reported a trend in the opposite direction to that expected for this attribute. The MBTI scale was used in this study, and while an evaluation of the MBTI in relation to the NEO (Costa & McCrae, 1992a) indicated that the Thinking/Feeling (TF) scale of the MBTI was directly related to Openness to Feelings, the correlation (r = .38, 18df) for the Juilliard students was opposite in direction to that found in three earlier studies with nonartistic populations (Broughton et al. 1989; Honorton & Schechter, 1987; Schmidt & Schlitz, 1989).

In an attempted replication of this study, Cunningham (Morris et al. 1993), used the NEO-PI to assess openness scores for pairs of musicians. These, in turn, were predicted to correlate positively with ganzfeld-psi success. While overall openness showed a positive but nonsignificant correlation with psi success ($p < .15$), two of the six subscales (fantasy and openness to actions), showed significant correlations, the subscale of 'openness to actions' very much so ($p < .02$). Aside from openness to experience, an examination of other characteristics of creative individuals suggests that other factors of the NEO-PI might also relate to creativity, in particular, extraversion.

Extraversion and Psi

Another factor or interest measured by the NEO-PI is that of extraversion. The observed relationship between extraversion and psi performance has been of theoretical interest for many years. Surveys by both Palmer (1978) and Sargent (1981) found that nearly all reports showed more effective psi for extraverts than for introverts. Schmeidler's own survey (1988) agreed with these findings, citing the relationship as "well founded" (p. 68). The psychologist Hans Eysenck, who accumulated a vast amount of information regarding extra and introversion (1967), reasoned that extraverts should perform well in psi tasks because they are easily bored and respond favorably to novel stimuli. It may be that the laboratory setting thus favors the extravert: Extraverts tend to respond well to novelty but their performance declines with monotony, and they tend to respond better in groups than in individual testing. Introverts show opposite trends. In a setting like the ganzfeld, extraverts may become 'stimulus starved' and thus be highly sensitive to any stimulation, including weak incoming psi information. In contrast, introverts would be more inclined to entertain themselves with their own thoughts and thus continue to mask psi information despite the diminished sensory input. In addition, the potentially stressful social situation of the testing environment might evoke defensive reactions, resulting in psi missing (Palmer, 1986). Eysenck (1967) also speculated that psi might be a primitive form of perception antedating cerebral cortical developments in the course of evolution, and hence, cortical arousal might suppress psi functioning. Thus, since extraverts have a lower level of cortical arousal than introverts, they would be expected to perform better in psi tasks. Of course, there are more mundane possibilities. Extraverts might perform better than introverts simply because they are more relaxed and comfortable in the social setting of the typical laboratory psi experiment, such as one would find in the typical ganzfeld experiment. This interpretation is strengthened by Schmeidler (1988), who reports a study conducted by her student, also an introvert, who conducted an ESP test in the comfortable environment of either his or the participants' homes, and found that ESP scores correlated negatively with extraversion, significantly so at $p = .01$. Further, a report by (Schmidt & Schlitz, 1989) found that introverts outperformed extraverts in a study in which subjects had no contact with an experimenter, but worked alone at home with materials they received in the mail. Part of Eysenck's thesis is that the optimal level of arousal is higher for extraverts than for introverts. In an attempt to examine the question of arousal, Stanford has explored the relation between extraversion and introversion, the intensity of white noise stimulation in the ganzfeld, and ESP performance. He found that extraverts enjoyed the relatively loud white noise stimulation and had higher ESP scores than did introverts (Stanford et al., 1989a, 1989b). However, these findings were not replicated in a further study by Stanford and Frank, 1991.

A meta-analysis by Honorton, Ferrari, and Bem (1990) on the relationship between ESP tasks and extraversion comprised 60 independent studies, 17 independent investigators, and 2,963 subjects. Honorton et al. first examined this relationship for forced-choice ESP studies and found that the ESP-extraversion relationship appeared to be an artifact of subjects' knowledge of their ESP performance upon their responses to the extraversion measure. Evidence for the ESP-extraversion relationship in these studies was limited to those where subjects completed the ESP task prior to the extraversion assessment (N = 18 studies, r = .17, z = 3.51). Conversely, no evidence for an ESP-extraversion relationship was found in studies where extraversion was assessed before the ESP task took place (N = 16 studies, r = -.02, z = -.78). The difference between these two conditions was significant (z = 3.58, p = .00045). For the free-response studies, a significant ESP-extraversion relationship existed that was free of this problem: for 11 of the 14 free-response studies extraversion testing preceded the ESP task (r = .21, z = 4.57, p = .000005). Thus, the ESP-extraversion relationship was both significant (r = .20, z = 4.46, p = .0000083) and homogeneous for the subset of free-response studies that involved individual testing (N = 12 studies). The effect was homogeneous across investigators and extraversion scales. A combination of all studies (free-response and forced-choice) yielded a small overall weighted mean correlation (r = .09), which is still significant (z = 4.63, p = .000004) and non-homogeneous.

The significant correlation between free-response studies and extraversion was also replicated in the PRL autoganzfeld database. Extraversion scores were available for 221 of the 241 subjects, all of whom completed the MBTI, which contains a measure for extraversion. None of the studies in the meta-analysis had used this questionnaire as a personality assessment. The correlation between ESP performance and extraversion for the PRL series was significant, r = .18, $t(219)$ = 2.67, p = .004 (one tailed), and very close to the meta-analytic result estimated for free-response studies (r = .20). The difference between the two correlations is nonsignificant (Cohen's q = .02, z = -.26, p = .793, two-tailed). Honorton et al. concluded their report by stating:

> "We conclude that there is a significant ESP/extraversion relationship in the free-response studies, that the relationship is consistent across investigators and scales, and that meta-analysis of parapsychological research domains has predictive validity." (Honorton et al., 1990, p. 113)

Extraversion and Creativity

McCrae and Costa (1990) describe extraverts as active and passionate, and Barron and Harrington (1981) suggest that 'high energy' and 'self-confidence' characterize creative individuals. These descriptions suggest that extraversion would be positively related to creativity. In addition, Cropley (1990) found willingness to take risks to be related to creativity, again suggesting that extraversion ought to relate positively to creative ability and creative accomplishment. A study focusing solely on the relationship between creativity and the five factors of the NEO model of personality by King, Walker, and Broyles (1996) yielded a significantly positive correlation ($p < .05$) between extraversion and creative ability as measured by the Verbal Form of the Torrance Tests of Creative Thinking.

Positive relationships between extraversion and creativity test measures have also been reported in studies by Di Scipio (1971) who examined extraversion in relation to tests of divergent thinking, and by Tapasak, Roodin and Vaught (1978), in their work with children and creativity tests. However, Leith (1972), Mangan (1967), and Rump (1982) found no significant linear relationships between extraversion and creativity measures, and Kumar (1978) found superior creativity performance in introverts. Matthews (1986), who examined the relationship between extraversion and arousal on performance in creativity tests, found no significant main effects of extraversion on creativity under normal arousal conditions. However, conditions of 'quiet anxiety' tended to facilitate creativity performance for extraverts but impaired performance in introverts, while conditions of 'noisy anxiety' impaired performance in both groups.

Ganzfeld studies which have included an examination of the extraversion variable are reported in the free response portion of the meta-analysis conducted by Honorton et al. (1990). However, two ganzfeld studies using a creative population and reporting on the extraversion variable have been conducted since that time. The first of these is the Schlitz and Honorton study (1992) with students from the Juilliard School of the Performing Arts. These students completed the MBTI, and its measure of extraversion was used to correlate with ganzfeld-psi scores. Schlitz and Honorton found that, while not quite significant, the correlation between ESP performance and extraversion (r = .21) was consistent with that estimated (r = .20) in the meta-analysis of the ESP-extraversion relationship by Honorton et al. (1990). However, they did find a correlation between creativity scores and extraversion, suggesting a possible relationship between extraversion and creativity among the performing artists. When two extreme outliers were removed, the correlation became significant ($r = .55$, $t = 2.61$, 16 df, $p = .019$, two-tailed).

In the second of these ganzfeld studies with a creative population, Cunningham (Morris et al., 1993) used a creative population made up of pairs of musicians. The NEO-PI was utilized to assess the relationship between creativity, psi and extraversion. She reported an overall significant correlation between psi success and extraversion ($r = .428$, $p < .01$, one tailed), with three of the six subscales yielding significance. The subscales of 'activity' and 'excitement seeking' were significant at $p < .05$, whereas the subscale of positive emotions' was significant at $p < .005$. Hence, Cunningham concluded that, "participants who did better craved exciting and stimulating environments, maintained a high energy level, and exhibited a cheerful optimism." (p. 186)

On the basis of their earlier work in personality correlates, especially the topic of extraversion-introversion, Eysenck and Eysenck (1985) took the view that extraversion would positively correlate with some forms of dissociation. However, a study by deSilva and Ward (1993) using 97 British participants did not find this to be the case. The measure of extraversion in this study was the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1964) and the measure of dissociation the Dissociative Experiences Scale, or DES (Bernstein & Putnam, 1986; Ross, Norton, & Anderson, 1988).

Dissociation and Psi

Dissociation is defined in DSM-III-R as a disturbance or alteration in the normally integrative functions of identity, memory, or consciousness. Dissociation is thought to occur to some degree in normal individuals, and a study by Ross, Joshi, and Currie

(1991) concludes that such experiences are common in the general populace. Dissociation has also been linked to reports of psychic experiences. The spiritualist mediums of early psychical research are thought to have engaged in high degrees of dissociation (Irwin, 1994; Richeport, 1992), and Gurney, Myers and Podmore (1886) thought that that the study of dissociation could illuminate the nature of paranormal mental phenomena. Early pioneers of psi research wondered if perhaps psychic functioning could be explained in terms of dissociative processes, or at the very least, that the forms of dissociation were bridge phenomena, linking normal cognitive functions to paranormal functions (Braude, 1988; Gauld, 1977). Ross (1989) has pointed out that severely dissociative individuals (such as those with multiple personality disorder) tend to report experiencing a variety of paranormal and psychic phenomena, and Murphy (1944) has argued persuasively for its relevance to psychic success. In her search for commonalties among gifted psychics, Schmeidler (1982) found evidence that the ability to dissociate was strongly characteristic of psi success. A study by Ross and Joshi (1992) has suggested that not only are dissociative experiences common in the general populace, but that paranormal-extrasensory experiences were also common in that same populace. Further, this study reported a significant relationship between dissociative capacity and the reporting of paranormal experiences. Richards (1991) used the DES in conjunction with a questionnaire that assessed the frequency of various psychic experiences. The DES was found to have moderate correlations (Pearson *rs* of between .3 and .4) with most, but not all, of the experiences. Richards felt that this demonstrated a person's ability to partition or focus consciousness in the service of particular needs, and that, "the ability may express itself in an enhanced sensitivity to certain types of experiences." (Richards, 1991, p. 88). The ability to dissociate has also been linked to reports of out-of-body experiences (OBE's) by several investigators (Alvarado, 1994, 1986; Irwin, 1985a; Palmer, 1978), and to outbreaks of poltergeist like phenomena (Roll, 1977; Gauld, 1977).

Part of the original rationale for the adaptation of the ganzfeld into parapsychological research was its ability to facilitate the detachment of the participant from normal reality anchors; in other words, to facilitate an inwardly focused, dissociative state.

As indicated by anecdotal reports of psi experiences (Rhine, 1962), and by laboratory research (Pekala, Kumar, & Marcano, 1995), dissociative states may be viewed as 'psi conducive'. 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 while facilitating dissociation. In this respect, the ganzfeld maximizes characteristics identified in descriptions of both psi and creativity, including relaxation, dissociation, and the search for new and unusual experiences. Gardner Murphy's (1966) review of the literature concerning creativity and psi led him to three principles which he felt were major components of, and shared factors of, both psi and creativity. In essence he felt that both psi and creativity are facilitated by the effects of: 1) Positive motivation; 2) Relaxation, and 3) Dissociation.

Dissociation and Creativity

The creative state, as well as psi, is considered to be elusive, dissociative, intuitive, and facilitated by altered states (Anderson, 1962; Wallas, 1926). Barron, in his landmark book on creativity and psychological health (1990), noted that creative individuals often deliberately induce altered states in themselves in which the ordinary strictures of reality are broken down. This is done in an attempt to increase creative output and often leads to increased dissociative tendencies. Barron states that in this way, the creative individual may thus transcend the ordinary world; through mystical states, prolonged trances or deep reveries (dissociation). The point of these deviations from perceptual constancy for the creative person is to permit a more inclusive and more valid perception, a release from apparently adaptive, but in some sense restrictive, limits.

Shepard (1978, 1981) argued that a decoupling of perceptual mechanisms from sensory input (such as is found in the ganzfeld) created fertile ground for the development of creative ideas. This occurs, according to Shepard, because the perceptual mechanisms automatically linked to organizing the sensory world begin to 'run on their own,' (dissociate from reality), occasionally constructing novel and useful percepts and images from fragments of internal neural noise and loosely guided consultations with memory (Shepard, 1981). Martindale (1989) supports this view by stating that "creative people may prefer or be prone to states of defocused attention" (p. 217). Further, Martindale (1980; 1981) speculates that the 'subselves' of creative people may be more dissociated than those of uncreative people, and that this dissociation arises from the disinhibition found in the primary process states of consciousness. In support of this statement, Martindale uses the example of William Blake, who contended that his poetry was dictated to him, and he was but the simple instrument of its production, even against his will, and the claims of Robert Louis Stevenson who asserted that his stories were dictated by 'brownies' or 'little people'. This, Martindale argues, makes sense if we think of the creative artist or poet as a scribe who copies down the utterances, or follows the directions of, "a dissociated subself that has access to 'inner speech'" (1989, p. 225). In view of this review, then, dissociation may be seen as an inherent ability, or predisposition of the artist in the production of their art. And perhaps even as a pre-requisite to the attainment of both the creative state and the psi facilitative state.

Instruments Used in this Thesis

The past decade has seen a rapidly increasing interest in the five factor model of personality. Goldberg (1981) noted the robustness of this model, stating that:

> "It should be possible to argue that any model for structuring individual differences will have to encompass - at some level - something like the 'big five' dimensions" (p. 159).

An important study by Amelang and Borkenau (1982) not only supported the five-factor model, it provided a much needed response to Jensen's (1958) plea for the study that would answer questions concerning the relationships among the Cattell, Guilford, and Eysenck systems. The answer: They all fit into the five factor model very nicely. For a detailed review of the development of the five factor model, see Digman, (1990) and Noller, Law, and Comrey (1987).

The five factor model as developed by Costa and McCrae (the NEO) consists of: N = Neuroticism; E = Extraversion; O = Openness (to experience); A = Agreeableness; and, C = Conscientiousness (McCrae & Costa, 1997). Using the NEO as markers for the 'Big Five', Costa and McCrae have demonstrated the presence of the five-factor model in the Eysenck Personality Inventory (EPI; Eysenck & Eysenck, 1964; McCrae & Costa, 1985); the Jackson Personality Research Form (PRF; Jackson 1974; Costa & McCrae, 1988), the Myers-Briggs Type Indicator (MBTI; Myers & McCauley, 1985; McCrae & Costa, 1989); and the California Q-Set (Block, 1961; McCrae, Costa & Busch, 1986). An analysis of the Minnesota Multiphastic Personality Inventory (MMPI; Hathaway & McKinley, 1951) by Costa, Busch, Zonderman, and McCrae (1986) in the context of the NEO, found four of the 'big five' factors – Neuroticism, Extraversion, Agreeableness (Friendliness), and Openness (Intellect) – well represented. However, Conscientiousness was conspicuous by its absence. The authors state that the NEO embodies a conceptual model that is distilled from decades of factor analytic research on the structure of personality. The scales themselves were developed and refined by a combination of rational and factor analytic methods and were the subject of intensive research for 15 years on both clinical and normal adult samples. A six year longitudinal study of trait stability was conducted by Costa and McCrae (1988) using their NEO instrument, and they noted retest correlations for Neuroticism, Extraversion, and Openness of .83, .82, and .83, respectively. These values approach the reliabilities of the scales themselves. The reliability coefficient alpha for each scale factor is: Neuroticism, .92; Extraversion, .89; Openness, .87; Agreeableness, .86; and Conscientiousness, .90 (Costa & McCrae, 1992b).

The use of the NEO personality inventory is becoming quite widespread in both psychological and parapsychological research, allowing for a general comparison of personality results between studies. Based on the review of the NEO and its use in prior ganzfeld psi research, the NEO (see Appendix 2) was chosen for use in this thesis as the personality assessment instrument for the attributes of openness and extraversion. A positive correlation between openness and psi, and between extraversion and psi, was predicted.

The Dissociative Experiences Scale (DES) was originally developed to meet the need for a means of reliably measuring dissociation in both normal and clinical populations (Bernstein & Putnam, 1986; Ross, Norton, & Anderson, 1988). The items in the DES were developed through using clinical data and interviews, scales involving memory loss, and consultations with experts in dissociation. The finalized version is a 28-item self report (see Appendix 3) that subjects respond to by circling the appropriate number showing where they fall on a continuum for each question. Reliability testing of the DES has shown both good test-retest reliability (.84) and good split-half reliability (Ross et al., 1991). Additionally, item-scale score correlations were all significant, indicating good internal consistency and construct validity (Bernstein & Putnam, 1986). A detailed review and description of the scale can be found in Carlson and Putnam (1992), and Bernstein and Putnam (1986). As the DES is widely used and respected throughout both psychology and parapsychology (Ray & Faith, 1995; Pekala, Kumar & Marcano, 1995), it was chosen for use in this thesis as a measure of dissociation in ganzfeld participants. A positive correlation between dissociation and psi was predicted.

Concluding Remarks

In conclusion, if one takes a broad view of who can be considered a creative person (discussed in more detail in the next chapter), it can be seen that researchers using a variety of different creativity instruments and definitions of the creative person, have found a general trend for creative individuals to be associated with relatively successful psi performance on free-response psi tasks. None of the various indicators of creative performance have been applied in a systematic way, however, and it is clear that this is a much needed next step in the evaluation of the creativity-psi relationship.

In addition, three further variables were reviewed and discussed in relation to their interactions with and impact on successful psi performance and creativity. These variables were openness, extraversion and dissociation. A discussion of the appropriate measuring instruments for each of these domains followed, and a hypothesized direction for each variable in relation to the experiments presented in this thesis was given.

The experiments presented in this thesis sought to locate the creative person within the context of the five factor model of personality (in particular, the traits of openness and extraversion), and to explore the roles of trait and abilities in predicting ganzfeld-psi success. In addition, the role that the attribute of dissociation might play in this success was also examined. Hence, for all studies, a positive relationship for openness to experience and extraversion to ganzfeld-psi success was predicted. The relationship between dissociation and psi success for a creative population was primarily explored in the final four experiments presented in this thesis, and a positive relationship between this variable and psi success was also predicted.

Although we have examined several variables in terms of a possible creativity-psi relationship in this chapter, we have not yet defined what creativity is, nor what the concept itself actually encompasses. The next chapter in this thesis seeks to gain a clearer understanding of what is meant by the term 'creative', by exploring the accepted definitions of creativity and examining the major theories and models of the concept. A review of current creativity measures, involving both objective and subjective approaches to measurement, is conducted. Finally, personality correlates and characteristics of the creative individual are explored in the context of what constitutes creativity.

Creativity and its Correlates

Chapter 4

> "Whether it is considered from the viewpoint of its effects on society, or as one of the expressions of the human spirit, creativity stands out as an activity to be studied, cherished, cultivated." (Arieti, 1976, p. ix).

This chapter reviews different measures of creativity with a view to identifying simple and effective methods of measuring creativity for use in studies of creativity and psi. Firstly, concepts and models of creativity are reviewed, followed by a discussion of the creative individual. Finally, detailed consideration will be given to the measurement and assessment instruments available for creativity research, and the creativity assessments selected for use in this thesis are discussed.

The defining of what creativity is, or what it entails, is problematic at best. The question of 'what is creativity' receives several, equally valid, answers. A standard dictionary defines creativity as, "having the ability or power to create, characterized by originality of thought or inventiveness," and, "having or showing imagination" (The Collins English Dictionary, 1985, p. 351). To Vernon (1989), creativity means a person's capacity to produce new or original ideas, insights, restructuring, inventions, or artistic objects, which are accepted by the experts as being of aesthetic, scientific, social, or technological value. Kubie (1958) felt that creativity comes from the free play of preconscious symbolic processes, while unconscious ones tended to fixate or stagnate creative thought, and Hayes (1989) stipulated that society defines creativity and creative acts through a complex process of social judgement. Dowd (1989) refers to it as a 'vague and slippery' concept, and Biondi and Parnes (1976) provide the circular statement that creativity refers to the abilities that are most characteristic of creative people. While none of these definitions contradict the others, one is left with a rather vague idea as to what creativity explicitly is.

Welsch (1980) reviewed 22 definitions of creativity, and after noting key attributes amongst them, suggested this definition:

> "Creativity is the process of generating unique products by transformation of existing products. These products, tangible and intangible, must be unique only to the creator, and must meet the criteria of purpose and value established by the creator." (Welsch, 1980, p. 97).

It is this view, of creativity as a multi-faceted phenomena rather than as a single unitary construct capable of precise definition (Isaksen, 1987), that is taken for the purpose of this thesis.

With creativity defined (at least, for the purposes of this thesis) the question is no longer 'what is creativity.' Instead, the questions then becomes, 'how best to understand creativity?' A misleading view of creativity is often that of a single-dimensional concept. In fact, a more accurate perception of creativity would involve the recognition of its multi-faceted and often integrated nature. One of the factors contributing to the complexity of the study of creativity is the interdisciplinary nature of the concept. Until recently, creativity has not been a subject of serious study among cognitive scientists and experimental psychologists. Like psi, it has been regarded as largely unresearchable, for primarily the same two reasons. First, the subject of creativity has had unscientific connotations, perhaps resulting from reliance on anecdotal or introspective accounts in previous attempts to describe the creative process, a problem it shares with the treatment of psi research in its early years. Second, it has been difficult to determine the best method or approach to studying creativity under controlled laboratory conditions (Finke, Ward, & Smith, 1992), which has traditionally also been a problem area for parapsychology. Murdock and Puccio (1993) have commented on several developmental factors that have resulted in resistance to creativity studies in the scientific research community. They noted: (a) the relative youth of the field, (b) the multi-faceted nature of the topic, (c) social issues within the scientific community, and, (d) conceptual development within the field as influences. For these, and other reasons, the scientific investigation of creativity, like psi, has primarily been limited to the 20th century, with the year 1950 commonly being cited as the birth of systematic research into this construct (e.g., Amabile, 1987; Barron, 1988; Isaksen, 1987).

The early historical perspective for creativity research focused on the identification of genius, followed by giftedness, moving on to originality, and finally focusing on the identification of creative talent in people. One of the earliest to inquire into the nature of genius was Galton (1869), who attempted to understand the hereditary determination of creative performances. This early focus on genius and eminence provided the bias of examining high levels of creativity in people. Not only was this bias on high levels or degrees of performance, but the evaluation was done by others, thus, the high degree of creativity needed to be socially or culturally 'conferred' (Isaksen & Murdock, 1993).

It was Guilford's presidential address to the American Psychological Association in 1950 that illustrated the establishment of the level or degree of creativity as the mainstream of inquiry:

> "In its narrow sense, creativity refers to the abilities that are characteristic of creative people. Creative abilities determine whether the individual has the power to exhibit creative behavior to a noteworthy *degree*... A creative pattern is manifest in creative behavior, which includes such activities as inventing, designing, contriving, composing, and planning. People who exhibit these types of behavior to a marked *degree* are recognized as being creative." (p. 444; emphasis are the author's).

Several researchers felt that if one wanted to study creativity in people, it seemed to make sense to first identify those individuals who could clearly be called 'creative'. This approach seemed to mitigate the need to have a clearly defined set of answers regarding the necessary and sufficient conditions of creativity. One of the reasons for this ambiguity is what Stein (1983) referred to as the homogenization of the use of the word 'creative'. He stated that the level emphasis of the concept of creativity began with the book of Genesis. In this book, there is a clear hierarchy for Hebrew words used to describe creativity. Certain words are reserved for God's creativity, meaning the *ex nihilo* type, and other words refer to a more human type of making, forming, or combining. Stein asserted that creativity researchers needed to distinguish the level of the creativity that they were examining.

However, it was soon recognized that the level approach still left many aspects of creativity unaccounted for. Therefore, following the early interest in identifying those of exceptional creative talent and productivity, psychologists concerned with identification of individual differences turned their attention to the testing of intelligence. The search for measures of intelligence was related to the examination of characteristics that prepare some individuals for higher levels of performance. A frequently recurring theme in the deliberation of the relationship between creativity and intelligence has been that creativity is not independent of the general factor of intelligence (Yamamoto, 1965). Schubert (1973) states that intelligence seems to be a necessary but not sufficient condition for creativity, and although intelligence appears to allow the development of creativity, it does not ensure that creative expression will always be forthcoming. (Schubert, 1973). Many creativity researchers currently hold the view that intelligent thinking must also include some degree of creative thinking, with the prevalent view being that creativity is a distinct category of mental functioning that has limited overlap with intelligence, both in the processes used and in the characteristics of individuals who exhibit them (Haensly & Reynolds, 1989). In this respect, the integration of intelligence and creativity is seem as providing optimal mental performance.

However, the investigation of intelligence provided very little attention to issues of creativity. The move from viewing giftedness as a function of IQ to investigating creativity as measured by divergent thinking and originality is documented by the literature regarding the creativity-intelligence distinction (Getzels & Jackson, 1962; Torrance, 1960). It is clearly outside the scope of this chapter to thoroughly review the creativity-intelligence distinction, but see Haensly and Reynolds (1989), and Getzels (1987), for a review of this literature.

From this, an entirely different perspective on identifying human abilities broke away from the traditional focus on intelligence, level, or degree of creativity. This approach has been referred to as cognitive style, has its origin in the work on perception, and is seen as a subset of the discipline of cognitive psychology. As Hayes (1978) indicated:

> "Cognitive psychology is a modern approach to the study of the processes by which people come to understand the world, such processes as memory, learning, comprehending language, problem solving, and creativity. Cognitive psychology has been influenced by developments in linguistics, computer science, and of course, by earlier working philosophy and psychology." (p. 1).

There has been an increasing amount of literature which examines relationships between various measures of creative ability and cognitive style. Instead of focusing on how much creativity a person had or to what degree a product was creative, this orientation focused on how people demonstrated their creativity (Kirton, 1987). This approach is discussed further in the section on Torrance in this chapter

It became clear from the progress of creativity research that creativity was not only a multi-faceted concept but also a very complex construct, and that many elements interact to manifest this phenomenon. In attempting to understand and define creativity, four basic facets of creativity seemed to emerge. These four facets have resolved themselves into four distinct, yet interrelated, areas of research within the domain of creativity: (a) qualities of the person, (b) aspects of the process, (c) characteristics of products, and, (d) nature of the 'press' or environment (Isaksen, 1987; Isaksen, Murdock, Firestien & Treffinger, 1993; MacKinnon, 1978; Mooney, 1963; Stein, 1968). These four methodological approaches to creativity research, the person, the process, the product, and the environment, will be briefly described here. For more comprehensive reviews of the nature of creativity research, see Isaksen (1987), Sternberg (1988a), and Glover, Ronning, and Reynolds (1989).

Person Approach

The person facet within creativity has a long and rich research tradition. The empirical antecedents to the person domain date back to Galton's (1869) work on hereditary genius. A number of subsequent researchers have adopted Galton's method of examining biographical data (Cattell, 1906; Cox, 1926, White, 1931), while others have broken the research down into three areas: personality characteristics, cognitive characteristics and developmental events (Davis, 1992; Tardif & Sternberg, 1988). In describing these categories Davis (1992) noted:

> "The distinction between affect (personality), cognition (abilities), and learning (biographical traits, experiences) is an ancient one. However, in creative people the three categories interweave quite tightly, and some traits could fit in one category as easily as another." (p. 65).

As an example, originality, a characteristic often associated with creative people, has been described as both a personality trait and a cognitive ability (Tardif & Sternberg, 1988; Torrance, 1974). As the questions examined within this area focus on the identification of traits or characteristics differentiating creative persons from less creative peers, there have been many lists and tests of characteristics that have something to do with being creative (Torrance, 1974; Williams, 1980). However, this research has also pointed out that these lists and tests alone do not provide a comprehensive view of the creative personality. As MacKinnon (1978) has emphasized:

> "There are many paths along which persons travel toward the full development and expression of their creative potential, and there is no single mold into which all who are creative will fit. The full and complete picturing of the creative person will require many images." (p. 186).

Many psychologists have provided a diversity of characteristics of the creative person (Fromm, 1959; Maslow, 1959), and Torrance (1979) introduced a multi-faceted model for thinking about the search for creative behavior. In turn, other multi-faceted models for dealing with the creative personality have been put forth by Amabile (1983), Gowan (1972), and Renzulli (1978). Another aspect to the study of the creative person relates to knowing more about the personal orientation toward problem solving and creative thinking. Isaksen and Treffinger (1985) suggest that it is helpful for individuals to have information regarding their learning and thinking style when researching how to use creative problem solving. Certain personality characteristics may influence preferences regarding what type of information people pay attention to, how they collect and analyze that data, and how they choose to use the information (Krippner, 1983). The new research focus then, is upon how people differ in their approach to using their creativity, not upon their level of qualifying personality factors (Kirton, 1976).

Process Approach

The best known research dealing with understanding and describing the creative process is probably that provided by Wallas (1926), in which he put forth a four stage approach to the creative process involving preparation, incubation, illumination, and verification. This approach will be discussed in more detail later in this chapter. Research regarding the creative process has relied upon retrospective reports, observation of performance on a time-limited creative task, factor analysis of the components of creative thinking, experimental manipulation, and study of variables presumably relevant to creative thinking and simulation of 'creative' processes on computers. Some of the questions relating to the creative process include: What are the stages of the creative thinking process? Are the processes identical for problem solving and for creative thinking? How can the creative process be measured? Is the creative process similar in different contexts? Although much of the earlier emphasis regarding the creative process centered upon creative problem solving and the development of cognitive, rational, and semantic aspects of creativity, there is an increasing awareness that the creative process cannot be limited to just those elements.

Product Approach

Although an acknowledged line of importance within creativity research, there appears to be a paucity of empirical investigation on the topic of creative products. One possible explanation for this is the feeling that the identification of creative products is 'obvious', that one implicitly knows a creative product when they see it. While there are some who have conducted investigations of creative products (Amabile, 1982; Pearlman, 1983), these have, for the most part, dealt with very specific contexts. Much of the current 'product' research is focused on the need of the creative product to be novel, and an interest in how new ideas or products are communicated or accepted by others (Glover, Ronning & Reynolds, 1989).

Press Approach

'Press' refers primarily to the relationships between creative individuals and their environments, and includes the study of social climates conducive or inhibitive to the manifestations of creativity. Thus, the 'creative environment' approach involves studying differences in perceptions and sensory inputs as a result of varying environments, and reactions to certain types of situations. Research approaches have included case study, interview and survey techniques with small groups and organizations, and attention to the creative elements of educational and organizational areas (Glover, Ronning & Reynolds, 1989). The primary goal of the 'press' approach is to provide suggestions for creating an environment that is supportive of, and conducive to, creativity (Amabile, 1984; VanGundy, 1984).

While these four domains represent the interrelated areas of research within the field of creativity, it is not always possible nor practical to include a full examination of each aspect within the confines of the experimental design. It will be recalled that the focus of the examination of creativity within the current experimental design is to further understanding of the role creativity may play in the facilitation of psi performance. To this end the creativity research conducted in this thesis has focused exclusively on the domains of 'person' and 'process'. Of particular interest for the author was the role that divergent thinking may play in the psi facilitation process.

The Creative Personality

The dominant thrust of the person facet of creativity research has been primarily psychological and the study of personality characteristics associated with creative behavior has been a generally active area of research for some time, although such research has waxed and waned in popularity over the years (Helson & Mitchell, 1978). Woodman (1981) stated unequivocally that any theory of personality that did not account for the creative act was 'incomplete'. He then categorized those theories that attempt to explain creative behavior into one of three major streams: (a) psychoanalytic, (b) humanistic, and, (c) behavioristic. Theorists writing in the psychoanalytic tradition (e.g. Freud, Jung, Kubie) view creativity as stemming from the preconscious or the unconscious. Humanistic theories (e.g., Murray, Maslow, Rogers) typically relate creativity to the individual's quest for self-actualization. Behavioristic theories view creativity as novel or unusual behavior that is nevertheless learned, and thus fundamentally no different than other behavior in terms of stimulus-response or contingencies of reinforcement.

A common approach to personality and cognitive factors in regard to creativity is to treat them as potentially important sources of individual differences (Arieti, 1976). Several authors (e.g., Barron, 1968; Barron & Harrington, 1981; Cattell, 1971; MacKinnon, 1970; and Welsh, 1986) have suggested that personality and motivational factors underlie much of the individual differences among people in creativity. Amabile (1983) has argued that creativity is best conceptualized not as a personality trait or general ability but as a behavior resulting from particular constellations of personal characteristics, cognitive abilities, and social environments. Guilford asserted that "creativity and creative productivity extend well beyond the domain of intelligence" (1950, p. 445). He further suggested that having the requisite abilities does not necessarily mean results of a creative nature would be produced; the latter would depend upon the presence of specific motivational and temperamental traits. Thus, Guilford addressed the genetic aspect in intellect (ability) and personality (temperament) yet did not exclude the contribution of environment (motivational factors) to the development of such traits.

Personality Characteristics

As most schools of thought hold that everyone is creative to some degree, however small or large a degree that may be, one approach to defining who is most likely to be most creative is to examine those characteristics that are most often associated with the creative individual. Understanding the characteristics associated with creativity has been a challenge for creativity scholars for many years. For decades, these scholars have investigated characteristics of the creative person (Barron, 1963; Barron and Harrington, 1981; Dellas & Gaier, 1970; Gilchrist, 1972; Gough, 1981; MacKinnon, 1978; Maslow, 1959; Torrance, 1974). One result of the dominant psychological thrust of the person facet is the large number of personality questionnaires that measure traits and characteristics associated with the creative person. Not surprisingly, many of these same characteristics are also on the list of characteristics for 'good' psi subjects. Most theorists explicitly or implicitly view creativity as both an intervening variable (MacCorquodale & Meehl, 1948; Turner, 1968), something not directly observable but used to explain relations between stimuli and responses, and a trait, something that a person 'possesses' and that varies among people. Largely as the result of interviews and psychological profiles conducted on highly creative individuals, several representative adjectives have come to the fore: clever, individualistic, insightful, original, self-confident, and unconventional. For decades, these scholars have investigated characteristics of the creative person (Barron, 1963; Barron and Harrington, 1981; Dellas & Gaier, 1970). Creative people were also found to be proud of their own accomplishments, to initiate activities, have unusual thought processes, are curious, exploring, and eager for new experiences (Gilchrist, 1972; Gough, 1981; MacKinnon, 1978; Maslow, 1959; Torrance, 1974). Still other researchers have described the creative person as enterprising, sensitive, tolerant of ambiguity and lack of conformity, showing initiative and persistence, needing variety and autonomy, resisting premature closure and crystallization of concepts, liking challenge, and having a need or drive to improve upon the current (Martindale, 1989). Additionally, creative people are seen as being independent of thought, self-starting, self-directed, and self-sufficient (Amabile, 1995). Generally, the creative person is considered to be non-evaluative and non-judgmental in their thinking, good at re-defining, and typically very bright. These representative traits and characteristics are equally true if the words 'creativity research' were replaced with 'psi research'.

Barron and Harrington (1981) concluded, after 15 years of reviewing research on personality characteristics of creative individuals, that:

> "In general, a fairly stable set of core characteristics (e.g., high valuation of esthetic qualities in experience, broad interests, attraction to complexity, high energy, independence of judgement, autonomy, intuition, self-confidence, ability to resolve or accommodate apparently opposite or conflicting traits in one's self concept, and finally, a firm sense of self as "creative") continued to emerge as correlates of creative achievement and activity in many domains." (p. 453).

Anderson (1962) also felt that the creative person, who is given more to expression than to suppression, has fuller access to his own experience, conscious and subconscious. In this way she felt that the creative person can be seen as someone who is more open to their feelings, ready for them, encouraging of them, and more acutely sensitive to them. MacKinnon (1995) characterizes the creative persona as manifesting a relative absence of repression and suppression as mechanisms for the control of impulse and imagery. In his view, repression operates against creativity, because it makes unavailable to the individual large aspects of his own experience. In this regard, dissociated items of experience cannot combine with one another; and there are barriers formed to communication among different systems of experience. The creative person, according to MacKinnon, is given to expression rather than suppression or repression, and has fuller access to his own experience, both conscious and unconscious. In this regard, MacKinnon views the creative person as someone who is not only more open to the "perception of complex equivalencies in experience" but also to experiencing "greater openness to his own depths." (MacKinnon, 1995, p. 84)

Creative Process

Some researchers feel (Leary, 1963) that the individual's ability to enter an altered state is conducive to the creative process. In his review of the different methods currently available to develop or teach creativity, Torrance (1987) cites a 67% success rate for courses using naturally occurring altered states (such as meditation or guided imagery) as a method of increasing creativity. Descriptions of the creative state portray it as almost trance like, unconscious, imagery filled, being unaware of physical surroundings and completely absorbed in the creative task, simultaneously completely open and yet inwardly focused. As was discussed in chapter 2, altered states are not only thought to be conducive to creativity, but also to the facilitation of psi. Shepard (1978, 1981) has argued that perceptual mechanisms are decoupled during altered states (such as dreaming), and transitions from such states represent a fertile ground for development of creative ideas. It is at this point, Shepard adds, that the perceptual mechanisms automatically linked to organizing the sensory world run "on their own" occasionally constructing novel and useful percepts and images (much like hypnagogic imagery) from fragments of internal noise and loosely guided consultations with memory. It is in this manner that the creative process may share a common 'birthing ground' with the psi process. It seems apparent from Shepard's descriptions of self report data that this form of creative thought is the product of involuntary mental operations that lead to spontaneous insight. Kaha (1995) states that creative individuals possess an ability to shift, alter or expand already existing boundaries, an ability often associated with success in laboratory psi research (Tart, 1974).

Krippner (1963) described similarities in the use of altered states in creativity and psi research by pointing out that both concepts seem to be pre-logical and pre-verbal in nature, spontaneous, elusive and difficult to cultivate. In a review of conditions relevant to both creativity and psi, he concluded:

> "Our survey of intrapersonal conditions for creativity and psi has revealed the phenomena to be non-verbal and prelogical in nature, largely unconscious in origin, dependent upon need and drive, closely aligned with emotionality, and yet subject to at least a modicum of conscious control. The relationship between creativity and psi seems to represent that portion of the nervous system free from societal conditioning. In addition, an altered state of consciousness will often bring about an increase in the functioning of both creativeness and psi." (p. 59)

Shepard (1978, 1981) has proposed that highly evolved and specialized perceptual mechanisms normally coupled to the analysis of sensory input have the ability to operate upon data other than that obtained from normal sensory input. This, Shepard says, takes place when these specialized perceptual mechanisms are decoupled from the sensory environment, such as in altered consciousness states. Flowers and Garbin (1989) speculate that because self reports have documented that mental events associated with creative thought often include extensive use of intuitive insights (Shepard, 1978, 1981), it is plausible that creating an environment that minimizes potentially interfering sensory input might be useful in facilitating manipulations of mental image processing, and contribute to creative thought. Furthermore, there is anecdotal evidence suggesting that these same perceptual mechanisms may not only be the source of spontaneously generated images or representations, (when their normal driving source of sensory stimulation is decoupled), but that such spontaneous generation in transitions from dreams or altered states, if appropriately selected and recognized as useful, could produce not only sudden creative insights but also sudden spontaneous psi experiences.

There is a fairly consistent pattern to indicate that a change of consciousness to a state dominated by primary process thinking (e.g., bizarre, spontaneous, dream-like, unstructured, symbolic), rather than secondary (e.g., rational, analytical, structured), in response to the ganzfeld experience relates to psi success (Sargent, 1982; Palmer et al., 1979). Research conducted by Moss and Gengerelli (1968) and Moss (1969) with artists (discussed in detail in chapter 3) was not only very successful, but made explicit mention in both studies of the appearance of considerable primary process material. Suler (1980) places great emphasis on the critical role of 'primary process thinking' in creative behavior, and describes this role as follows:

> "The creative act can be conceptualized as a special form of interaction between primary and secondary process thinking in which a novel idea or insight is generated by the loose, illogical, and highly subjective ideation of primary process and is then molded by secondary process into a context that is socially appropriate and meaningful to others." (p. 144)

Kris (1952) hypothesized that creative individuals are more able to alternate between primary process and secondary process modes of thought than others. Primary process cognition occurs in normal states, such as dreaming and reverie, and in abnormal states, such as psychosis and hypnosis. It is autistic, free associative, and analogical and tends to operate on concrete images rather than abstract concepts. According to Kris, creative inspiration involves a 'regression' to a primary process state of consciousness. Because primary process cognition is associative, it makes the discovery of new combinations of mental elements more likely. A good deal of evidence is supportive of Kris' (1952) theory that creative people have easier access to primary process modes of thought (see Suler, 1980, for a review). They report more fantasy activity (Lynn & Rhue, 1986; Singer & McCraven, 1961), remember their dreams better (Hudson, 1975) and are more easily hypnotized than uncreative people (Aston & McDonald, 1985; Bowers & van der Meulen, 1970), in which respects they mirror the successful psi participant (Sondow, 1987). Wild (1965) showed that creative individuals are better able to shift between use of primary process and secondary process cognition. Martindale (1989) feels that access to primary process thought can only occur within a matrix of personality traits that involve disinhibition, and are unconstrained by societally perceived restrictions, conditions which also foster the manifestation of psi.

The fact that the process and the source of both creativity and psi remain essentially unknown does not in itself give sufficient basis for assuming that the two processes are, if not in some respects identical, in some way interrelated and interdependent. Is there any basis on which to ground such an assumption? Creative insight, or intuition, constitutes one of the most recurrent facts of creative life and is a basic form of the psi experience. Intuition, which can be defined as knowledge gained without rational thought (Agor, 1989), is not only recognized as a part of the creative process (McAleer, 1995), but is also recognized as an integral part of the creative personality. Dellas and Gaier (1970) include intuitiveness as being among the 13 traits found to be associated with creativity in their evaluation of more than two dozen studies of personality characteristics of creative persons, stating that, "Intuitiveness also comes through as a hallmark of the creative person" (p. 68). Eysenck (1994) wrote that allied to creativity is the process of 'intuition', which he views as being theoretically instrumental in mediating creativity, and Jung (1928) described intuition as the psychological function that explores the unknown, and senses possibilities and indications which may not be readily apparent. In his discussion of the role of inspiration in the creative process, McAleer (1995) states that, "intuition, much more than rational thought, appears to be vital to the creative thinking process" (p. 60).

Most societal views of the creative persona involve a tradition or mythology that creative people are naturally more intuitive, more in touch with the divine, and therefore, more open to and in touch with 'other worldly' influences than are non-creative individuals. In description, the experience of flashes of creative insight appears very similar to experiences of flashes of insight reported in ESP experiences. Research on the intuition insights and decisions of executives indicates that not only is intuition in this manner thought to work to a fairly successful degree (Agor, 1995), it is also becoming a more accepted practice (Casebolt, 1985; Schwartz, 1995), with courses teaching creativity in business also focusing on intuitive training (Block, 1995). In the conventional sense of the word 'creative innovation' has also been seen as involving a business 'sixth sense', and as evidencing 'boardroom intuition' (Schwartz, 1995).

Extrapolating from this, creativity and intuition could be inferred to reside alongside each other, and to naturally exist at some level in everyone. An illustration of the interactive nature of the intuitive/creative process can be seen in Einstein's six year struggle with the relativity principle. Einstein's struggle has been described as a groping, feeling, struggle, marked by recurring feelings of being right, of having an intuitional apprehension that he was moving in the right direction. Flashes of insight and intuition apparently occurred at this stage of Einstein's work, followed by exploratory episodes of feeling, and emerged only as new dimensions of the whole structure were felt via feedback transformations. Only after experiencing this intuitive insight did Einstein resort to verification (not discovery) through verbal, logical analysis (Anderson, 1962).

Models of Creativity

Creativity has been studied from a diversity of theoretical perspectives, giving rise to an even larger diversity of creativity models. A presentation of all such models is outside the scope of this chapter, however a brief overview will be given on a few of the more major concepts and theories of creativity in the field, and then focus will be brought to bear on the divergent thinking model of creativity, which is the approach taken in this thesis.

Spearman (1931) claimed that the generation of novel ideas could be explained by three "neo-genetic processes", those capable of generating new mental content. These three principles are: (1) the Principle of Experience – "A person tends to know his own sensations, feelings, and strivings" (p. 16); (2) the Principle of Relations – "When two or more items (percepts or ideas) are given, a person may perceive them to be in various ways related" (p. 18); and possibly the most important, (3) the Principle of Correlates – "When any item and a relation to it are present to mind then the mind can generate in itself another item so related" (p. 24). Spearman's basic model therefore, involves an active process in which associations with an initial idea can be freed from their relation to it and thus lead to something wholly new. Several similar creativity concepts lead directly from Spearman's Principle of Correlates, including Koestler's 'bisociation of matrices'.

As what may be thought of as his major work on creativity, "The Act of Creation", Koestler (1964) proposed a theory that tries to integrate considerations drawn from psychology, biology, and genetics, as well as from his own literary way of articulating his ideas. His key concept was 'bisociation' which refers to a pattern of thinking that is at the heart of creative achievement in all fields, all theoretical sciences and arts, (including the art of humor), literature, and poetry. Bisociation is the intersection of two dissociated matrices, or patterns of thinking and feeling, and the yielding of complexes that are new. His theory, like Spearman's, is based on the principle of association of elements or entire frames of reference.

As a proponent of a social psychological approach to creativity, Amabile proposes a theory of creativity in which background knowledge, cognitive style, social factors, and environmental influences all contribute to the creative act (Amabile, 1983). She argues that, "creativity is best conceptualized not as a personality trait or a general ability but as a behavior resulting from a particular constellation of personal characteristics, cognitive abilities, and social environment" (p. 358). Amabile proposes an interaction between the three primary components of: (1) Domain relevant skills – one cannot be truly creative unless one knows a great deal about a particular area, has the skills necessary to produce in that area, and has 'talent' for that area; (2) Creativity relevant skills – cognitive and personality characteristics that have traditionally been viewed as underlying generation of potentially creative responses; and, (3) Task motivation – intrinsic motivation, or engaging in an activity for its own sake.

In an early, but still influential, model of creativity, Wallas (1926) developed four main stages characteristic of the creative process. Perhaps one of the most interesting aspects about these stages is their recourse to unconscious mental processes, both in the incubation or cerebration stage and in the sudden flash of insight or intuition. Wallas' Four Stages of the Creative Process (1970) are:

1) Preparation: This stage includes, "the whole process of intellectual education" (p. 92). During this stage individuals are laying the foundation for their later creative skills by acquiring the requisite knowledge and skills of their field.
2) Incubation: During the incubation stage, or gestatory period, the problem is not consciously pursued; rather incubation is characterized by the, "free working of the unconscious or partially conscious processes of the mind" (p. 95).
3) Illumination: This stage is "the final 'flash' or 'click'" (p. 96), that is the culmination of the incubation stage. It is at this stage that what has previously been unconscious suddenly becomes fully conscious. This stage most closely resembles psi, and intuition.
4) Verification: The fourth and final stage in the creative process, verification involves any correction or revision needed and completes or refines the product.

It should be noted here that several researchers, most notably Anderson (1962), Sondow (1987), and White (1964), have seen similarities between Wallas' model of the creativity process and the process that psi is speculated to go through. Both psi and creativity start out with a need to create or to know, which is similar to the preparation stage in creativity. This is followed by a incubation period, or an unconscious or conscious scanning of the environment which parallels the assumption that psi is first processed unconsciously. This is then generally followed by a flash of insight or illumination where the psi information is manifested and assimilated, and then the final stage is reached, that of verification, which in a free response design seems relevant to the judging process, where evaluation, selection, and logical thought dominate.

Guilford's Structure of Intellect (SOI) Model

An overall evaluation of Guilford's system is beyond the scope of this chapter, however, because of the relevance of his views on creativity to the work presented in this thesis, a detailed overview is presented here. Guilford (1950, 1956, 1959) hypothesized that at least eight primary abilities underlay creativity. These were:

(1) Sensitivity to Problems - creative people see problems where others do not, an ability possibly related to curiosity;

(2) Fluency - people who produce large numbers of ideas are more likely to have significant ideas;

(3) Novel Ideas - creative people have unusual but appropriate ideas;

(4) Flexibility - creative people should easily be able to change set;

(5) Synthesizing Abilities - creative thinking requires the organizing of ideas into larger, more inclusive patterns;

(6) Analyzing Abilities - symbolic structures must often first be broken down before new ones can be built;

(7) Complexity - related to synthesizing, refers to the number of interrelated ideas an individual can manipulate at once; and,

(8) Evaluation - at some point, the value of new ideas must be determined.

Guilford, then, saw creativity as a result of the action of several more or less independent traits. However, he and most others have come to focus on fluency, flexibility, and to a lesser extent, novelty as the crucial aspects of creativity. Other factors, such as that of evaluation, were admittedly underplayed (Guilford, 1967). Guilford proposed the Structure of Intellect (SOI) model in 1950 and has emphasized the significance of creative potential for measurement and training (Guilford, 1950, 1967). Guilford proposed three dimensions of mental ability: the process of thinking or the operation, the content or the kind of information, and the product of thinking. Operations are the five ways in which humans can process four different kinds of informational contents that can lead to six different types of products. Guilford designed a three dimensional cube representative of his SOI model, see Appendix 10 for Guilford's cube. In the original proposition of this model, the five processes or operations are cognition, memory, convergent and divergent thinking, and evaluation. The content of thought (i.e., the kind of information being processed) is of four kinds: figural, symbolic, semantic, and behavioral. The operation and content are basic dimensions of thinking. The product of thinking along these dimensions is of six kinds: unit, class, relation, system, transformation, and implication. The five operations or processes multiplied by four contents or kinds of information, multiplied by six products make 120 factors. The definitions of five operations, four contents, and six products are given in Table 4.1. Guilford claimed that the 120 factors arising from this 5 x 6 x 4 matrix were essentially independent of one another.

Guilford's model differentiates 'divergent thinking' from the process of 'convergent thinking'. According to Guilford's SOI model, divergent production, or divergent thinking as it most commonly referred to, is: Producing a number of alternative items of information from memory storage, either verbatim or in modified form, to satisfy a given need, such as naming objects that are both hard and edible, or suggesting a number of different titles for a given short story. Thus it is a matter of retrieving from memory storage members of a specific class. It can also be seen as a generation of information from given information, where the emphasis is upon variety and quantity of output from the same source; a search for logical alternatives. It is optimally revealed by individual differences in test scores when two class specifications are given (Christensen & Guilford, 1963). Guilford warned that creativity should not be associated with only divergent thinking, but that several other SOI dimensions are certainly involved, and that divergent thinking itself is a category which contains as many as 30 different dimensions (Guilford, 1971, 1977, 1984).

Conversely, Guilford defines convergent production, or convergent thinking, as: Retrieving from memory storage a particular, fully specified item of information, such as thinking of a special word to fit a given place in a crossword puzzle or drawing the correct conclusion from given facts. It is also seen as a generation of information from given information, where the needed information is completely

Table 4.1
Definitions of Guilford's five operations, four contents, and six products

Operations	**Contents**	**Products**
Major intellectual processes; different ways in which humans deal with information Cognition (C). Discovery or recognition of different forms of information; comprehension Memory (M). Storage and potential availability of information in its original form Divergent Production (D). Generation of variety and amount of information, based on given information, most involved in creative potential Convergent production (N). Generation of conventionally accepted single best answer to a given problem Evaluation (E). Making judgements concerning extent to which a particular piece of information meets given criteria (adequacy, suitability, etc.)	Types of information with which humans deal Figural (F). Concrete visual, auditory, or other sensory forms Symbolic (S). Denotative signs (letters, numbers, words, etc.) without consideration of meaning or form Semantic (M). Meaning of words and occasionally pictures; important in verbal thinking and communication Behavioral (B). Nonverbals involved in human interactions, particularly concerning such things as moods, desires, and intentions	Types of outcome of information processing Units (U). Mutually inclusive items of information; "things" Classes (C). Groupings of sets of items based on their common properties Relations (R). Connections between items based on variables applying to them (e.g., relative size) Systems (S). Organized, interrelating, or interacting groups of items or parts Transformations (T). Various types of changes in existing information Implications (I). Extrapolations or elaborations of information in terms of, e.g., consequences or expectancies

determined by the given information; a search for logical imperatives. It may seem strange that events of retrieving items of information from memory storage should involve two different psychological functions, but factor analysis of tests of divergent and convergent thinking (Khire, 1993) consistently shows this to be the case. One function involves a broad search, as in reviving members of class while the other entails a focused search for a particular class member.

In spite of early criticisms of the SOI model - namely that it was too rigid, unsupported by theoretical and empirical data, and that the verbal definitions of factors were not precise enough to allow task construction that would be representative of the factors - Guilford's views on creative thought have had lasting influences on creativity research. Delineating between divergent and convergent thought led to a reconsideration of processes involved in creative problem solving and the development of a variety of applied creativity programs:

> "The greatest importance of divergent-production abilities is in connection with creative thinking, where many alternative ideas need to be brought to light with ease. Since creative thinking is an important aspect of problem solving, these abilities are also important in that connection." (Guilford, 1977, p. 108).

Thus, the 24 divergent production factors arising from combinations of divergent production with various contents and products could be different elements of creativity. These elements would include several types of fluency, originality, flexibility, and elaboration. Tests of divergent production then, should be useful as tests of creative productivity, although Guilford makes it clear that neither any one test nor any one overall creativity score is feasible as a predictor (Guilford, 1975).

The essence of Guilford's model demonstrates that divergent production involves the cognitive processes of fluency, flexibility, originality, and elaboration. Taken together, these are the cognitive components of creative thinking. According to Dowd (1989) divergent thinking is, by its very nature, exploratory and creative, and oriented towards the development of possibilities rather than data, to speculation rather than conclusions. It is characterized by thought processes that radiate outwards as they explore new ideas generated from the original notion. In this regard, divergent thinking is thought of as more intuitive than convergent thinking, and the ability to engage in divergent thinking directly related to creativity (Dowd, 1989).

As the SOI model gained widespread recognition, the approach of divergent or convergent thinking was also applied to the process of science. Giving quantum theory and the theory of relativity as examples of primary creativity, Ghiselin (1963) applied Kuhn's view of change in sciences to the entire creative process. As is well known, Kuhn (1962) proposed that science worked in two ways: 'Normal' science involved the extension of a theory along the lines of its particular paradigm, whereas 'revolutionary' science involved the overthrow of one paradigm and its replacement with a radically different one calling for a new view of the world. In the same volume as Ghislen's chapter, Kuhn (1963) suggested that normal science actually involved considerable convergent thought whereas revolutionary science called for the flexibility and open-mindedness that characterize the divergent thinker.

Torrance's Creativity Concept

Guilford's (1967) original conceptualization of divergent thinking has been retained in current creativity theorizing in the four general categories into which he grouped them (fluency, flexibility, originality, and elaboration), not in the 16 divergent production factors that he identified or the 24 such factors that his theory posited (Kogan, 1983; Torrance, 1990; Wallach, 1970). This is also the case of the most influential divergent thinking theory of creativity, that by E. Paul Torrance (Torrance, 1966, 1972, 1984, 1988, 1990). Torrance (1979) created a model for studying and predicting creative behavior in people. His model identified abilities, skills and motivations as important and interrelated factors in creative behavior. Torrance emphasized the need to consider more than simply ability when trying to understand and predict creative behavior. Skills involve knowing and using strategies for creating. Motivations involve personal commitment of time, energy, effort, and enthusiasm to creative pursuits. The majority of work to understand creativity has focused on determining the level, capacity or degree of the characteristics highly creative people possess. The Torrance approach concerns how people show the creativity they have. Rather than 'how creative are you' this question asks 'how are you creative'.

The influence of Torrance's theory derives primarily from the success of his tests of creativity. According to one comprehensive survey of creativity research (Torrance & Presbury, 1984), by 1984 the Torrance tests had been used in 40% of all recently published studies of creativity with college students and adults. The Torrance tests dominated the field of creativity research to such an extent that, in what was intended as a comprehensive meta-analytic evaluation of the long term effects of various creativity training programs, only studies that employed the Torrance test were included (Rose & Lin, 1984). The Torrance tests still continue to be the most widely used of the divergent thinking tests, and dominate the world of creativity testing (Baer, 1993).

Torrance defines creativity as:

> "the process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficult; searching for solutions, making guesses, or formulating hypotheses and possibly modifying them and retesting them; and finally communicating the results." (Torrance, 1967, p. 73).

In reflecting on this definition, Torrance commented that some find it too loosely constrained, while others find it too narrowly oriented to scientific progress to the exclusion of artists' endeavors. However, this definition was an attempt to find an area of focus in creativity that would be productive in helping scientists and lay people alike better understand the phenomenon. Torrance's methods of assessment of creative potential, like Guilford's, emphasized the ability to generate many new ideas (fluency) that are unusual (originality) and represent a variety of categories (flexibility), as well as the ability to embellish the ideas (elaboration). In addition, the Torrance tests furnish an overall creativity index. These scores can be used separately, as measures of the component skills of divergent thinking, or combined into an overall divergent thinking index score. While these subscales may be used separately, there is considerable evidence that the subscale scores are highly intercorrelated. In a survey of available evidence, Kogan (1983) reported that fluency scores correlate so highly with the other 'quality' scores (flexibility, originality and elaboration) that, "a strong case can obviously be made for exclusive reliance on the more easily scorable ideational-fluency index" (p. 637). According to Baer (1993), "the widespread use of the Torrance Tests of Creative Thinking have led scores on these tests to become the de facto operational definition (or definitions, if subscale scores are used) of divergent thinking." (p. 16)

The Measurement of Creativity

As has been pointed out, a misleading view of creativity is often that of a single-dimensional concept when, in fact, it has a multi-faceted and often integrated nature. A variety of tools are used for the purpose of measuring creativity and its aspects, including questionnaires, check list, rating scales, pencil-and-paper tests, and interviews (Malhotra, 1993). The real question here is whether this dynamic phenomenon can be measured. The straightforward answer to this question is 'yes'. There are many informal methods used to establish the magnitude, quantity, or quality of some attribute of creativity, used everyday to judge implicitly whether someone or something is creative. Examples of informal indicators of creativity include how long a Broadway play or show runs; the final price of a painting in an auction, a book making it onto the best sellers list, or a song ranking in the 'top 40'. These examples, while not intended to be formal measures of creativity, communicate the magnitude of creativity, at a general level, of some product or person.

Since the beginning of systematic, experimental research into the nature of creativity, typically thought to be the early 1950's (Puccio, 1995), a robust array of formal methods for measuring creativity have been developed. This myriad of creativity measures are used to measure, for example, characteristics of creative people, preferences associated with aspects of the creative process, qualities of creative products, and factors in the work environment that facilitate creative performance. Therefore, the challenge is not in finding an instrument or method for measuring creativity, but in selecting the measure that best suits the aspect of creativity to be explored. The general purpose of measurement is to facilitate the process of inquiry. This is why scientists are concerned with quantifying or qualifying abstract constructs, such as intelligence, motivation, or even something as complex as creativity. The goal is to go beyond merely assigning a number to some behavior, but to use measurement to gain a deeper understanding of the phenomenon under observation. Measurement permits researchers to generate more precise descriptors of human behavior through analytic procedures that verify, predict, or explain (Kaplan, 1964). Without reliable and valid means of measuring complex variables, researchers are unable to refine or test their theories and hypotheses. Additionally, measurement allows researchers to extend their work by generating new and meaningful information and can be used to link research and practice.

Considerable diversification exists in the types of measures used in the assessment of creativity. Although pencil-and-paper tests probably account for the majority of measures employed in research studies, other techniques are commonly used. In a comprehensive review and critique of currently available techniques for the measurement of creativity, Hocevar (1981) arrived at a taxonomy of 10 categories: (a) tests of divergent thinking, (b) attitude and interest inventories, (c) personality inventories, (d) biographical inventories, (e) teacher nominations, (f) peer nominations, (g) supervisor ratings, (h) judgements of products, (i) eminence, and (j) self-reported creative activities and achievements. Hocevar concluded that an inventory of self-reported creative endeavors and achievements is the most defensible approach for identifying creative individuals.

When assessing the creative endeavor, tests of divergent thinking are the ones most often used in educational settings and in educational and psychological research (Wallach, Goldstein, & Nathan, 1990). As the responses are open-ended, considerable subjectivity often occurs in evaluating just how creative, original or ingenious the answers given may be. The scoring of responses is often differentiated along a continuum to reflect their being indicative of higher or lower levels of creativity. Another method occasionally used to estimate the degree of manifested creativity is largely a normative one based on the statistical frequency of a response – the less frequent or more rare, the greater the amount of implied creativity. However, a concern here is the confounding of ideational fluency with scores on each of several other dimensions of creative endeavor. In this respect, the combination of objective creativity assessments with subjective ones is recommended in assessing both level and style of creativity.

Because creativity is usually treated as though it is normally distributed in the population, most of the 'person' assessments of creativity focus on how much creativity an individual possesses. This approach to assessment has been referred to as the 'level' approach (Isaksen & Dorval, 1993; Isaksen & Puccio, 1988). More recently researchers have refocused on various 'styles' of creativity (Kirton, 1976; Isaksen & Dorval, 1993). The style approach looks at how people differ in the way that they manifest their creativity. A clear practical benefit to the style approach is that it promotes the concept that there is more than one way to be creative. For a more detailed description of the implications associated with the separation of the level and style approach to creativity, see Isaksen and Dorval (1993).

While tests of divergent thinking are not to be confused with measures of general creativity, describing creativity in terms of divergent thinking is the most widely used approach to studying creativity. Guilford (1986) and others (most notably, Torrance, 1974; Wallach & Kogan, 1965; Wallach & Wing, 1969) have suggested that the more creative individual should possess the types of abilities measured by tests of divergent thinking, and the Guilford tradition has had considerable impact on the study of creativity.

On the basis of Guilford's (1956) SOI model and over two decades of factor analytic research, Guilford and others have identified various intellectual abilities. Some of these abilities (e.g., fluency, flexibility, originality, redefinition, and elaboration) have been collectively labeled 'divergent thinking'. A wide variety of tests have been developed by Guilford and his colleagues to measure divergent thinking, such as Alternate Uses (Christensen, Guilford, Merrifield, & Wilson, 1960), Plot Titles (Berger & Guilford, 1969) and Possible Jobs (Gershon & Guilford, 1963). Tests of divergent thinking are distinguished from traditional intelligence tests in that they require a multitude of responses rather than a single correct answer. For example, in the Alternate Uses test, subjects are asked to think of alternative uses for a variety of common objects (e.g., a pencil or box). Similarly, in the Possible Jobs test, subjects are asked to generate clever job titles symbolized by specific emblems (e.g., a light bulb or a safety pin). Two of the most widely used divergent thinking test batteries, the Torrance Tests of Creative Thinking (Torrance, 1974; 1990) and the Wallach-Kogan creativity test (Wallach & Kogan, 1965) may be seen as modifications and extensions of the Guilford tests.

Despite the considerable and valuable impact of divergent thinking measures on the creativity literature, they have not gone without criticism, and a number of researchers have made suggestions as to how divergent thinking tests might be revised to better suit both test takers and researchers (Evans & Forbach, 1983; Hocevar, 1979; Milgram, 1983; Milgram & Arad, 1981; Runco, 1986; Zarnegar, Hocevar & Michael, 1988). Torrance (1990) in particular has continued to refine and improve his creative thinking tests.

So, what approach to measuring creativity is best? Creativity in general has many vastly different meanings and implications, reflected in diverse philosophical conceptions and values regarding creative talent. Consider, for instance, the example of creativity as a huge lake of water fed by many tributaries. A cup of water was sampled from the middle and described as 'lake water'. The degree to which it was comprised of specific components from one tributary or another might be nearly impossible to determine in a practical and efficient way. If samples were drawn in or near specific tributaries, however, certain variables might more readily be separated and analyzed. At a broad and philosophical level, the 'lake water' is of general interest. For experimentation and progress at a more exact and empirical level, the researcher would probably need to work near or in one of the tributaries. The challenge then, is to learn enough about each of the tributaries to be able to extrapolate intelligently and formulate reasonable hypotheses about the lake water (creativity) and why those who come to bath in its waters do better at psi tasks.

Creativity Measurement

An examination of all major commercially available creativity instruments and assessments was conducted by a review of the creativity literature and an investigation of such tests available at libraries, as well as contacting various creativity and psychological test outlet organizations and requesting detailed information. In addition, the author conducted phone and email interviews with creativity researchers at several organizations, including Scholastic Testing Service, the Torrance Center, the University of Los Angeles, the University of California at Davis, and the editors of the Journal of Creative Behavior, the Journal of Creativity Research, and the Center for Creative Leadership. Final selection was obtained by pilot work with several small groups of creative individuals who provided feedback as to the appropriateness of the tests. The instruments chosen for use as a result of that pilot work for the studies in this thesis will be presented here. Readers interested in the measurement of creativity may also want to refer to a number of previously published papers and articles (Crockenberg, 1972; Hocevar & Bachelor, 1989; Mumford & Gustafson, 1988; Petrosko, 1978; Treffinger & Poggio, 1972). For more extensive reviews and critiques of creativity assessment see also Brown (1989), Davis (1992), Hocevar (1981), Hocevar and Bachelor (1989), Michael and Wright (1989), and Treffinger (1987).

Given the dynamic nature of creativity, there is no reason to expect that any single measure can capture the essence of creativity. The lack of such a global measure of creativity forces the user to make a conscious decision about what measurement tools to use. Given the many aspects of creativity it is not prudent to randomly select a measure, or to select a measure merely because it is convenient. Therefore the variables to be measured must be carefully considered. As will be recalled, the four major areas of measurement within creativity have been identified as the person, the process, the product, and the environment. Since previous psi literature has indicated that creative populations perform better at psi tasks than the general population, it was considered most appropriate for the research in this thesis to approach the measurement of creativity from the aspects of 'person' and 'process'.

Hocevar and Bachelor (1989) list eight categories of creativity measurement: (1) tests of divergent thinking; (2) attitude and interest inventories; (3) personality inventories; (4) biographical inventories; (5) ratings by teachers, peers, and supervisors; (7) eminence; and, (8) self reported creative activities and achievements. In attempting to assess and understand the role of creativity in the apparent enhancement of psi performance for 'creative' individuals, four of the above categories for creativity measurement were used. These were: (1) tests of divergent thinking; (2) attitude and interest inventories; (3) personality inventories; and, (4) self reported creative activities and achievements. Access to either biographical inventories or ratings by teachers, peers, and supervisors for creativity assessment were not available, and the aspect of eminence in their respective creative domains for participants was indeterminate. The following section discusses the creativity measures used in this thesis, and in particular the Torrance tests, in more detail. The creativity instruments selected for use, along with the addresses (p. A4.26) for obtaining them, are shown in Appendix 4.

Creativity Measures

Divergent Thinking Tests

Two of the foremost leaders in the area of cognitive characteristics were Guilford (1977, 1986) and Torrance (1974; 1990). Guilford and his colleagues designed numerous assessment activities to measure the various cognitive abilities described in his SOI model. Some of the mental operations Guilford associated with creativity were sensitivity to problems, fluency of ideas, flexibility in thinking, originality of ideas, and redefinition. Torrance's Tests of Creative Thinking (TTCT; Torrance, 1974; 1990) are a well-validated set of measures of originality (ability to generate uncommon responses), elaboration (ability to expand on ideas), flexibility (ability to generate different kinds of ideas), and fluency (ability to produce a quantity of ideas). Taken together these cognitive characteristics are commonly referred to as divergent thinking abilities. Although many authors have criticized measures of divergent thinking in general on the grounds that verbal fluency may be confounded with level of intelligence (e.g., Baer, 1993; Kogan & Pankove, 1974; Michael & Wright, 1989), the TTCT has shown remarkable predictive validity (e.g., Reiger, 1983; Runco, 1991; Torrance, 1972, 1981; Torrance & Wu, 1981).

Torrance Tests of Creative Thinking

Thinking Creatively with Words - Verbal

Developed primarily by Torrance, this creative assessment is a paper-and-pencil, task oriented test designed to assess cognitive functioning and student potential. It consists of seven verbal tasks which take 45 minutes to complete. These tests have the option of being scored professionally, on scales of fluency, flexibility, originality and elaboration by the organization from which they are ordered. Treffinger's (1984) analysis of several studies of TTCT test-retest reliability point out a range from .50 to .93 with most retest figures in the .60s and .70s. Studies of validity have yielded a satisfactory validity coefficient of .51. Further information on the validity and reliability of this test can be found in Torrance (1990) and Torrance and Wu (1981). This test is shown in Appendix 4, pp. A4.1 - A4.9.

Thinking Creatively with Pictures - Figural

This pictorial approach to creativity assessment is a three part, paper-and-pencil test designed to measure different aspects of creative functioning. The figural portion is composed of three sections: picture construction, picture completion, and circles with a small amount of writing to label drawings. The first subset is scored on originality and elaboration, while the remainder are scored on fluency, flexibility, originality, and elaboration. Streamlined professional scoring can be provided by the organization from which the test is ordered, and is used to produce five norm referenced measures and thirteen criterion referenced measures. Fluency is scored by counting the number of varying and unrepeated responses, zero for common responses, and elaboration is scored by estimating the number of details within the six subsets of limits determined by normative data. There is a five to ten minute time limit for each of the sub-tests. This test has been in existence since 1962 and has been refined in its use over the years. Studies of validity have shown a validity coefficient of .59 for males and .43 for females, for an overall validity coefficient of

.51. Further information on the validity and reliability of this test can be found in Torrance (1990). This test is shown in Appendix 4, pp. A4.10 - A4.16.

Thinking Creatively with Sounds and Words

Onomatopoeia and Images (OI) and Sounds and Images (SI). Measures of originality and together comprise the test battery Thinking Creativity with Sounds and Words (Khatena & Torrance, 1973; Torrance, Khatena & Cunnington, 1973). OI consists of onomatopoeic word stimuli. These are auditory, visual and verbal in nature, and possess both sound and semantic elements evocative of both factual and emotive meanings. The listener, when presented with onomatopoeic words, is required to use creative energies to break away from habitual thought patterns to produce original responses. More subtle than the meaning component of onomatopoeic words is the sound component. According to the manual, it strikes the listener unaware and stirs the emotional base of intellect. Together the sound and meaning of the words set in motion those intellective-emotive processes to produce an original response Sounds and Images consists of simple to complex auditory stimuli. Similar in rationale to Onomatopoeia and Images, the measure requires the listener to break away from sound sets to produce original responses. The measures are on cassettes with instructions given to the listener to use creative imagination to produce original images. The adult version of Onomatopoeia and Images used in this thesis presents ten words four times, with time intervals of 15 seconds between each word. Sounds and Images presents four sound sets three times, with a time interval of 30 seconds between one sound and the next. Image responses are scored for originality based on the principle of statistical frequency and relevance with credits ranging from zero to four points. A creative analogy score was developed (Khatena, 1977) so that credits of zero to three points are given for the production of direct, personal, fantasy and symbolic analogy respectively, and zero or one point for simple or complex image structure of the analogy. A combined score of from zero to four points gives a creative analogy index. These two measures, the SI and OI, have been used both as independent and dependent variables in many studies on imagery and creative imagination (Khatena, 1973, 1978, 1982, 1984). More detail on each of these separate tests is given below. These tests are shown in Appendix 4, p. A4.17 - A4.19.

(1) Onomatopoeia and Images (OI), is one of two separate measures for sounds and words. The overall measure is designed to assess verbal originality. The OI measures the originality of responses to abstract words. One cassette provides the stimuli for administering this to individuals or groups. Timing is determined by the tape and takes 30 minutes. Scoring is done professionally and interscorer reliability coefficients ranging from .95 to .99 were found. Internal consistency of test forms was determined obtaining product-moment reliability coefficients and correlating them with the odd-even administration sequences of the test items. Coefficients ranging from .76 to .95 were obtained for administrative sequences (after correction by the Spearman-Brown prophecy formula). Further information on the validity and reliability of this test can be found in Torrance, Khatena, & Cunnington (1990).

(2) The Sounds and Images (SI) is the second of two measures for sounds and words and measures the originality of responses to abstract sounds. A cassette provides the stimuli for administering this measure. The timing of the SI is determined by the tape and takes 30 minutes. Scoring by professionals gives interscorer reliability coefficients ranging from .88 to .97 with an average coefficient of .95. Split-half reliability coefficients were obtained by correlating subjects' responses to the odd-even items of both forms (A or B) of the adult level of Sounds and Images. Coefficients obtained were .88, .90, and .91 combined (scale corrected by the Spearman-Brown prophecy formula). Further information on the validity and reliability of this test can be found in Torrance, Khatena, and Cunnington (1990).

Possible Jobs (Guilford's SOI Test)

This divergent thinking test is one of the 238 short measures associated with the Structure of Intellect (SOI) model developed by Guilford, 1959. This paper-and-pencil measure is designed to measure an aspect of creativity that relates to flexibility of idea generation, that of 'elaboration', the ability to generate a variety of implications or deductions from given information. Subjects are asked to generate clever job titles symbolized by specific emblems (e.g., a light bulb or a safety pin), with a time limit of five minutes for each page. The test consists of two pages, with three emblems on each page. Subjects are encouraged to list as many possible jobs per emblem that they can think of. The average reliability over use with all groups tested is reported by Guilford (Sheridan Psychological Services, 1970) to be .70. Further information on the validity and reliability of this test can be found in Gershon, Guilford, and Guilford (1980). This test is shown in Appendix 4, pp. A4.20 - A4.22.

Attitude and Interest Inventories

Tests of ability, interests and personality are appropriate when the researcher's goals are to explain or understand something about creativity, but they are not acceptable as criteria of creativity (Hocevar & Bachelor, 1989). According to Hocevar and Bachelor, (1989) assessing creativity through the administration of inventories of creative activities, accomplishments, attitudes and interests are the best of the currently available assessment strategies when one cannot conduct biographical studies of eminent individuals or conduct analyses of creative products.

Some investigators have suggested that creativity can be identified in terms of interests and attitudes. This approach is based on the assumption that a creative person will express attitudes and interests favoring creative activities. Khatena and Torrance (1976) have developed a personality inventory specifically for identifying creative individuals. The Creative Perception Inventory has two subscales, "Something About Myself", and "What Kind of Person are You?" that are designed to identify the extent to which a respondent has interests, thought patterns, and personality characteristics that are thought to be creative. Items on these instruments call for the test taker to select characteristics in a forced choice format. For example, the creative person will describe themselves as curious rather than self-confident, a self starter rather than obedient, intuitive rather than remembering well, and altruistic rather than courteous. The 'Something About Myself' inventory was chosen as the assessment of participants' attitudes and interests.

Khatena-Torrance Creative Perception Inventory – Something About Myself (SAM)

SAM is one of two separate measures in the KTCPI. The purpose of the overall battery is to identify creative self perceptions, to assist in special education and job placement, and evaluate effects of instruction. SAM is designed to have individuals choose from a checklist of 50 statements which describe themselves in regard to their creative interests and abilities. These statements are based on three broad areas: personality traits, use of creative thinking strategies, and creative productions. In addition to an overall total score, the SAM measures six specific factors: Environmental Sensitivity, Initiative, Self strength, Intellect, Individuality, and Artistry. Interscorer reliability for this measure has found to be quite high, correlation coefficient of .99, indicating a certain amount of relative ease in scoring. Split-half and equivalence methods used the responses of 60 adolescents and 60 college subjects. Odd and even items were correlated and corrected by the Spearman-Brown prophecy formula to give *rs* of .92, .95, and .94 for adolescent and adult groups, and the two groups combined. Test-retest reliability coefficients were also computed and *rs* = .98 and .77. Further information on the validity and reliability of this test can be found in Khatena and Torrance (1976). This test is shown in Appendix 4, p. A4.24.

Khatena-Morse Multitalent Perception Inventory

The KMMPI was selected as the creativity assessment providing information on participants' creative activities and achievements. This instrument consists of a 50 item autobiographical questionnaire designed to gather information in creative activities and achievements and provides information separated into five distinct areas: Artistry, Musical, Creative Imagination, Initiative, and Leadership. Scoring is conducted by counting the number of yes responses to questions and interscorer reliability coefficients have consistently been between r = .95 and 1.00. Internal consistency as estimates of reliability given by coefficient alpha have ranged from .71 to .92. Split-half and odd-even reliability estimates (corrected for full-length by the Spearman-Brown prophecy formula) yielded similar values, with median split-half and odd-even values approximately .82 (range .63 to .90). Retest-test reliability coefficient gave estimates ranging from .78 to .93. Further information on the validity and reliability of this test can be found in Khatena and Morse (1990). This test is shown in Appendix 4, p. A4.25.

Personality Inventories

Some investigators have characterized creativity as a set of personality factors rather than cognitive traits. Although some creativity studies have used personality inventories designed solely to identify creativity, in keeping with the previous ganzfeld-psi-creativity database (Morris et al., 1993; Schlitz & Honorton, 1992), the NEO personality was selected for use in this thesis. The NEO is discussed in detail in chapter 3.

Self Reported Creative Activities and Achievements

Perhaps the most easily defended way of identifying creative talent is in terms of self reported creative activities and achievements. Although there is a problem in deciding which activities and achievements should be designated as creative, most of the lists that have been used in research have a reasonable degree of face validity. Creative activities can take place in a number of fields recognized by society as important. Research incorporating this type of checklist has been published in a number of studies (Hocevar, 1976, 1979; Holland & Baird, 1968; Richards, Holland & Lutz, 1967; Runco, 1986; Torrance, 1969; and Wallach & Wing, 1969). In general, the total creativity score is simply the number of activities checked, or listed. Although these lists have been used in educational and psychological research, there are no commercially available checklists. The prototypic self report requests the individual to list all the creative achievements or activities that they take part in (such as exhibited or performed a work of art, published stories, performed roles in plays, etc). The self report devised by the author for use in this thesis drew from the basic questions found in the previously mentioned studies. It consists primarily of a question regarding self perception of creative ability plus a listing of the number and type of creative/artistic activities involved in. This is combined with questions on self confidence, cognitive style, competitiveness, and professional dedication to comprise a six item, self report creativity assessment. This test is shown in Appendix 4, p. A4.23.

It is necessary here to address several concerns about creativity assessment. It is clear that many fundamental questions remain unresolved in the creativity research, and one such problem is that of the identification or assessment of creative talent. Several reviews of creativity identification and assessment instruments have been published over the last two decades (e.g., Crockenberg, 1972; Hocevar, 1979a; Khatena, 1973; Michael and Wright, 1989; Torrance, 1976; Treffinger, 1987; Treffinger & Poggio, 1972). The purposes of creativity assessment should extend well beyond the effort to label or isolate highly creative people from their less creative peers, as has also been argued by Khatena, (1977); Rimm (1984), Torrance, (1976) and Treffinger, (1987). However, there are many reasons for the persistence of problematic creativity assessment. Not the least of these has been the inability to formulate a single, general or unifying theory of creativity, from which a definition could be derived as a foundation for a comprehensive approach to assessment. The field suffers not from a shortage of theories and definitions, but from an overabundance (Dacey & Madaus, 1969; Treffinger, Renzulli & Feldhusen, 1971). It can be argued however, that the complexity of creativity itself mitigates against a universally acceptable definition. Treffinger, Renzulli and Feldhusen, (1971) contend that in the absence of the unifying and directing effects of a single, generally-accepted theory and definition, measurement problems are predictable:

> "Given the existing array of ideas about creativity...it is not in the least surprising that there exists a number of tests, all purporting to be measures of "creativity," but differing in a number of ways. Each instrument mirrors the particular set of beliefs and preconceptions of its developer concerning the nature of creativity." (p. 196).

Treffinger and Poggio (1972) have emphasized this more formally by calling for systematic efforts to integrate theories and research on the nature of criteria and for adequate conceptual and operational definitions. Despite these calls for synthesis, a variety of widely divergent creativity assessment instruments have continued to appear in the literature. Surveys of instruments have been reported by Kaltsounis (1971: 48 instruments), Davis (1971: 23 instruments), Kaltsounis (1972: 38 instruments), and Kaltsounis and Honeywell (1980: 77 instruments). Concerns over issues of validity and reliability in creativity testing have been voiced, due primarily to the problematic nature of constructing an instrument measuring a concept that seems to have a variable and shifting definition. For a comprehensive review of the concepts of validity and reliability in creativity research, see Treffinger (1987).

Because hypothetical constructs other than divergent thinking may affect performance on divergent thinking tests, researchers have sought to ascertain whether divergent thinking tests alone could be considered valid creativity measurements. Barron and Harrington (1981) stated that even after 80 years of creativity research the answer to, "the vitally important question of whether divergent thinking tests measure abilities actually involved in creative thinking", (p. 447) was unsatisfactory. Their conclusion that "some divergent thinking tests, administered under some conditions and scored by some sets of criteria, do measure abilities related to creative achievement and behavior in some domains" (p. 447) would seem to indicate that the use of divergent thinking tests as standalone criterion for, or classifying measure of, creativity is at best, incomplete.

Conversely, according to Runco (1993) the divergent thinking approach to the study of the creative process is one that has the most explicitly developed theoretical base, underlies most creativity tests, and has generated the most empirical research. Runco states that divergent thinking tests should not be thought of as synonymous with creativity, but instead as very useful as estimates of the potential for creative thought (1993). Divergent thinking tests are psychometrically reliable (Runco, 1986) and widely employed as estimates of creative potential. When administered in conjunction with attitude and interest inventories; personality inventories, and self reported creative activities and achievements (Wallach, Goldstein, & Nathan, 1990), divergent thinking tests can be used to provide the "many images" that MacKinnon (1978, p.186) calls for in the picturing of the creative individual.

Conclusions

In order to examine the relationship between creativity and psi, it was firstly necessary to review the different ways that creativity has been defined and measured in the past. This chapter reviews four different domains of creativity study; person, process, product, and press (environment). Each domain has its particular approach to creativity assessment, but the aspects of person and process are those most germane to the focus of this thesis. Thus, from a practical point of view, it was necessary to identify the predominant models in creativity research and from that, to establish the most effective means of measuring creativity in these areas for inclusion in this thesis.

An examination of the major theories and concepts highlighted Guilford's Structure of Intellect model and the Torrance approach, which focus on cognitive factors in an individual's approach to creativity. Cognitive factors thought to have important relationships to creativity include cognitive styles, such as thinking or problem-solving styles (Kershner & Ledger, 1985; Noppe, 1985), cognitive complexity (e.g., Quinn, 1980), divergent thinking (Guilford, 1967; Torrance, 1979), linking remote association among elements or ideas (e.g., Mednick, 1962), ideational fluency (e.g., Basadur & Thompson, 1986), and imagery and verbal fluency (e.g., Suler & Aizziello, 1987).

Many of these cognitive attributes or abilities are not sharply differentiated from each other. One of the better known models in this list is Guilford's SOI. Although many different mental functions relate to creativity, the operation of 'divergent production' is seen as being particularly critical for creative behavior. Woodman and Schoenfeldt (1989) feel that this cognitive style or ability, which they liken to adaptive flexibility and the ability to generate logical alternatives, provides a good example of a cognitive ability-creative behavior relationship that is empirically well supported. Many studies have reported positive relationships among divergent thinking and various creativity criteria (Baer, 1991; Bartlett & Davis, 1974; Halpin, Halpin, & Torrance, 1974; Harrington, Block & Block, 1983; Hocevar, 1980; McCrae, 1987; Runco, 1991, 1986; Torrance, 1969) while other studies have found no significant correlation between divergent thinking and measures of creativity (Andrews, 1975; Barron, 1969; Fitzgerald & Hattie, 1983; Gough, 1976; Hocevar, 1980). A review and assessment of commercially available creativity measures produced four different areas from which assessments were drawn: (1) tests of divergent thinking; (2) attitude and interest inventories; (3) personality inventories; and, (4) self reported creative activities and achievements.

As noted earlier, evaluations of various creativity measurements conducted by the author with small representative groups of artists and musicians identified several instruments appropriate for this study. Creativity tests selected were restricted to those requiring less than two hours of participants' time to complete. Additionally, evaluation feedback pinpointed those assessments felt by the artistic/musical groups to be too simplistic or boring (e.g., 'Plot Titles'), while highlighting those tests that best assessed the areas of interest in this thesis, as well as eliciting interest and excitement in the participants. The creativity instruments selected based on these evaluations are: the Torrance Tests of Creative Thinking (Verbal, Figural and Sounds and Images); Guilford's 'Possible Jobs'; Something About Myself (SAM) from the Khatena-Torrance Creative Perception Inventory; and, the Khatena-Morse Multitalent Perception Inventory, all of which were described in detail above.

Finally, the problematic nature of creativity assessment due to the lack of a single unifying definition as to its true nature was discussed. It was pointed out that due to the possibility of other hypothetical constructs affecting performance on creativity tests, there is some debate as to whether these tests alone could be considered valid creativity measurements. However, while the sole use of divergent thinking tests may be inadequate to effectively measure or assess the various facets of creative ability and skill (Barron & Harrington, 1981), when used in conjunction with tests examining attitudes, personality attributes and creative activities, divergent thinking tests can provide a balanced view of the creative person and process (Runco, 1993; Treffinger, 1987). It was decided that the divergent thinking paradigm, assisted by personality, attitude, and activity inventories, would be best suited to the aims of this thesis.

Related Issues

Chapter 5

Psi functioning and creativity appear to share common aspects of personality and cognitive style, as shown in the previous chapter. The variables under review in the present chapter have been included as a means of casting a wide exploratory net in the hopes of elucidating these interrelations. Much of parapsychological research is devoted to the determination of cognitive states fundamental to the occurrence of psi phenomena and, within the context of the ganzfeld, particular attention has been given to internal attention states. The seminal surveys by Braud (1975) and Honorton (1977) underscored the "deployment of attention toward internal mentation process" (Honorton, 1977, p. 466). This emphasizes the psi conducive cognitive state as one involving engrossment in ongoing mentation and a concomitant resistance to distraction by sensory stimuli. Thus, the occurrence of psi is thought to require a passive but concentrated focusing of attentional resources upon the contents of consciousness rather than upon the demands of sensorimotor processes.

Absorption and Psi

This characterization of the state of consciousness during psi experiences shows strong concordance with a psychological dimension known as absorption. Absorption is formally defined as "a 'total' attention, involving a full commitment of available perceptual, motoric, imaginative and ideational resources to a unified representation of the attentional object" (Tellegen & Atkinson, 1974, p. 274). Absorption thus represents the capacity and inclination of an individual passively, and more or less exclusively, to engage total attention in some object or experience, either internal or imagined.

The absorption construct has received considerable attention within parapsychology (for reviews see Irwin, 1985b and Stanford, 1987), and the similarity between absorption and the evident psi conducive cognitive state has prompted some investigation of the relationship between psi and the capacity for absorbed experience. The first study exploring this relationship in relation to laboratory ESP performance was that by Reid, Steggles and Fehr (1982) using the Tellegen Absorption Scale (Tellegen, 1982). The ESP task consisted of only three trials, on each of which the *a priori* probability level was set at 0.5. Not surprisingly, no significant correlation between ESP and absorption scores was found. A methodologically superior study by Palmer and van der Velden (1983) also failed to establish a relationship between absorption capacity on the Tellegen Scale and performance on a free response ESP task, however, this may be linked to the failure of the study overall to produce evidence of ESP having occurred. A significant positive correlation was reported by Stanford and Angelini (1984), between Tellegen absorption scores and the ESP task, when participants were bombarded with pink (random) noise rather than silence in the ESP sessions. In an effort to pinpoint time-locked verbal markers of entry into and function within an internal attention state during ganzfeld, Stanford, Kass, and Cutler (1988) reported higher psi success rates for those participants with high absorption scores, indicating that the absorption scale has some predictive value for ganzfeld-ESP performance. Sondow (1986) used a four-item, three point absorption scale devised by Bowers (1978) and found no significant relationships between it and creativity measures or ganzfeld-psi results, which were at chance overall. In an experimental induction of out-of-body experience's (OBE's), Irwin (1981) found that high absorption scorers were more open than low scorers to the laboratory OBE-induction technique.

At a more peripheral level, Mathes (1982) has found a positive relationship between absorption capacity and a tendency to have mystical experiences. Both the capacity and the need to become totally absorbed in an activity or an experience are higher among spontaneous psi experiencers than among nonexperiencers (Glickson, 1990; Irwin, 1994). Similarly, OBE experients as a group show superior capacity for absorption according to Irwin (1980, 1981), and this effect has been replicated by Myers, Austrin, Grisso, and Nickeson (1983). Wilson and Barber (1983) report that excellent hypnotic subjects (who rate high in absorption), report relatively frequent spontaneous paranormal experiences, including telepathy, precognition, apparitional experiences, and OBE's. A survey by Myers and Austrin (1985) has confirmed this association, and showed more specifically, a relationship between absorption capacity and a history of telepathy, precognition, apparitional experiences, OBE's, and a commitment to certain mystical and spiritual beliefs. Irwin (1985a) also found positive relationships between reports of parasomatic bodies in OBE's and high absorption scores.

Accumulating data from both laboratory research and spontaneous experiences converge to conclude that the capacity for absorbed experience is an important factor in the occurrence of psi. This, in turn, lends support to the view that the psi conducive cognitive state entails absorption in the context of mentation. The internal-attention states model would posit then, that people with the intrinsic ability to enter into an absorbed state should perform better at psi tasks. In addition, sensory restriction conditions, much like the ganzfeld, have been shown to strongly encourage absorbed mentation (Barabasz, Barabasz, & Mullin, 1983). A correlational study by Lynn and Rhue (1986) reported strong support for an association between creativity and absorption, hypnotizability, and expanded awareness as indexed by the scale developed by Tellegen and Atkinson (1974). In addition, absorption has been found to be conceptually related to openness (Glisky, Tataryn, Tobias, Kihlstrom & McConkey, 1991), and a study by McCrae (1987) concluded that the personality domain of openness is positively related to creativity. Hence, as a variable that has been linked to both creativity and openness, participants' absorption levels will be explored in relation to ganzfeld-psi success using the Tellegen Absorption Scale (TAS). A 34 item questionnaire type measure of individual's capacity for absorbed experience has been developed (Tellegen and Atkinson, 1974; Tellegen, 1982) and will be used for the purposes of this thesis. This form is comprised of the 34 TAS questions embedded along with 12 buffer items in a self report questionnaire, to comprise a 46 item absorption instrument (see Appendix 5).

In an attempt to further understand the effects of an internally focused, psi conducive cognitive state, certain session and mentation variables were examined. There is a fairly consistent pattern to indicate that a change of consciousness to a state dominated by primary process thinking (elementary, unstructured, symbolic) in response to the ganzfeld experience relates to psi success. For example, confirming his own earlier work (1980), and that of Stanford and Neylon (1975), Sargent (1982) reported a significant positive correlation between psi success and spontaneity, dreamlikeness, and unstructuredness of mental activity, indicating a noticeable change of consciousness in the ganzfeld ($p < .05$, 1 tailed). Bizarreness of session mentation (to what extent the mentation was primary process like) in the Sargent study was positively correlated, and time estimates of ganzfeld duration were negatively correlated, with psi success (for each, $p < .05$, 2 tailed). Palmer, Bogart, Jones, and Tart (1977) also observed that subjects who experienced shifts in their states of consciousness in the ganzfeld were significantly more likely to produce ESP than those who did not ($p < .05$), as did Sargent, Bartlett, and Moss (1982; $p < .002$). Stanford and Neylon (1975) found a significant difference ($p < .03$, two tailed) in estimates of ganzfeld duration for those who rated the target high versus those who rated it low. Those who did not underestimate time scored significantly below chance ($p < .005$, 2 tailed). The percentage of time that random, disconnected thoughts were reported correlated significantly positively with ESP scores ($p < .04$, 2 tailed) in that same study. Using a questionnaire similar to that used by Sargent (1980), Palmer, Khamashta and Israelson (1979) found that their successful subjects reported more bizarre, spontaneous and dream-like imagery than unsuccessful subjects. If, as this research seems to indicate, measures of a shift to a more 'altered state', underestimating time, and more random, disconnected, bizarre imagery are all associated with psi success in the ganzfeld, can these variables then be used to increase the repeatability of the ganzfeld procedure in eliciting psi? The purpose of including these exploratory variables in this thesis was to examine the session, mentation, and state variables that might help to predict successful ganzfeld-psi performance. While there is empirical evidence to support the hypothesis that relatively unstructured mentation may favor the occurrence of psi (see Stanford, 1975, 1979 for reviews), efforts to measure this or similar characteristics of mentation through post session questionnaire items require much introspection and reflection. As a consequence, such measures may be unreliable, have doubtful validity, and be subject to demand characteristics of the experimental situation. To circumvent this, immediately after the ganzfeld mentation period, but prior to any other activity, participants were asked a series of questions concerning their ganzfeld experience, including one on the passage of time, which is included on the session print-out. These were noted down by the experimenter on a two-part questionnaire developed in-house and based on similar questionnaires used in the aforementioned studies. This questionnaire, the Edinburgh Autoganzfeld Experimental Questionnaire, will hereafter be referred to as the EAEQ, Parts 1 and 2. The EAEQ was used to evaluate aspects of participant's mentation and to probe for differences in imagery and alteration of consciousness during the ganzfeld. Part 1 deals with participant's responses to these aspects of the ganzfeld and Part 2 deals with the experimenters subjective interpretation of session and mentation attributes for that trial. Two blind judges completed similar assessments for each session, including Part 1 and 2 of the experimental questionnaires for each participant. These forms can be found in Appendix 6.

Blind Judging of Free Response Material

While little systematic research has been done regarding the benefits of skilled versus naive judges, several ganzfeld studies which have utilized both subject and independent judges have shown differing results between the two. In a study by Palmer, Khamashta and Israelson (1979), two independent judges revealed a greater level of psi hitting than the judging by the subjects. However, Sondow (1979), Sargent, Bartlett and Moss (1982), and Child and Levi (1980) obtained a greater degree of psi scoring from their subjects judging, than from that of their independent judges. It should be noted here that the independent judges used by Child and Levi were not experienced judges, nor did they know that they were judging transcripts from an ESP study. A further finding from the Sargent et al., (1982) study demonstrated that the results from the independent judge correlated significantly with those from of the experienced subjects, but not with those of the naive subjects. This would seem to indicate that the use of experienced outside judges, who have received prior training or detailed instructions, is important to the judging task. Also of importance is the subject's own innate judging ability, and the differential abilities or inclinations of subjects to report their experiences during the ganzfeld. Given the complexity of free response judging procedures, the difficulties inherent in the judging of such material can be substantial. As noted by Palmer et al., (1977) the degree of transformation the psi response seems to undergo before its emergence into consciousness (and the subjects mentation) may render it unrecognizable to some judges, while others have little difficulty in its evaluation. While the foregoing experiments offer little conclusive evidence regarding whether independent judges would be better at identifying the psi material, (and thus the target), in ganzfeld trials than would the participants themselves (Milton, 1990), it is felt that an independent assessment of the presence of psi in the data is appropriate. While participants may occasionally become overly introspective when engaged in the judging task, or become caught up in emotional images, reacting to personally symbolic aspects of a target clip (Milton, 1985), it is hoped that the more subjective approach of an outside judge will provide additional information regarding target-mentation correspondences. It was decided in advance for the last four studies in this thesis that blind judges would evaluate session transcripts and compare them with the appropriate corresponding target pool, providing target ranks and ratings for each ganzfeld trial. For all studies, blind judges also rated various characteristics of the mentation reports themselves, so that these ratings could then be compared both with psi scoring and with the various individual differences measures.

Emotional Versus Neutral Target Material

The majority of reported spontaneous psi experiences appear to deal with emotionally charged material (i.e., deaths, weddings, etc.). Ganzfeld studies exploring the impact of the emotionality of the target stimuli (Bierman, 1995) seem to indicate that video clips embodying either a high negative or positive content make better target material than similarly evaluated 'neutral' targets. In two series which made use of with a limited number of targets and were designed to examine the emotionality variable in the ganzfeld setting, Bierman (1995) reported significant psi hitting for emotionally charged targets for both studies. Krippner (1975) suggested that emotional stimuli are more effective in dreams than in non-dream experiments, possibly due to a need for greater vigilance in the unconscious state. A dream study by Dalton, Steinkamp and Sherwood (1996), reporting overall significant psi results, found that the majority of hits in the study centered on targets having a negative or threatening aspect ($p = .005$, 61%), with neutral targets yielding the poorest response rate ($p = .47$, 33%). This experiment seems to reinforce the concept of vigilance in the dream state as put forth by Tolaas (1986) and Ullman (1986). Vigilance theory perceives the occurrence of psi in the dream state as an organism's means of scanning its environment for any possible physical and psychological dangers to the sleeping organism. Psi mechanisms are thought to be involved in identifying such threatening events occurring spatially and temporally distant from the dreamer. Other parapsychological studies have examined the impact of strong emotional target stimuli on the psi response of participants, and of particular interest for this experimenter was the research conducted by Moss and Gengerelli (1968) and Moss (1969). These studies used emotionally stimulating target material with artists and non-artists (discussed in detail in chapter 3) in an effort to recreate the strong emotion typically reported in spontaneous psi events. These studies were overwhelmingly successful, but an analysis examining the impact of target emotionality on the psi results (ascertaining whether negative or positive targets were more successful) was not conducted. Study emphasis was on the participant population rather than target qualities, and the stimulus material is given only as being comprised of six episodes of contrasting emotional material arranged into three pairs. Mention is made in both studies of the appearance of considerable primary process material, which is compared to similar findings in both subliminal research (Pine, 1960) and the dream research conducted by Ullman, Krippner and Feldstein (1966).

Furthermore, previous research in the ganzfeld technique has indicated that dynamic targets, or video clips with an accompanying soundtrack, may be the best type of target material for research into altered states and psi (Dalton & Utts, 1995; Honorton, Berger, Varvoglis, Quant, Derr, Schechter & Ferrari, 1990). It is speculated that this is due to video clips more closely mimicking real life material, involving color, sound, motion and emotion, which may add to the ability of the participant to retrieve the target material. Video clips are typically thematically based, with this theme being reinforced throughout the duration of the video clip. Van de Castle (1977), himself a participant in several dream-psi studies, strongly recommended that psi target stimuli always be emotionally compelling and diversified. Based on these recommendations and the significant findings of current ganzfeld work using dynamic targets (Bierman, 1995; Broughton & Alexander, 1995; Morris et al., 1993), this thesis also elected to make use of dynamic video clips as target stimuli.

Therefore, for the purposes of this thesis, a target pool of dynamic video clips with accompanying sound track was compiled. This dynamic target pool includes excerpts from motion pictures, television shows, documentaries, and cartoons, all of exactly one minute duration, and comprised of equal measures of neutral (e.g., seagulls flying), positively charged (e.g., children playing), and negatively charged (e.g., nuclear explosion) target clips. Successful dynamic clips from the Psychophysical Research Laboratories (PRL) autoganzfeld target tapes were edited and incorporated, as well as several video clips from a successful previous semi-automated ganzfeld study conducted at Edinburgh (Morris et al., 1993). Additionally, the author gathered, coded and edited new material that she felt embodied successful elements of target stimuli, to complete an initial target pool of 72 video clips for the first study, and later expanded this to 100 clips for the last four studies. These 72 clips were arranged in judging sets of four targets, constructed to minimize similarities among targets within a set, for a total of 18 sets of four target clips. Two identical target tapes were constructed, one solely for viewing by the sender, the other solely for viewing and judging by the receiver. A more detailed description of the target presentation system is given in chapter 6. At the conclusion of the studies, three blind judges assessed the target pools for emotional impact of target material, and these ratings were used to assign a target emotionality rating (separate from that of the authors', who knew the origin of the clips). This emotionality rating was correlated with participant's rankings of the target to evaluate whether participants tended to 'pick up' better on one type of target stimuli over another.

The Geomagnetic Field and Psi

Given that environmental conditions provide a potentially rich source of signals to the human organism (Campbell, 1967), then it is to be expected that psi experiences, both in and out of the laboratory, should like other behaviors be influenced by complex, subtle stimuli within the environment. Research into the relationship between the geomagnetic field and ESP over the last decade or so has produced an increasingly large body of evidence that suggests a relationship between psi performance and fluctuations in the field (Arango & Persinger, 1988; Berger & Persinger, 1991; Haraldsson & Gissurarson, 1987; Lewicki, Schaut & Persinger, 1987; Persinger & Schaut, 1988; Persinger, 1985, 1987, 1989; Persinger & Krippner, 1989; Radin, McAlpine & Cunningham, 1993; Schaut & Persinger, 1985; Spottiswoode, 1990, 1993; Wilkinson & Gauld, 1993; Williams, Roe, Upchurch & Lawrence, 1994). This relationship has associated periods of relative quiescence in the geomagnetic field with enhanced psi perception. Persinger and Krippner (1989) reported that higher scoring for dream ESP experiments ($p = .04$) tended to occur on days of low geomagnetic field activity, relative to the surrounding days, as did Tart (1988) in his study of GESP. Similar findings were reported by Makarec and Persinger (1987), for card guessing scores. Spottiswoode (1990), in his analysis of six free-response studies, found a significant negative correlation between trial scores and the geomagnetic field values of the three hour periods in which the trials occurred. The Spottiswoode study also pointed out that this observed geomagnetic effect was absent from studies with no apparent overall ESP result.

Analyses conducted by Persinger (1987), Persinger and Schaut (1988), and Wilkinson and Gauld (1993) on spontaneous case materials have indicated that the reported psi experiences of day to day life also take place, to a significant degree, in times of low geomagnetic activity. This appeared to be especially true of reported telepathic experiences (Persinger, 1988). Possibly then, it is the day-to-day variations in this global phenomenon which would help explain the persistent variability in the display and accuracy of these experiences, both in the laboratory and in daily life.

The earth's magnetic field can be likened to that of the magnetic field surrounding a bar magnet. However, while the intensity of a typical bar magnet's field is measured in tenths of a Tesla, the geomagnetic field (GMF) typically measures a few hundred-thousandths of a Tesla. In addition, the bar magnet's field is static, while the global geomagnetic field is constantly changing as the Earth is subjected to solar and other extraterrestrial influences. Such influences show up in geomagnetic measurements as either periodic (e.g. the day-night cycle due to solar heating) or transient (e.g. cosmic ray events) fluctuations. These fluctuations are recorded and transformed into several types of geomagnetic measures. The measures most typically used in psi research are the *ap* and the *aa* indices, the former being a three-hourly and the latter a daily measure of the mean change in the global geomagnetic field. It is the *ap* indices that is of interest in this thesis.

However, one of the problems inherent with studies examining this topic is the lack of understanding as to what mechanism(s) could account for a psi-GMF relationship. Broadly speaking, the possibilities are:

(a) that the ambient magnetic field somehow interacts with, or composes, the physical mechanism underlying psi,

(b) that some third factor modulates both the GMF and psi or,

(c) that the ambient magnetic field has some direct effect on human physiology that directly or indirectly affects psi functioning.

In his extensive work examining the relationship of the GMF to the psi process, Persinger (1979), among others, has examined the first two possibilities in some detail. For the purposes of this thesis, then, it was decided to explore the GMF-psi relationship in view of the third option.

Even though past research has suggested that magnetic fields could affect human physiology, Hubbard and May (1986) have argued that magnetic fields as weak as the geomagnetic field could have no effect, and would most likely be swamped out by the stronger local fields caused by electrical appliances and such. However, there has been more recent, and better quality, research showing that this is indeed a viable proposition. It has been shown that with fields weaker than the geomagnetic field, the brain exhibits electrical activity at the frequency of the ambient field, but only if the frequencies correspond to those occurring naturally in the brain (Bell, Marino & Chesson, 1994). However, these induced effects are known to be transient (e.g., see the review by Ross-Adey and Bawin, 1977).

Although the literature is consistent in suggesting a relationship between low geomagnetic field activity and psi performance, few studies have used a creative population. A previous evaluation by Radin et al., (1993), of two separate ganzfeld studies at Edinburgh, one of which used a creative population and the other a normal one, demonstrated a non-significant negative relationship between psi hitting and geomagnetic field for the normal population, but a non-significant positive correlation for the creative population. In effect, the creative population was evidencing a higher hit rate during periods of high geomagnetic activity, which is a reversal of the normally found trend. Given that the correlations were non-significant, it may be that this particular trend was a chance occurrence. Therefore, in keeping with the more often found trend of low geomagnetic field indices and psi hitting, a positive relationship was predicted between a low geomagnetic field (as measured by the *ap* index) and psi hitting in the ganzfeld. Geomagnetic parameters using the *ap* index were derived from a local survey station approximately forty miles away in order to examine the relationship between psi hitting in the ganzfeld and low geomagnetic field fluctuations.

The determination of the mechanism, or mechanisms, by which ESP occurs would greatly facilitate the understanding of psi, and provide a solid base from which to more definitively explore psi, as well as enhancing the possibility of eliciting more controlled psi. An important first step in this determination would be the identification of some measurable variable that is systematically associated with the occurrence of ESP. The relationship between the geomagnetic field and ESP could play a vital role in this search for the first physical correlate of psi. Therefore, after completion of all ganzfeld trials presented in this thesis, the geomagnetic ap indices for every trial were compiled and correlated with the target ranks for that session. This was conducted in support of the hypothesis that psi hitting is associated with low geomagnetic field activity as measured by the *ap* indices.

Pre-Selection of Ganzfeld Participants

The Participant Information Form (PIF) is a demographic survey questionnaire used regularly by the Koestler Chair and contains 77 items collecting general information on participant's demographics, background and experiences. This confidential questionnaire includes several questions about belief in and experience of psi phenomena. Participants who believe in and/or have experienced what they interpret as psi phenomena are traditionally called 'sheep'; 'goats' are those who disbelieve in psi phenomena and who have not had experiences which they interpreted as psychic. Parapsychologists have found that sheep tend to score consistently positively at psi tasks, while goats tend to score consistently negatively (Palmer, 1982; Lawrence, 1993). Converging evidence from earlier ganzfeld research (Honorton, 1992) has found that initial ganzfeld success was positively and significantly related to four specific factors : 1) Prior psi experiences; 2) the practice of some mental discipline; 3) prior laboratory psi testing; and, 4) Feeling/Perception (FP) preferences on the Myers Briggs Type Inventory (MBTI). In addition, those participants who list themselves as both having a belief in psi and prior psi experiences tend to out perform others in the ganzfeld who have listed only one of these. It was stated earlier that all participants taking part in the ganzfeld studies presented here were pre-selected primarily on the basis or their apparent or stated creative/artistic ability. In order to involve participants who would be most likely to produce psi in the ganzfeld, thus ensuring a more greater chance of examining the variables and characteristics outlined, it was decided to pre-select whenever possible, ganzfeld participants on the basis of their affirmative responses to both of the 'sheep' questions (belief in psi + prior psi experiences), for affirmative responses to the question of the practice of a mental discipline, and for an affirmative response to the PIF question regarding whether they felt that they personally would be able to demonstrate psi ability in a controlled laboratory experiment, considered by Schmeidler (1988) to be the third of the more important 'sheep' questions.

The decision was made not to try to develop a non-creative comparison group for the studies in this thesis for two reasons. First, the standard definition and understanding of creativity posits that everyone is thought to be creative to some degree, and at some level. Further, as the ganzfeld research database from Psychophysical Research Laboratories (PRL) was quite large, and excluding the Juilliard sample, is comprised of some 314 ganzfeld trials, it was felt that this database was adequate for a comparison group. The PRL database is acknowledged (Honorton, 1992; Honorton et al., 1990) to consist of ganzfeld research conducted with an ostensibly 'general' population, and can be considered an acceptable control group for this study.

Summary

This chapter has outlined several exploratory variables of interest to this research. The first of these, absorption, has a long standing tradition of association with hypnotizability and the ability to become completely immersed in a task, both traits that have been associated with psi success. Absorption is also thought to facilitate the creative process, by reducing distractions and focusing attention on the creative task. In particular, absorption as a participant trait would seem to facilitate the elicitation of psi in the ganzfeld due to the necessity of the participants becoming absorbed in their imagery to the exclusion of possible outside distracting influences. Spontaneous case material lends weight to this supposition, and laboratory evidence seems to suggest that absorption plays a role in the achievement of an internally focused psi conducive cognitive state. Particularly in the generation of primary process imagery.

While the final consensus on the efficacy of blind judging offered no conclusive evidence either way, it was felt that an independent assessment of the presence of psi in this data was appropriate. Blind judging of various characteristics of the participant's mentation reports themselves, as well as session variables, will allow these ratings to be compared both with overall psi scoring and with the various individual differences measures. It is hoped that the subjective information from the blind judges will provide further instruction regarding target-mentation correspondences.

The emotional impact of target material is a topic of great interest for any research dealing with psychological or physical reactions to stimuli. While prior research in parapsychology indicates that there is a greater reaction to emotionally charged stimuli, there has been very little conducted in the way of determining in what direction the reaction is greatest. While vigilance theory in dream research would seem to indicate that target stimuli incorporating a threatening or negative aspect elicits the greatest response from the sleeping organism (Ullman, 1986), ganzfeld research conducted with both negative, positive and neutral targets, would seem to indicate that to the conscious organism, any target of sufficient emotion charge elicits a response (Bierman, 1995), while neutral targets are, for the most part, ignored. By assessing the target emotionality after all ganzfeld trials have been completed, any response bias on the part of the experimenter is felt to be avoided, allowing for a clearer comparison of target emotionality to overall psi scoring. The aspect of target emotionality explored in this thesis is considered by the author to be a factor that is of importance to both psychological and parapsychological research communities. It must be noted at this point however, that exceptionally strong negative, or disturbing, material was omitted from the target pool as a means of avoiding any possible mental or psychological distress for the receiver or the sender.

As evidenced by the many studies that have sought to examine the relationship between increased psi perception and a quiescent global geomagnetic field, this variable may well become the first measurable physical correlate of psi. Its inclusion in this thesis is an attempt to aid in that endeavor. In a strange reversal of the usual geomagnetic-psi relationship, an evaluation by Radin et al., (1993), of a creative population in a semi-automated ganzfeld study at Edinburgh University, demonstrated a non-significant positive correlation. This means in effect that the creative population evidenced a higher hit rate during periods of high geomagnetic activity. Given that the correlations in this evaluation were non-significant, it is felt that this may have been a chance occurrence. Accordingly, the ganzfeld trials in this thesis, all conducted with a creative population, have been evaluated with the normal geomagnetic-psi relationship in mind; that of increased psi perception on days of low geomagnetic activity.

As much of parapsychological research is devoted to the determination of cognitive states fundamental to the occurrence of psi phenomena and, within the context of the ganzfeld, to understanding those process-oriented attributes that appear to facilitate psi perception, several variables have been reviewed here as a means of exploring those interrelationships. In order to carry out such explorations, a secured experimental method of doing so, one that reduces the possibility of artifactual and experimenter error, must be developed. The following chapter describes just such an experimental system and protocol, while attempting to address previous flawed study designs and procedural confounds.

The Development of an Improved Methodology for the Study of Psi in the Ganzfeld*

Chapter 6

Chapter 2 found that reviews of the ganzfeld-psi meta-analyses and its critics demonstrated that while the effectiveness of the technique itself was not in question, many of the study designs and procedures were. In devising an improved methodology for experiments in this thesis, it was hoped to retain or even enhance the effectiveness of the ganzfeld technique while improving upon or circumventing past procedural and design flaws. A critique and discussion of PRL's autoganzfeld studies design and procedures by Wiseman, Smith, and Kornbrot (1994) describes a non-psi hypothesis which they feel could potentially account for the results. This chapter first briefly summarizes past debates of the ganzfeld-psi results, then moves on to focus on Wiseman et al.'s critique, pointing out the difficulties with this assessment. Finally, the chapter concludes with a description of the development of a methodology for improving the ganzfeld-psi process that seeks to overcome the potential flaws identified in Wiseman et al.'s critique.

Like any other controversial area of science, parapsychology has had its critics (e.g., Alcock, 1987; Bunge, 1991; Frazier, 1986; Hansel, 1980). However, the criticisms leveled at procedures and designs have, when valid, been of great benefit to parapsychology, allowing objective and constructive suggestions for improvement to be implemented, enhancing the science as a whole. The Hyman-Honorton debate, discussed in chapter two, is a prime example of such an exchange. After a series of exchanges over the assessment of design flaws in ganzfeld studies, a meeting between the two authors allowed them to realize that their disagreements centered on 'technicalities' rather than focusing on central issues, many of which they were in agreement about. They collaborated on a joint communiqué (Hyman & Honorton, 1986), which listed specific methodology improvements and guidelines for future

* * This chapter draws from a paper presented by the author at a 1995 Parapsychological Convention.

research, as well as encouraging critics and parapsychologists to work together in focusing on common objectives.

Honorton began a series of automated ganzfeld researches in 1983 designed to meet the criteria outlined in the joint communiqué, and eventually published a paper summarizing the results of that series (Bem & Honorton, 1994). This prompted Hyman to publish a critique of the PRL work, with a reply this time by Bem (Honorton died before the actual publication of his paper). This exchange is detailed in chapter 2, but to summarize, Hyman stated that the automated ganzfeld failed to replicate certain patterns and trends that had emerged in the manual ganzfeld studies, and challenged the adequacy of the randomization procedure in the experiments. Bem pointed out that what Hyman referred to as 'patterns' had been published as 'suggestive' findings, and that PRL's automated ganzfeld had also yielded 'suggestive' finding in this same area (the sender/receiver relationship). Bem addressed the issue of randomization by pointing out that documentation on the adequate randomization of the target set of four, the most critical issue under scrutiny, was provided by Honorton et al. (1990). These statistical analyses had confirmed a uniform distribution of values throughout the full target range of 160 possibilities, and statistical tests on the actual frequencies observed confirmed that targets were selected uniformly from among the four possibilities within each target set, and that the four possible judging sequences were uniformly distributed across the sessions.

In his review of the skeptical literature, Honorton (1992b), stated that the skeptics could no longer claim to have demonstrated a relationship between methodological flaws and study outcomes. Honorton felt that, having failed in showing that psi effects were not really significant or that their significance was systematically related to the presence of flaws in the experiments, parapsychology's critics had run out of plausible conventional explanations. Thus, it is not too surprising that the 'alternative hypothesis' put forth by Wiseman et al. in attempting to explain the success of the PRL data fails to meet either of these criteria: conventional or plausible.

The alternative hypothesis set forth by Wiseman et al. (1994) centers around the possibility that the sender verbalized either during the sending or the judging period while in the sender's room in such a way as to be heard by the experimenter. This was in spite of the fact that senders had explicitly been verbally instructed by the experimenters not to do so (Berger, 1994), and that the computer itself displayed a message before every showing of the target clip that the sender was to 'silently communicate' this clip to the receiver (Berger & Honorton, 1985). In addition, the word 'silently' in the message was flashed on and off to reinforce this aspect of the message. Wiseman et al. conjectured that if some senders vocally rewarded any of the receiver's relatively accurate comments, the experimenter would only have had to unconsciously register the presence (and not even the content) of these noises to know that a certain section of mentation pertained to some aspect of the target. Because target sets were "constructed to minimize similarities among the targets within a set" (Bem & Honorton, 1994, p. 9), Wiseman et al. felt that this would have made it easier for the experimenter to make implicit unconscious use of this information to somehow cue the receiver as to the identity of the target clip. The potentially large effect that unconscious experimenter cueing can have on psychological experiments has been well documented (see Rosenthal, 1966). Wiseman et al. theorize that this cueing could have occurred when the experimenter reminded the receiver of their mentation, or in those series where the experimenter reminded receivers of possible target correspondences that they might have missed, which occurred for 165 of the 354 trials. Wiseman et al. are careful to point out that they are not speculating on experimenter fraud, but on whether the experimenter may have unconsciously detected and utilized subliminal noises escaping from the sender's room. It should be noted here that Wiseman et al.'s hypothesis deals with subliminal sounds levels due to the fact that sound insulation for the PRL senders room that can be verified would rule out any sound level within the normal hearing range.

As part of this hypothesis, Wiseman et al. speculate on the extent and effectiveness of the sound proofing measures in the sender's room. While there is extensive information available regarding the receiver's acoustical isolation (Industrial

Acoustics Corp., 1205A Sound Isolation Room), being placed in a specially built, industrial standard sound isolation room (Honorton et al., 1990), this was not so for the sender's room. Due to Honorton's death before this examination took place, and the closure of the lab resulting in the storage of information in various places (some inaccessible), there were not many sources of information available about the extent to which the sender's room was insulated. Many of the people still accessible who worked at PRL before its closure did so after the construction of the sender's room, which was built some time before 1982, almost 15 years ago. The memories of the various people that Wiseman et al. consulted about room construction were vague, occasionally conflicting, or later found to be inaccurate. In addition, the building itself has been torn down, precluding a physical inspection of the premises. Because of the impossibility of reconstructing the actual wall and room material, Wiseman et al. acknowledge the difficulty of trying to establish the plausibility of the 'sender-to-experimenter' leakage hypothesis (Wiseman et al., 1994). With this in mind, let us examine their sound leakage hypotheses.

Wiseman et al. conjecture that there were two types of sound which may have leaked from the sender's room: Structure borne sound and airborne sound. Structure borne sound could be caused, Wiseman et al. stipulated, by senders stamping their feet on the floor or striking their hands against the arms of the chair. As the floors of the experimenter's area and sender's room were on the same level and structure borne noise, such as the slamming of a door, have been noted (Everest, 1994) to travel great distances, Wiseman et al. felt that while the carpet that was known to be in the sender's room would have helped to dampen the effects of structure borne noise, it may not have completely eliminated it. However, how the experimenter might have differentiated the effects of structure borne noise coming from the sender's room from that coming from other rooms and offices on the same level, is not discussed. Wiseman et al. note that structure borne noise is unlikely and focus their attention on the possibility of airborne noise.

The crux of Wiseman et al.'s argument lies in the assessment of airborne noise, caused, for example, by senders giving off vocal cues of delight or encouragement while listening to the receiver's mentation. In attempting to assess the possible pathways for sound to travel from sender to experimenter, the authors list two ways this might have occurred:

1) Around the frame of the sender's room door, which was a steel door filled with sound absorbent foam; or,
2) Through 'flanking transmission', which refers to any indirect paths of sound, such as the small amounts of sound that might travel along the floor, ceiling or back wall of a room.

While Wiseman et al. were unable to ascertain whether there could have been actual leakage from around the sender's room door frame, they felt this is suggested by the fact that PRL experimenters positioned a "free standing Sonex-covered plywood barrier (5 ft wide by 8 ft high)" (Honorton et al., 1990, p. 104) inside the sender's room, between the sender's chair and the acoustical door, to control for any possible sound transmission through the door frame. It should be noted that the sender's room had double walls which were covered with four inch Sonex acoustical tiles, as was the ceiling of the room. Further, the experimenter was situated some 12 to 14 feet away from the sender's room door. For a more detailed description of the sender's room, see Honorton, et al., 1990; Wiseman et al., 1994.

With regard to the possibility of 'flanking transmissions', Wiseman et al. were also unable to obtain details regarding whether the walls contained structure breaks to prevent this. However, the Honorton et al. report mentions the inclusion of a fine copper mesh inside the walls of both rooms for electrical shielding purposes, which would have considerably reduced any such transmissions.

In attempting to assess whether any meaningful levels of sender noise could have reached the experimenter, even subliminally, Wiseman et al. acknowledged that it is impossible to accurately assess the amount of possible sender-to-experimenter acoustic leakage that there might have been, especially as the PRL autoganzfeld facility has been dismantled. Additionally, they note that their estimates for evaluating possible sounds levels are based on the best of all possible 'leakage' conditions. In discussing the possibility of subliminal perception of target information by the experimenter, they note that "the literature on acoustical subliminal perception is in itself controversial" (Wiseman et al., 1994, p. 450) and that some theorists on the matter argue that the phenomena has not been demonstrated, while others argue that it has (see Urban, 1992, 1993, for a review of this literature). As such, Wiseman et al. state that their analyses represent the most optimistic estimates and interpretations of subliminal literature for their hypothesis.

The Wiseman et al. paper (1994) concludes by saying that despite the possible problems outlined in their report, they believe that the autoganzfeld studies, and its resulting database, not only represent an impressive achievement, but also achieved a very high level of methodological sophistication. The authors suggest several methodological improvements for future ganzfeld work:

1) Increased documentation (written as well as electronic media, such as video or photographs) of the physical layout and qualities of the facilities involved;
2) Identification in the written study report concerning any discrepancies between authors, or of any summaries of that study presented by other authors;
3) In terms of the sender's room design, ganzfeld experiments should either, i) place the sender in a purpose built sound isolation chamber (similar to the receivers room) or, ii) move it much further away from the experimenter, preferably where it will not share the same flooring level. (Wiseman et al. 1994, p. 451-452).

In a reply to Wiseman et al., Bierman (1995b) examined internal patterns in the PRL data to assess the plausibility of Wiseman et al.'s claims. Bierman noted that the Wiseman et al. hypothesis would predict stronger effects for sessions where the subject was less confident about his ratings, which would enable the experimenter to influence her/him toward a particular selection. A secondary analysis comparing scoring in sessions with strong confidence ratings with the scoring in sessions with a lower rating actually showed the opposite trend. Bierman concluded from this pattern that the sound leakage hypothesis was not supported for the PRL database.

The Wiseman et al. (1994) paper serves the purpose of pointing out that it is essential to parapsychology's continued growth as a science that errors and problem areas with earlier work are identified and eradicated in future studies. Thus, the automated ganzfeld procedure developed at PRL (Berger & Honorton, 1985) was designed to address the basic methodological problems identified in the Honorton-Hyman debate following the meta-analyses of earlier literature (see chapter 2). The new procedures and methodology outlined in this chapter furthers that effort, and is designed to address the concerns and methodological problems that Wiseman et al. (1994) and others (Hyman, 1994; McCrone, 1993) have raised regarding the PRL work.

Identification of Problem Areas in Autoganzfeld Research

As we have seen, although the autoganzfeld results have been held in high esteem, close examination of the procedure still raised questions and suggested the need for improved design in future studies (McCrone, 1993; Wiseman et al. 1994). In essence, criticism has focused on a few main areas.

1) Honorton et al. (1990) acknowledged that after about 80% of the sessions were complete, it was found that there was the possibility of dynamic target soundtrack leakage into the receiver's headphones. This was regarded by the researchers as extremely unlikely to have affected results, given that; (a) for the leakage to be heard consciously over the receiver's headphones, the white noise had to be turned off completely and an external amplifier had to be added between the VCR and the receiver's headphones; (b) there was no correlation between success rate and white noise level during the earlier trials ($t = -.48$); and (c) the results for dynamic targets actually increases after the possibility of leakage was eliminated. Regarding (b), however, it has been pointed out that perhaps those most skilled at extracting weak signals from noise may, for some reason, also be those who would prefer higher white noise settings, thus canceling out any correlation between success and noise level.

2) Since the same video tape was used as the target and for the judging, the target clip may have looked slightly different in some way, since it (unlike the other three)

had just been shown six times. However, this would not explain the greater success of dynamic vs. static targets, and video technicians (Sony, 1993) do not know of any evidence that such playing of the tapes would modify them in any noticeable way, e.g. distortion, increased static, or the like.

3) Given that the experimenter interacted with the receiver, and in some series, pointed out correspondences that may have been overlooked by the receiver during judging, then perhaps experimenters were somehow given cues about the identity of the target (perhaps even unconsciously), which then led them to guide the receiver to notice more correspondences with the correct target. Several sources have been suggested:

a) Cues in the physical appearance of the just played target tape as noted above;
b) Slight differences in the lengths of the four tapes (for example, if the experimenter could hear the click of the VCR turning off and on during the target presentation to the sender - and the tape was nearby - thus the experimenter might have gotten possible length cues for the target tape);
c) Differences in the rewind time from a target tape at the end of a pool versus the beginning, as the tape is rewound after being displayed to the sender; or,
d) Idiosyncratic sounds made by the target tape when being played by the VCR.

These seem unlikely but not impossible. Effort was made to have all targets in the PRL research approximately 73 seconds long, although there may still be slight differences among them. Tapes were set to rewind to a central location after displaying to the sender, to minimize time cues to the experimenter. During the special series with one dynamic target pool, when the experimenter may have had a real opportunity to notice at some level the rewind time, the computer was programmed to return to a randomized location on the tape. Regarding idiosyncratic tape noises during the tape playing itself, this seems very unlikely since the experimenter wore headphones the whole time, listening to the receiver's mentation, and the videotapes play quite softly (it should be noted here that the author has interacted extensively with the PRL automated system, installing it at the Rhine

Research Center during her time there as a research fellow). Additionally, these sources of possible cues to the experimenter, unlike the soundtrack cues, are equally likely for dynamic and static targets, and could not explain the differences between them. Finally, those series where the experimenter did not attempt to facilitate the receiver's noticing of correspondences did not produce independently significant results, although the effect is weaker.

4). The issue of possible sound leakage from the sender's room to the experimenter. Sender's were instructed both verbally (Berger, 1994) and via monitor to silently communicate the target to their receiver, and to silently encourage selection of the correct target during the judging sequence. Still, the sender was not as acoustically isolated from the experimenter as from the receiver, since the experimenter was in an adjoining room and the acoustical shielding in the sender's room was less than for the receiver's room. However, leakage from the sender to the experimenter seems unlikely, as the experimenter was wearing headphones at all times and hearing either the receivers' response when viewing the targets, the soundtrack of the target itself, or was in discussion with the receiver about the just viewed clip. In addition, the experimenter was seated within a three sided cubicle, whose walls extended out past either side of them, and which put the experimenter below visual level when seated (Varvoglis, 1995). This would effectively block, in the author's estimation, possible subliminal sound levels coming from the sender's room.

5). The possibility of signaling systems between the sender and the receiver, when the sender was an outside friend of the receiver. Such systems can be extremely sophisticated and essentially impossible to rule out completely. However, over half of the data were collected with lab personnel as senders, and the results were almost as good (34%) as those with nonlab (36%). Since the results with nonlab senders were spread out over many sender-receiver pairs, such a signaling system would have to be deployed by quite a few people, not just one or two deceptive individuals.

6). Experimenter fraud cannot be arbitrarily ruled out, as the experimenter in these studies could have easily removed the coverings from the VCR to obtain the identity of the target and then attempted to bias the receiver's judgements; or, the safeguards of the computers controlling program, Series Manager, could have in principle, been circumvented by a clever experimenter. Given the spread of positive results throughout the eight different experimenters involved, this possibility becomes less likely as several of them would have had to be involved. Given that all were working in the same lab makes it even more important to obtain independent confirmation of the automated ganzfeld results from other laboratories.

In summary, several different kinds of criticisms have been offered of the PRL autoganzfeld results. Taken individually, each has problems in accounting for both the overall results and for the stronger results with dynamic targets. In addition then, to the identification and eradication of procedural and design flaws, steps to circumvent the possibility of fraud (or the accusation of fraud) must also be taken. Security safeguards designed to address these issues are discussed next.

The Necessity of Instituting Safeguards

Safeguards against fraud or deviation from protocol are often challenged, with regard to researchers as well as participants. This may be especially true for protocols that involve very few subjects, already regarded as talented, including special sender-receiver pairs. Many parapsychologists deliberately choose to avoid gifted or special subjects, because they wish to escape the suggestions of fraud that would likely follow positive results. As Morris (1987) has argued, protocols that emphasize one, or few participants, and produce dramatic effects are regarded as ideal by those who wish to avoid the noise and uncertainty produced by weak results. Unfortunately, such dramatic effects are also attractive to the media and thus regarded as ideal for the 'pseudo-psychic' — the participant intending to cheat if given the opportunity.

In general, the more participants involved in a study the less likely deception is, as one would need to posit increasingly complex collusion among different individuals. In addition, the motivation of a pseudo-psychic to cheat is decreased when there is less opportunity to become famous by doing so, as in studies that use many participants and do not focus on individual results (Morris, 1987). Process-oriented research also militates against deception, as the internal patterns of results would need to be produced fraudulently as well. However, pseudo-psychics who are familiar with the study's background may be able to replicate those patterns (see Wiseman & Morris, 1995 for a description of strategies that pseudo-psychics can use to produce patterns in results). With larger population samples, such possibilities become increasingly unlikely unless the participants are all drawn from the same tightly knit group. However, many investigators may not have the necessary resources to conduct larger studies or may not be able to locate enough participants capable of the strength and consistency of psi performance that would be desired for effective process-oriented research. Thus, it is important to employ procedures designed to minimize the likelihood of participant fraud.

A second area of security that is addressed here concerns precautions against experimenter bias or deviation from intended procedure. This is a serious consideration primarily for protocols that employ a single experimenter and where intentional experimenter bias would likely pass unnoticed by others connected with the study, such as colleagues and participants. Intentional experimenter bias is of less concern with co-experimenter procedures, where different sessions are conducted by different experimenters, and where independent researchers have previously found evidence for the effect in question. It should be kept in mind when considering intentional experimenter bias that motivation can go in both directions. One may wish to get good results to keep a program alive, to obtain more funding and prestige, etc., especially if the experimenter is persuaded that the effect is really there, but currently eluding detection. On the other hand, it could be argued that some researchers may be motivated to produce chance results because they would then be regarded by many mainstream researchers and the media as excellent scientists, doing a fair evaluation of the phenomena but in some way using methodologically superior procedures. Researchers may find their motives, designs and procedures questioned and come under suspicion of fraud, regardless of results.

Given the possibility of attribution of intentional experimenter bias or procedural deviation, ideally one would wish to employ procedures that eliminate these, without hopelessly constraining the procedures to ones that have no real ecological validity, and for which one would have little reason to expect success. If a procedure's virtues could easily be made obvious to potential critics, yet not seem intrusive to participants, those involved could feel more confident that whatever results emerged would not lead to unfounded accusations. However, in practice, such perfection can only be approximated. The most effective solution, in parapsychology as well as other research, is natural replication and extension, with many participants and researchers involved. But it is also important and useful to have procedures as well safeguarded as possible, even at early stages, for several reasons:

1) As a sign of general competence;
2) To minimize unfair accusations;
3) To help those involved feel comfortable with the results at various stages of the study;
4) To provide conditions that will not need to be altered substantially in later stages, following reasonable criticism of earlier studies;
5) To discourage fraudulent individuals, such as pseudo-psychics, from participating and wasting researchers' valuable time and resources;
6) To encourage others to feel confident in undertaking replication attempts; and,
7) To encourage potential sources of funding to feel confident that their funds will be intelligently used.

For the remainder of the chapter the development of the automated ganzfeld system at University of Edinburgh is discussed in relation to attempts to address these issues.

Development of the Koestler Chair Automated Ganzfeld System

The automated ganzfeld system of the Koestler Chair of Parapsychology was developed as a means of replicating and extending the successful ganzfeld research at PRL. A detailed description of the automated ganzfeld system used at PRL can be found in Honorton et al., 1990. The PRL system was the brainchild of several people, with Rick Berger primarily responsible for the design of the hardware and software of the system, and many others involved with its development at various stages.

The Edinburgh automated system was designed to be used as a free-response testing system under a variety of experimental designs, including automated ganzfeld research. It is a computer-based system that provides automatic data recording, highly effective shielding against sensory cues, and resistance to both subject and intentional experimenter bias. 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, a super VGA monitor and a printer. The target presentation system involves two PC/VCR's, both frame-accurate NTSC videocassette recorders 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. Other equipment includes 3 NTSC video monitors, one each for the receiver, sender and experimenter; 2 stereo cassette tape recorders (one for the mentation and one for judging), and one for playing relaxation instructions and white noise; 2 microphones (clip-on for the receiver, hand held for the experimenter); 2 four-channel stereo mixers; 2 stereo audio amplifiers; 3 headphones, one each for receiver, sender and experimenter; 1 red incandescent bulb and flexipoise lamp; and an audio cassette tape with 15 minutes of relaxation instructions and 30 minutes of white noise.

The program itself runs under a combination of Microsoft Quick Basic 4.5 and Windows 3.1/DOS 5, and is password protected - unless the experimenter has knowledge of the correct password he or she cannot run the program. The program produces a datafile during each session which is stored to both the hard drive and a floppy disk, and is sent for immediate printout to the printer at session conclusion. All target presentations, VCR video and audio signals, as well as computer graphics, are computer-controlled.

The system at Edinburgh was originally conceived and initially programmed by Charles Honorton. It was re-designed, after Honorton's death, by Dean Radin and Robin Taylor to improve security features and sensory shielding, and re-programmed and documented by Dean Radin. For a description of research using an early version of this system at Edinburgh, see Morris et al., (1993). Additional re-programming, security features and sensory shielding have been implemented by the author, who also completed the necessary upgrading and documentation. Consultations with Richard Wiseman were conducted to gain the viewpoint of a skeptic (as well as a magician) on the security measures of the system, and improvements made to the system accordingly by the author. Professor Robert Morris and Deborah Delanoy were involved conceptually throughout this system's development. Additionally, during the course of this process, additional computer security expertise was occasionally consulted.

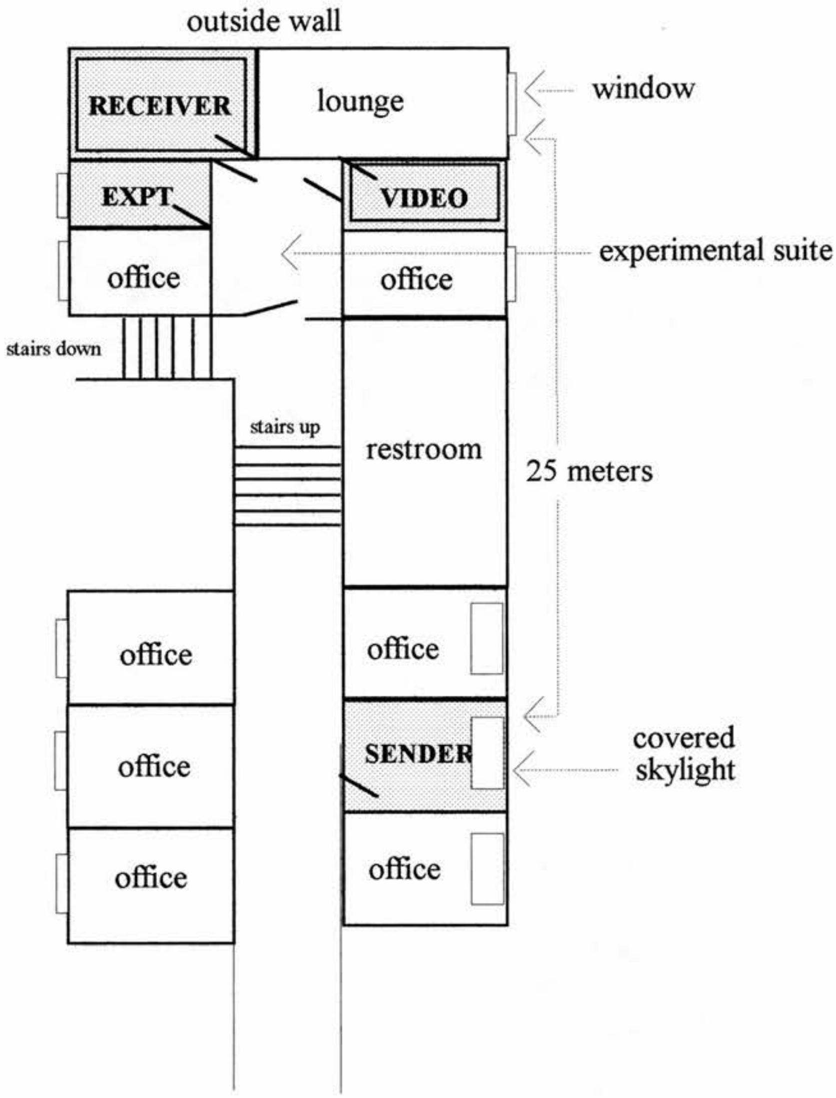
The resultant automated system can easily be tailored to produce a variety of different experimental conditions, to explore those that work best in general, or best for specific participant populations. It can also vary conditions in accordance with process-oriented designs and its flexibility allows for a wide range of experimental uses in addition to automated ganzfeld research.

The security measures presented here address the issues and concerns of automated ganzfeld procedures using video tape presentation systems. The possibility of some future ganzfeld systems using digitized target systems would eradicate some of the issues regarding cues from equipment issues raised below; whether they would introduce new concerns remains to be seen. Thus, this chapter is confined to addressing the issues involved in the type of videotape based automated ganzfeld system currently found in use at Edinburgh University.

Experimental Environment

All facilities were in the top floor of the Psychology Department. Receiver and experimenter rooms are adjacent, toward the rear of a six room experimental suite, having a central foyer connected by a door to a hallway. The sender's room is located up a small flight of stairs and approximately 25 meters down that hallway, placing the sender on a different floor level to that of the receiver or the experimenter. The automated ganzfeld laboratory consists of four rooms, shown in Figure 1, and labeled on the drawing as RECEIVER, EXPT, VIDEO, and SENDER.

Figure 1. Koestler Chair Laboratory Layout



Receiver Room

The receiver's room has double camden walls using the guidelines from the official manual of the British Broadcasting Corporation (Guide to Acoustic Practice, 1990), is double-doored, and partially electromagnetically and acoustically insulated. The room was tested for decibel (dB) attenuation at 24 separate frequencies from 50Hz – 10,000Hz. It attenuates airborne sounds between the receiver's and sender's rooms by a minimum of 60dB and a maximum of 100dB over the audio spectrum (50Hz to 10,000Hz). Between sender and receiver rooms, the attenuation was over 65dB for all of the frequencies tested and 85dB or better from 125Hz to 5000Hz, thus providing very effective sound shielding through a wide range of frequencies (see Appendix 7). These audio checks were performed by building engineer specialists from Heriot-Watt University using the Nortronics Sound Measuring System. The procedure for doing such checks generally involves having a well calibrated source of sound at one site and monitors in several locations within the recording site. Sounds at various specified frequency and loudness are then generated systematically at whatever site might be expected to be the source of unwanted noise (the sender's room in this case). At the same time, the sound level is monitored at whatever site is to be shielded from the unwanted noise (the receiver's room and the experimental suite in general). For more detailed information on this test equipment and the results, see MacKenzie (1992). The receiver's room is double-floored to provide vibration attenuation; however, some very low frequency vibrations can be felt inside the receiver's room if people in the Experimenter's room jump up and down very hard, and faint noises can be heard if someone inside the Experimenter's room yells loudly. When the receiver is wearing the headphones, listening to white noise, and sitting in the reclining chair (i.e., in ganzfeld stimulation), their ability to hear any airborne sounds or vibrations originating in the experimental suite is substantially reduced. Essentially no sound or vibration can be heard or felt in the receiver's room that originated from sender's room unless it were of such strength as to be noticed throughout the entire five-storied, stone walled building. The two rooms are on two different floors and have no common walls.

Experimenter Room

The experimenter's room is adjacent to the receiver's. It contains the computer that controls the audio/video target presentation, audio mixing equipment, and other assorted audio/video hardware (shown in detail in Figure 2).

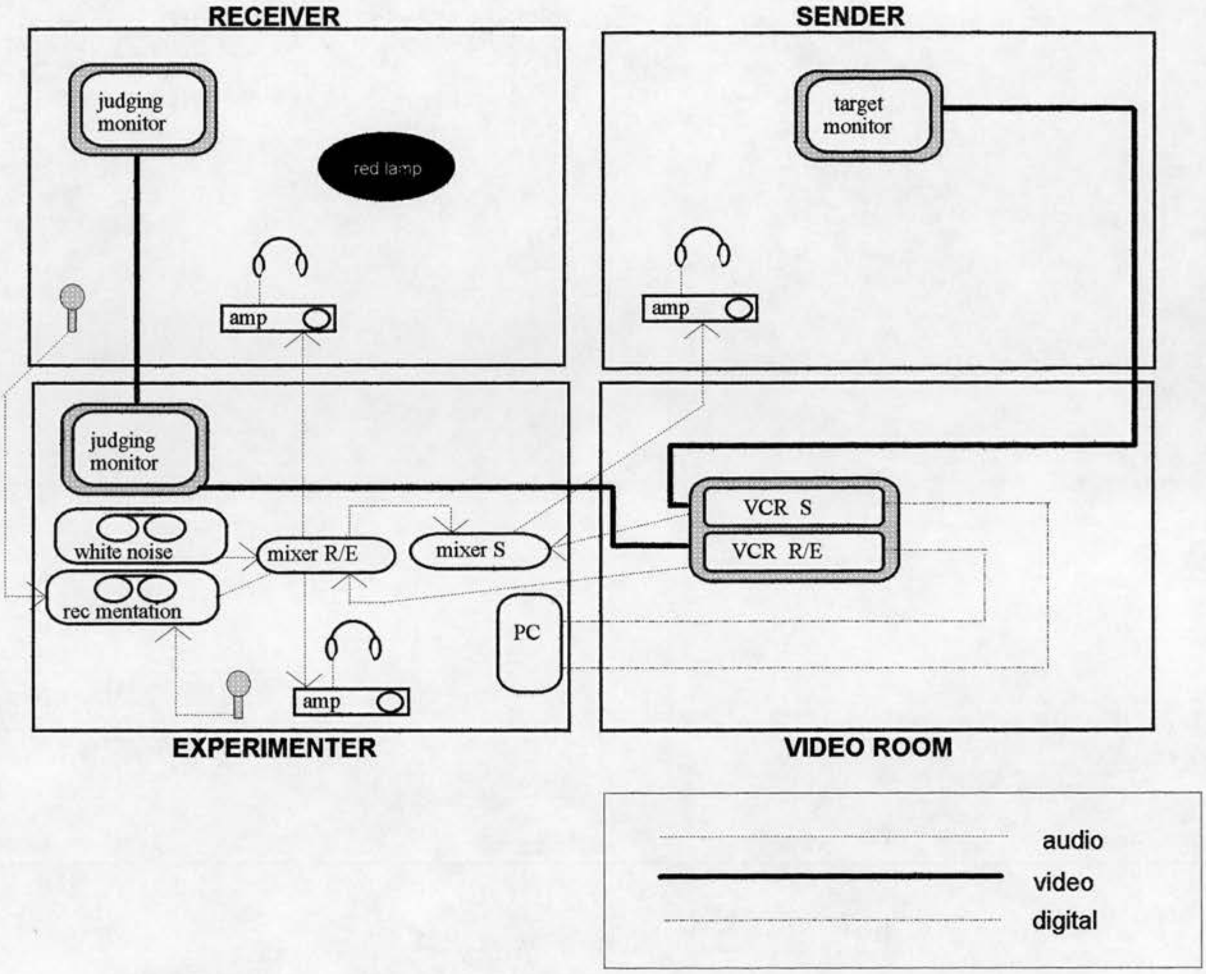


Figure 2. Audio, video, and digital communications layout.

This design isolates the audio and video (a/v) paths for sender and receiver-experimenter to avoid introducing sensory cues. The only direct connection between the sender's and the receiver's a/v systems is the output of the audio mixer into the input of the sender's audio mixer.

Video Room

The video room is double camden walled, with double doors, partially electromagnetically and acoustically insulated, and contains the target presentation system. This consists of two PC-VCR's, which are computer-controlled NTSC-format video tape recorder/players. One PC-VCR is used only to send the target clip to the sender; the other is used only to play the four judging clips to the receiver. No sound from the VCR's can be detected outside the room when the doors are closed.

Experimental Suite

The receiver, experimental, and video rooms are housed within the experimental suite, a self-contained unit of six rooms plus a central foyer. The additional three rooms include a lounge area where participants can be entertained and can relax with experimenters and senders before and after the ganzfeld session itself. The offices on either side of the entrance to the experimental suite, on the inside, are occupied by laboratory members, one of whom is the author.

Sender Room

The sender is placed in a room located outside the experimental suite and down a hallway, separated from the receiver by at least 25 meters, four doors and a flight of stairs (Figure 1). This effectively places the sender on a different floor level to the experimenter and receiver, and sharing no common walls. The sender's room is not acoustically or electromagnetically shielded. The TV monitor which conveys the target material in the sender's room is positioned in the far corner away from the door, with a five foot high by 6 foot wide partition between it and the door, effectively shielding against any extraneous light or color from the monitor being viewed from around or under the door. The sound amplifier is similarly positioned, and all sounds to the room related to the experiment are conveyed through the headphones. This ensures that no airborne sounds or vibrations can be heard outside of the sender's room through the area around the door. Thus, anyone standing or lying outside the sender's room door cannot see or hear the display to the sender. The skylight pictured in the sender's room is completely covered by an opaque, dark green window shade. Additionally, prior to the beginning of the experiments in this thesis, new locks were installed on the sender's door, and only laboratory research personnel had access to the keys. The offices to each side of the sender's room are occupied by members of the parapsychology unit. A layout of the rooms involved is provided in Figure 1.

GANZFELD PROCEDURAL STAGES

A flow chart (Appendix 8) is included in the appendices to help visualize the stages involved in the typical automated ganzfeld procedure. A brief outline of that procedure is as follows:

The computer program is initiated and the datafile for that session started shortly before the participant arrives. The computer saves the session data to the hard drive throughout the session, and also to floppy disk at the conclusion of the judging sequence. After their arrival the receiver is taken to the ganzfeld room and prepared for the session with the appropriate adjustments made to audio and light levels. The receiver's room door is then shut and the sender is escorted to the target room. The sender's TV is turned on and the sender adjusts their audio when the relaxation tape begins. The door to the sender's room is locked from the inside by the sender and an electronic sensor on the outside of the door automatically activates an alarm should the door be opened during the session. The experimenter returns to the experimental suite, conducts an audio check with the receiver, and then initiates the relaxation period for sender and receiver by beginning the relaxation tape and signaling the computer to begin timing this period.

At the end of this relaxation period, the computer signals the experimenter to begin the sending (or mentation) period. The experimenter then fades down the sender's relaxation audio tape, signals the computer to begin the sending period, starts the mentation tape recorder, and prepares to take down the receiver's mentation. The receiver has been instructed by the experimenter (prior to session beginning) and the relaxation audio tape to begin speaking out loud when they hear the white noise begin, which starts now.

During the relaxation period, the sender listens to the relaxation tape along with the receiver, then during the sending/mentation period observes the target, hears its sound track when it is shown, and attempts to silently communicate the target material to the receiver. The target may be shown several times to the sender during this time period. The sender is encouraged to draw or sketch relevant target material in between showings of the target, to remain focused on relevant target material. During the impression period, the sender can hear the receiver's mentation and attempts to mentally reinforce correct images.

At the completion of the sending/mentation period, the computer signals the experimenter to fade out the white noise to the receiver, and review the session mentation with them. After review, the receiver then takes off the eye shields and prepares to review the four target possibilities. After reviewing the four possible targets, the receiver ranks and rates them according to the correspondence of their imagery to each target. When the judging sequence is completed, the computer saves the data and then instructs the sender to return to the ganzfeld room and reveal the target. Session data is then sent to the printer for multiple printouts, and the experimenter is prompted to close out the session.

Security Measures

While the automated ganzfeld procedure developed at PRL is widely recognized as one of the soundest methodologies in parapsychology, it has not been without its criticisms (Hyman, 1994; Wiseman et al., 1994). Naturally, any replication attempt of complex studies, such as those carried out at the PRL laboratories, must take into account the advantages and disadvantages encountered in those studies, and while capitalizing on the former, attempt to eliminate or minimize the latter. An attempt to evaluate these criticisms in relation to the system under discussion was made, and those issues will be addressed here. The main criticisms of the earlier automated ganzfeld work (e.g., Morris et al, 1993; Wiseman et al., 1994) have been:

1) Possible subliminal sound leakage to the receiver through inadequate electronic component isolation;
2) Repeated playing of the target tape during sending might alter it physically, providing a subtle cue;
3) Sounds from the VCR might provide cues to the experimenter about which clip was being played as target;
4) Sound leakage from the target room to experimenter might provide cues, if senders are noisy;

5) There could be a complex electronic signaling system between sender and receiver; and,

6) Deliberate experimenter bias.

Criticism 1: Possible subliminal leakage to the receiver. The audio systems, as well as the video systems, are electronically isolated from each other. The only direct connection between the sender's and the receiver's audio or video systems is the output of the audio mixer into the input of the sender's audio mixer (Figure 2). The technicians from the Electronics/Audio-Visual department at the University of Edinburgh have electronically checked all such connections, following recommended procedures (all sound levels at upper limit), and have verified electronically that no such leakage exists in this facility. Such checks were conducted prior to the beginning of each ganzfeld study and again at approximately the mid-way point to verify continued security. These continued to fall within previously stated boundaries. In general, it is important to ensure that any electronic system that links various components within an environment is in fact functioning as it should. Faulty connections, inadequately shielded adjacent cables, inadequately isolated electronic components, components that drift outside of specified parameters and such, can produce biases of information in the system. Even if this leakage is so minimal that it would be extremely unlikely to be having an effect, that remote possibility can still be enough to raise concerns, especially from those who regard genuine psi effects as even more remote (e.g. Wiseman et al., 1994; Humphrey, 1995).

Criticism 2: Repeated playing of the target tape during sending might alter it physically such as to provide a subtle cue. Although this would not be a problem with a digitized target presentation system, many labs currently use a video tape based ganzfeld system. The system under discussion utilizes two separate tapes for sending and judging, each housed in a separate PC/VCR, both of which are totally under computer-control.

Criticism 3: Sounds from the VCR might provide cues to the experimenter about which clip was being played as target, allowing the experimenter to guess the sender's target clip. In this system, two separate VCR's are used, and sensorially isolated in a separate room away from the experimenter. The theoretical cue may work as follows: It is possible, although unlikely, that by the experimenter hearing the sender's VCR rewinding or fast-forwarding the video tape before it begins to play, that the experimenter can get a hint about which target pool, and possibly which specific target clip, the VCR is playing. Such a cue would obviously bias the experimenter towards certain targets or a particular target. The experimenter might then inadvertently transfer this bias to the receiver during the judging process, and this is clearly unacceptable.

Note this sensory cue is only possible if :

a) The experimenter is familiar with the locations of the target pools on the video tape;
b) The experimenter knows the order of the clips within each pool;
c) The experimenter pays attention to how long the VCR rewinds or fast forwards, or perhaps notices the video tape counter, and,
d) The video tape always begins from the same location (e.g., it always rewinds to the beginning of the tape at the beginning of each session).

To eliminate these potential cues in this facility, the following steps have been taken. The VCR's have been placed in a separate non-adjoining, sound attenuated room in the experimental suite, behind two doors (labeled as 'video' on Figure 1). Research personnel have confirmed that video tape or VCR sounds cannot be heard in the experimental suite anteroom or in the experimenter's room even by people not wearing headphones, as the experimenter wears during this time, and even if the experimenter's door is not closed, which it is throughout the ganzfeld session. The digital tape counters have been completely blocked from view from inside the housing of the VCR by inserting an opaque cardboard cover and completely covering this with black electrical tape, which effectively removes any possibility of accessing control of the VCR through the remote control. The front control panels are inaccessible, being enclosed by the metal housing unit for the VCR's. The video clips themselves are all exactly one minute long within a fraction of a second, eliminating any cueing from the length of time the clip is played, even if they could be heard. The order of the clips within each target pool is fixed by the recorded order on the video tape, but the order in which they are played during the judging process is always freshly randomized for each session. Thus, even if the experimenter is familiar with the order on the video tape, they will not know the actual target sequence within each pool. The sender video tape is never rewound to the beginning of the tape, but starts up where the tape stopped at the end of the last session. Research personnel confirmed that no sound can be heard from the video room, and the computer program is written to ensure that no timing cues (e.g. tape rewind times, etc.) are available to the experimenter, thus, the experimenter cannot receive any information regarding tape movement, including where rewind begins or ends. In addition, an opaque cover has been inserted inside the metal cover of the VCR itself covering all digital information regarding tape characteristics. The receiver and sender video tapes are locked into the two VCR's via the specially designed metal housing unit, with a uniquely numbered brittle plastic security tab, eliminating the possibility that a confederate may surreptitiously retrieve one or both of the tapes and tamper with them.

In general, it is important to consider all sources of information that may be linked to the target at the various stages of its generation, storage, and display, including any blind judging situation. This is necessary to ensure that none of those sources of leakage are available to the receiver or anyone with whom the receiver has contact at crucial stages of the experiment. The use of automated equipment can effectively eliminate many such sources of leakage, but unfortunately can also create new sources within itself. As equipment capabilities evolve and sophisticated equipment becomes cheaper, various sources of information at any given stage may be eliminated. For instance, the use of CD recorders in the current system would eliminate some of the cueing possibilities from the standard VCR's used now. The author would use them in any future system she designed, but even they would need to be evaluated carefully, to ensure that they themselves do not introduce new sources of leakage. In short, any system that manages a target must have all its components evaluated to assess the extent to which they may provide a direct or indirect link to the receiver.

Criticism 4: Sound leakage from the sender's room to experimenter might provide cues, if senders are noisy. As was noted above in the description of both the experimenter and sender's rooms, these rooms are separated by some distance (approximately 25 meters), and a small flight of stairs and four closed doors, two of which are locked throughout the session. In addition, these facilities have been acoustically evaluated (sound attenuation between the sender's room and the foyer of the experimental suite was above 55dB from 125Hz on up, and presumably higher for the experimental room itself when the door is closed, as it normally is during sessions), and confirmed that even without headphones on, experimenters could not hear shouts from the sender's room. In addition, there is an electrical sensing system connected to the door of the sender's room that was designed to detect the opening of the door by activating a flashing red light in the experimenter's room. Consequently, if the sender left the room during the experiment, the experimenter would instantly be alerted. As an added precaution, the door into the experimental foyer is kept locked during sessions. Senders were verbally requested by the experimenter to remain silent throughout the ganzfeld session, and the computer instructs the sender, in two different places in the program, to *silently* send or encourage the receiver in regard to the target. Written instructions for the sender are included in the target room, which also include directions to silently send the target. In general, it is important to remember that senders may use strategies which can produce additional information, such as showing emotion verbally and physically, acting out scenes, responding to any real time feedback they may receive from hearing the receiver's responses and judging, and so on. Such a possibility is reduced by using staff as senders, who know the characteristics of the system, and who will be acting as senders for the first experiment in this thesis. But many participants may feel more comfortable with the senders with whom they already have a sense of rapport, and exploration of sender/receiver rapport is an important research topic in itself. Thus, sensory shielding from sender to receiver, or anyone linked to the receiver, must be very thorough, more than might casually appear to be the case to the participant.

Criticism 5: There could be a complex electronic signaling system between sender and receiver. Several security firms were consulted in attempts to evaluate and address this criticism. They confirmed that while one could conceivably do a great deal to prevent and detect known signaling systems, given the present state of technology it would be extremely expensive to guard against all available types of signaling systems. Furthermore, while the signaling system could be very simple (e.g., in systems which employ senders and the sender hears the receiver, a tap when the receiver is doing well), the technology of such signaling systems is rapidly expanding and any detection systems for electronic signaling devices would necessarily require continuous, and expensive, upgrading. Using only laboratory staff as senders is one way of addressing this. There remains the possibility of a fixed monitoring system in the sender's room, or monitoring of the sender's room by an accomplice outside of the room. Attempts can be made to shield against or to detect electronic transmission systems, or to monitor transmissions within a certain range, and monitoring any attempt to produce raps (e.g., to an outside wall). The facility's present physical circumstances make these types of systems unlikely, as the room is periodically inspected and the environment is monitored during sessions for strangers. The layout of the sender's room is designed to prevent anyone standing or lying outside of the door to receive any visual or auditory information about the target clip. Additionally, such systems involve the co-operation of the receiver. Receivers will be used for only one session, thus meaning that any deliberate fraud by receivers would involve several people.

In general, deliberate fraud between sender and receiver in terms of complex signaling systems is very difficult to eliminate, especially if one posits that the sender is prepared to spend a fair amount of money and has access to the required expertise. It is probably safest not to draw any strong inferences under any conditions from only one sender/receiver team, if their data are not supported by data from other teams. Steps to make communication difficult include: extensive inspecting of sender and receiver environments, ideally in non-obtrusive ways; electronic monitoring of the environment, throughout a wide frequency range; shielding of receiver's room (expensive if a wide range of frequencies is involved); use of many receiver/sender pairs; and use of senders drawn from the research team.

Criticism 6: There might be deliberate experimenter bias. To counter this logically the use of multiple experimenters in any automated ganzfeld experiment is advocated. The first experiment in this series makes use of such a procedure. However, for the remaining experiments the author was sole experimenter. The automated ganzfeld program records session data not only to the hard drive, but also to floppy disk. This disk was stored in a secure location by the author, and produced before each trial. Immediately after each session, as soon as the computer has recorded the session as completed, multiple copies of the session datafile were printed out. It should be noted that no feedback is given regarding the target until the computer stores the judging data to disk. In the study where laboratory staff assisted as senders and co-experimenters for the author, each experimenter received one of these session records, and one was included in the session file which, along with the audio taped subject mentation, was placed in the unit's Security Cabinet. For the other experiments, a session record was provided to Professor Morris at the conclusion of each trial, and the other was included in the session file along with the audio taped mentation, and placed in the unit's Security Cabinet. For more detail on the security precautions involved in accessing the Parapsychology units Security Cabinet, see Delanoy, Watt, Morris, and Wiseman (1993). The session records on computer disk were compared to printouts in the experimenters' possession for discrepancies before any data were analyzed. In the case of the first study, a minimum of two experimenters are required to sign off on the hand-written record of the participant target ratings see Appendix 6, which is then included in the subject file with the computer print-out. In the following experiments, the author signed as primary experimenter and the receiver signed as acknowledgement of the accuracy of the information.

It should be noted here that while intentional experimenter bias can be made difficult and risky, it is still, in principle, possible with this facility. For example, when using multiple experimenters, a specific experimenter could substitute a rigged program that would respond to that person's name by allowing them to select or know the target, and which could be removed afterwards; these actions could be masked by modifying the time stamp on the program revisions. Unfortunately, once one considers the possibility of deliberate experimenter fraud, it is difficult to guard against all the options available to someone who is highly motivated and has access to appropriate resources and expertise. In these experiments this option was made sufficiently difficult that deliberate fraud would run a high risk of being detected. In the first experiment, presented in chapter 7, the experiment was monitored both by the presence of a second experimenter, and by having co-experimenters as senders who were able to monitor the interactions between the experimenter and the receiver. In all experiments, the experimental sessions themselves were recorded, so that they could then be evaluated later, both by blind judges to assess success prior to experimenter interactions, and to assess any possibility of experimenter cueing in the judging stage. While there was the possibility of employing further computer security safeguards, anyone having sufficient computer expertise could find ways to circumvent them and their usage unnecessarily complicated the experimenter.

The Random Number Generator

In addition to the above security measures, a global randomness certification test on the target generating system was conducted. 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 1-72 (the actual number of targets available) for the first experiment, and 1-100 for the following experiments. In the pre-series test, 63,000 trials were generated and chi-square tests revealed no consistent departures from the expected uniform distribution. At completion of the final study, 63,000 trials were once again generated, and again no consistent departures from the expected uniform distribution were detected. Periodic randomness checks performed at irregular intervals were conducted not only by the author, but also by specialists from the Artificial Intelligence and Computer Engineering group in the Psychology Department, with no evidence of 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 conditions, 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 is not stored.

In laboratories where the sender is not located directly in line-of-sight with the experimenters room, allowing monitoring of that room by the experimenter, installation of surveillance cameras, hidden or otherwise, in hallways and appropriate sending and receiving rooms, make it possible for experimenters to monitor these areas without physically being present. However, the psychological drawbacks to these, giving participant's the feeling that 'big brother' is 'watching' them, and making them feel uncomfortable and self-conscious, has led the author to rely on the door mounted signaling system, and vigilant monitoring of the environment by herself and other lab members during experiments. Honorton also cautioned against the use of cameras inside the sender/receiver rooms (Honorton, 1991), feeling that they inhibit participant's relaxation, and engender a sense of mistrust by the experimenters.

Discussion

An evaluation of the earlier criticisms of ganzfeld work, using both manual and automated systems, was presented in this chapter. Following that, an identification and discussion of the primary problem areas for the ganzfeld database was conducted. A new automated ganzfeld system was then presented, designed for increased flexibility, yet maintaining a high level of security and procedural precautions to address previous design and methodological flaws. Finally, the chapter concluded with a detailed account of how this new methodology addressed and negated each of these problem areas, and specific design considerations for the experiments discussed in the following chapters were considered.

The subliminal sound hypothesis put forth by Wiseman et al. to account for the successful results of the PRL database, while unsubstantiated, does serve to illustrate certain potential problem areas in ganzfeld research. The consultation of Wiseman during the review and refinement of the security measures instituted at Edinburgh's automated ganzfeld facility clearly demonstrates how such criticisms can be used to work in favour of improving testing methodologies.

A full description of the Edinburgh automated ganzfeld operating system was given, including a discussion of laboratory layout and equipment, the sound proofing and sound attenuation tests undertaken, and the measurements and results from such tests. In addition, a flow chart was provided to help visualize the stages involved in automated ganzfeld procedures, along with a brief description of the procedure.

The identification of past and potential problem areas for automated ganzfeld research illustrated here allowed for systematic steps to be taken to eradicate or circumvent such problems in the Edinburgh facility. The security measures involved in accessing the computer program and session set-up records include precautions against experimenter bias, protocol deviation or protocol violation. Additionally, the author would like to note here that the experiments conducted with herself as sole experimenter were done so under additional program safeguards, including detailed reviews and monitoring by senior staff (Professor Robert Morris). Periodic and random checks were conducted on all aspects of the computer program and ganzfeld sessions, including session data files and reviews of the integrity of the printed records and files stored to diskette. No discrepancies were ever reported.

The author's efforts to evaluate and set up appropriate automated ganzfeld procedures from which to attempt replication of PRL's successful series of ganzfeld trials have been facilitated by the expertise of many people. Obviously, ganzfeld systems and their particular designs will vary from laboratory to laboratory and be dictated somewhat by purpose and expense, and the description of the automated ganzfeld facility used in this thesis should in no way to be construed as the perfect design for all automated systems. However, it is hoped that the security measures and precautions outlined here may contribute to the evolving effort and play some small role in the development of future systems.

While it is acknowledged that a single, absolutely fraud proof experiment does not exist and claims to the contrary are ineffectual, it is important to maintain the physical environment of the laboratory, and hence the participant, at a high level of stability and security. It is especially important that experimental protocols providing high levels of security be implemented in research that seeks to establish or falsify any unknown variable. This chapter described the basic features of the automated ganzfeld system developed as a secure system from which to conduct experimental research on anomalous cognition. Five experiments were conducted using this system, with slight modifications of stimuli and the computer program that will be described when appropriate. An account of these experiments follows.

Experiment 1: Creativity, Psi, and Relevance of the Sender

Chapter 7

This chapter reviews the rationale for a comparison of the presence or absence of a sender using a creative population, and outlines again the specific technique used for this purpose, the ganzfeld technique, before reporting on such an experimental comparison. Initial exploratory work, involving the development of target stimuli and selection of creativity assessments for the measurement of creative abilities, and the basic detailed design of the computer program and testing procedure, produced a simple procedure that was then examined formally in a total of five automated ganzfeld studies. This chapter reports on the first of these, and what was learned from it. Details of the apparatus and procedures which have already been outlined in chapter 6 will not be repeated here, but other procedural refinements and details will be covered in greater detail, as this experiment establishes the basic pattern for the subsequent studies.

Examination of altered states research (Chapter 2) has indicated that these states enhance the successful detection and retrieval of psi inputs. From this there emerged a noise reduction model identifying certain antecedent conditions felt to facilitate the acquisition and recognition of psi material. These are: somatic relaxation, reduced sensory processing; a sufficient level of cortical arousal to sustain conscious awareness in the absence of patterned sensory input and, the deployment of attention towards internal mentation processes (Honorton, 1978; Braud, 1977). By this criteria, the ganzfeld meets the prescript of a psi conducive technique, involving the reduction of sensory noise levels through regulation of perceptual input, deployment of attention towards internal mentation which could serve to carry psi impressions, the facilitation (through stimulus hunger) of an effective link between the receiver and the remote information source (either a sender or the target itself), the recovery of target information through the receiver's continuous mentation report, and the confirmation of receiver-sender interaction through objective assessment of target-mentation correspondences. The ganzfeld procedure has frequently been cited as one of the best existing techniques for examining anomalous cognition under controlled laboratory conditions, and the ganzfeld database to date is considered, as a whole, to constitute some of the best evidence for a replicable psi effect (Utts, 1991a).

The present study was planned independently of this thesis in terms of the sender/no sender variable, as part of an independently planned and externally funded research project for the Koestler Chair. The use of a creative population, coupled with my extensive involvement with the setting up of the project and contributions to the questionnaire items, has allowed it to contribute to the thesis, and it was pre-planned to include this first study as part of the thesis. The aim of the study presented in this chapter was the use of a population known to produce superior psi performance in the ganzfeld to examine whether the presence of an active sender in some way contributes to or detracts from the ability of a remotely located receiver to gain information about target stimuli. One of the most important recent theoretical issues to arise in parapsychology concerns the role of the sender in psi procedures. As discussed in chapter 2, there is growing speculation concerning whether the presence of a sender increases successful psi functioning in the ganzfeld. That psi interactions may frequently occur without the cognitive mediation of a sender has been suggested by spontaneous case studies involving intuitive impressions (Stevenson, 1970), synchronistic episodes (Stanford, 1974) and psi mediated somatic influences (L. E. Rhine, 1961). As laboratory emphasis has shifted from telepathy to clairvoyance, the view emerged that perhaps psi need not involve mind linkages at all; as telepathy results could be produced by clairvoyance of the target, of related actions, or even of brain states. Attempts at devising pure telepathy or pure clairvoyance procedures revealed the difficulty of trying to rule out alternative information flow pathways (e.g. Morris, 1975).

Only a small number of experimental studies have attempted to incorporate a no sender comparison condition within the study confines (Bierman et al., 1984; Braud et al., 1984; Braud & Wood, 1977; Dunne et al., 1977; Kanthamani et al., 1988; Sargent et al., 1982), and surveys of this literature (e.g. Carpenter, 1977; Palmer,

1978) have given mixed results, indicating only that research results tend to be somewhat better when senders are present rather than absent. Only two ganzfeld studies have compared sender vs. no sender conditions within the same study (Raburn, 1975; Raburn & Manning, 1977). The Raburn and Manning (1977) study found its best results when there was a sender present and the receivers knew that ESP was being tested.

It has been difficult in past research on the sender/no sender effect to separate the psychological effects of knowing there is a sender from the actual presence of the sender itself. A study conducted by Williams, Roe, Upchurch, and Lawrence (1994) compared three different sending conditions in an early version of the Edinburgh automated ganzfeld facility, incorporating conditions of 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 only three hits in 13 trials was obtained, and in the 'two senders' condition only two hits in 17 trials was achieved. This experiment departs from the typical ganzfeld experiment in many ways, one of them being an active attempt to manifest psi missing over the course of the experiment. Additionally, the experimenters also served as senders and receivers for each other over many sessions, becoming very familiar with the target pools — also a departure from the standard automated ganzfeld protocols. No real conclusions can be drawn from this experiment concerning the presence or absence of a sender, especially given the problems in interpersonal dynamics that the authors acknowledged as having a profound impact upon the study.

In Honorton's (1995) meta-analysis of 'real time' ganzfeld studies examining the sender/no sender question, he noted that due to the small number of studies without senders, the meta-analysis was less than clear concerning the moderating effect of the sender. He felt that the strongest evidence regarding the impact of the sender came from his analysis of a subset of five investigators who each contributed studies with and without a sender, thus holding sampling, laboratory, and investigator style factors constant. Based on this assessment, Honorton felt the meta-analysis indicated that the presence of a sender results in significantly superior anomalous communication effects, although the magnitude of the difference is small, and the findings based on a relatively small database. Further, he points out that as, with one exception (Raburn, 1975), the primary studies were not designed to systematically assess sender versus no sender conditions, his meta-analysis could not address the underlying source of this difference. At best then, the sender/no sender meta-analysis by Honorton (1995) is inconclusive.

The unpersuasiveness of the data from the meta-analysis, as well as the contradictory indications of previous literature (Carpenter, 1977; L. E. Rhine, 1956), made it clear that a study specifically designed to compare sender/no sender effects, (holding sampling, laboratory, and investigator style factors constant), was needed to assess the extent to which the sender's influence is instrumental or peripheral. Within experimental research, once procedures which appear to work with sufficient strength and consistency are established, it becomes possible to use that procedure to address process-oriented questions, such as effectively testing tentative models. The ganzfeld technique increasingly appears to be such a procedure, based upon its continued success even when procedural conditions are tightened (e.g., Rosenthal, 1986; Honorton et al., 1990). Additionally, the use of a population known to produce superior psi performance in the ganzfeld was indicated for this study as a means of elevating the psi effect to an easily discernable level, thus improving the chances of detecting a difference in the sender/no sender conditions. It should be recalled that ganzfeld research conducted with the Juilliard School of the Performing Arts by PRL researchers (Schlitz and Honorton, 1992) showed that, as a group, this creative population scored significantly better than the PRL general population (t = 2.09, two tailed, 239 df, $p = .03$). The study with pairs of musicians conducted by Cunningham at Edinburgh (Morris et al., 1993), using an early semi-automated version of the system presented here, found overall psi results to be significantly positive, producing a hit rate of 40.6%, ($p < .05$), with the self-rated, more highly creative individuals scoring significantly better than others ($t = 2.20$, $p < .025$). Therefore, the experiment presented in this chapter uses a creative/artistic population in systematically comparing sender with no-sender conditions. The inclusion of a third condition, referred to as 'replication', was instituted as a control and comparison group, allowing for the evaluation of the presence of psi under prototypical ganzfeld conditions.

A variety of creativity assessments, as discussed in chapter 4, have been used in past psi research to identify individuals as 'creative'. These measurement instruments include questionnaires, check lists, rating scales and pencil-and-paper creative thinking tests. All have been used in attempts to assess concepts ranging from divergent thinking or originality, to answering simple questions regarding involvement in societally defined creative activities. In a comprehensive review and critique of currently available techniques for the measurement of creativity, Hocevar (1981) arrived at a taxonomy of ten categories. These ten categories included: (a) tests of divergent thinking, (b) attitude and interest inventories, (c) personality inventories, (d) biographical inventories, (e) teacher nominations, (f) peer nominations, (g) supervisor ratings, (h) judgements of products, (i) eminence, and, (j) self-reported creative activities and achievements. Hocevar concluded that an inventory of self-reported endeavors and achievements is the most defensible approach for identifying creative individuals. It was this approach, the self-report, that was chosen as the measurement of creativity for this study. Self-report questionnaires are considered to have a reasonable degree of face validity (Hocevar & Bachelor, 1989), and have been used widely in creativity research (Hocevar, 1979; Holland & Nichols, 1964). The prototypic self report requests the individual to list all the creative achievements or activities that they have or take part in, such as exhibited or performed a work of art, published stories, performed roles in plays, etc. In general, the total creativity score is simply the number of activities listed. Research incorporating this type of checklist self-report has been published in a number of studies (Holland & Astin, 1962; Holland & Baird, 1968; Richards, Holland & Lutz, 1967), and Hocevar (1976; 1979) used a checklist of creative activities and accomplishments with university students to create a 90 item list of creative activities and accomplishments. Other lists similar in content and emphasis have been developed by Runco (1986), Skager, Schultz, and Klein (1965), Torrance (1969) and Wallach and Wing (1969). Although such self-reports have been used extensively in educational and psychological research, there are no commercially available checklists. Therefore, the self-report used in this study (shown in Appendix 4) drew upon the basic questions prevalent in the previously mentioned studies, and consists of a question regarding self perception of creative ability and then listing the number and type of creative/artistic activities that one is involved in. These were combined with questions on self confidence, competitiveness, cognitive style, and professional dedication to comprise a six item questionnaire. The adoption of this particular method of creative assessment also allows overcoming some of the drawbacks associated with more objective measures, such as the consumption of participants time filling out more involved paper-and-pencil assessments, the anxiety of timed tests, and involved interpretation and scoring of the results, while still allowing correlation with personality measures and participant characteristics.

The study presented in this chapter was undertaken in conjunction with Koestler Chair staff, who also acted as both experimenter and sender throughout the study. The computer program for the automated ganzfeld system, as outlined in chapter 6, was modified by the author to include three target presentation conditions, and following the strategy developed by Williams et al., these three conditions were referred to as the 'no sender', 'sender' and 'replication' conditions in order to conduct a systematic within-study comparison of the impact of one moderator variable (presence or absence of a target observer or sender). The condition of 'no sender' involved the sender being absent, with receiver and experimenter blind as to sender's presence or absence. The condition of 'sender' involved having the sender present with receiver and experimenter blind as to sender's presence or absence. The condition of 'replication' was instituted as a control and comparison, allowing for the evaluation of the presence of psi under prototypical ganzfeld conditions, and involved having the sender present with both receiver and experimenter aware of the sender's presence. Except for the 'replication' condition, receivers and experimenters were kept blind to the condition of the current session in order to assess the extent to which the sender's influence is intrinsic to the communication process or based upon psychological or motivational factors. The author acted as a primary experimenter, and was actively involved in all steps of the experimental procedure, acting as either experimenter or sender, and conducted all statistical analyses and write-up of the study material presented here.

As described in chapter 2, parapsychologists have attempted to relate various measures of personality and cognitive style to psi performance in endeavors to identify correlates of successful psi performance. According to the model put forth by Honorton (1992), this approach was somewhat successful at PRL in predicting personality characteristics for successful ganzfeld participants. As will be recalled, the PRL model is based on the individual differences and characteristics found to be associated with successful ganzfeld-psi performance at PRL. The four factors identified in this model are: 1) Prior psi experiences; 2) the practice of some mental discipline; 3) prior laboratory psi testing; and, 4) Feeling/Perception (FP) preferences on the Myers Briggs Type Inventory (MBTI). An evaluation of the MBTI in relation to the five factor model of personality (the NEO) by Costa and McCrae (1992a) indicated that the Thinking/Feeling (TF) scale of the MBTI was directly related to Openness to Feelings. Therefore, though the PRL work had used the MBTI, I was curious to see if the factor of Openness, as measured by the NEO-PI, would show a positive correlation with psi hitting in the ganzfeld, as is indicated for FP preferences on the MBTI. The NEO-PI (Costa & McCrae, 1992b) is a widely used personality measure, and has been used in previous automated ganzfeld studies (Morris et al., 1993). Further, there has been a wealth of research linking psi performance and another individual differences measure, that of extraversion (Palmer, 1978, Sargent, 1981). As discussed in chapter 3, the meta-analysis by Honorton, Ferrari, and Bem (1990) on the relationship between psi tasks and extraversion showed a significant ESP-extraversion relationship for free response studies (p = .0000083). While the rationales behind the extraversion-psi relationship are varied and hotly debated, there has as yet been no clear consensus reached as to the underlying cause (Schmidt & Schlitz, 1989; Honorton et al., 1990). Therefore, in keeping with the process-oriented tradition of psi research, an examination of individual differences relating to openness and extraversion, as measured by the NEO personality inventory, was undertaken.

As will be recalled from chapter 5, research into the relationship between the earth's geomagnetic field (GMF) and anomalous cognition over the last decade or so has produced an increasingly large body of evidence that suggests a relationship between psi performance and fluctuations in the field (Berger & Persinger, 1991; Persinger & Schaut, 1988; Persinger, 1989; Persinger & Krippner, 1989; Spottiswoode, 1993; Wilkinson & Gauld, 1993). Although previous literature is consistent in suggesting a relationship between low geomagnetic field activity and psi performance, few studies have used a creative population. The ganzfeld study conducted by Morris et al., (1993) was evaluated for the impact of the geomagnetic field on study outcome by Radin et al., (1993). This semi-automated ganzfeld study used both a creative population as well as a normal one, and Radin's evaluation showed a non-significant negative correlation between psi hitting and geomagnetic field for the normal population, but a non-significant positive correlation for the creative population. In other words, for that study, the creative population manifested a higher hit rate during periods of high geomagnetic activity rather than low, a reversal of the normally found relationship. However, given the small number of participants in each of these studies (n=32), and given that the correlations themselves were non-significant, it may be that this particular trend was a chance occurrence. Therefore, in keeping with the previous parapsychological literature, a positive correlation between a low geomagnetic field, as measured by the *ap* index, and psi success is expected for the present study.

When they originally volunteer to participate in a study with the parapsychology unit, each participant fills out an extensive Participant Information Form (PIF). This form is used regularly by the Koestler Chair, and contains 77 items covering many different aspects of the participant's background, prior experiences, interests, characteristics, etc. (see Appendix 9). Three of the PIF questions are directly related to the first three factors identified on the four factor model put forth by Honorton (1992). Affirmative responses to these three questions were used to help identify individuals for participation in the sender/no sender study. Participants would then be contacted by the author, or another member of the Koestler Chair staff, to either take part in the ganzfeld study if their PIF responses matched study criteria, or be offered the opportunity to participate in other research if they did not. A summary of how these responses match the four factor model (Honorton, 1992) is discussed later in this chapter.

The current study used only participants who identified themselves as creative, and who responded in the affirmative to as many as possible of the three 'factor' PIF questions mentioned above. In essence, by not restricting the study criteria to paid professionals or those engaged solely or full time in the performance or production of their art, this allowed for inclusion in the study of a wider range of creative talent.

Method

It should be noted here that this experiment was carried out by the author in conjunction with others of the Koestler Chair staff, namely Robert Morris and Deborah Delanoy, who also acted both as experimenters and senders throughout the course of the study, and with Caroline Watt, who acted as a sender for the latter part of the study. As was pointed out in chapter 6, the use of multiple experimenters in automated ganzfeld research serves to alleviate the concern of potential experimenter bias that was discussed in relation to earlier ganzfeld research.

In order to assess the extent to which the sender's influence is intrinsic to the psi communication process, or whether it may be based upon psychological or motivational factors, the current study incorporated three primary conditions:

1) No Sender: The sender was absent, with receiver and experimenter kept blind as to sender's presence or absence;
2) Sender: The sender was present, with receiver and experimenter kept blind as to sender's presence or absence, and;
3) Replication: The sender was present, and the receiver and experimenter were fully aware of the sender's presence.

The first two conditions, 'sender' and 'no sender', were designed to provide a comparison of the presence and absence of sender, with both 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 was described as a 'helper' who may or may not be serving as their sender for that session. The initial preparation of the receiver proceeds as usual and is described in detail in the following procedure section. When the helper arrived at the target room, the computer randomly selected whether the sender stayed to send or was asked to leave, and displayed this decision on the monitor screen. In this way, both receiver and experimenter were able to remain blind as to the sender's presence or absence until the end of the session. If instructed by the computer to leave, the sender went elsewhere in the building, typically back to their office, locking the door after them. The third condition, termed the 'replication' condition, was included as a means of examining the role of expectation, and to provide a condition which more closely replicated the original PRL autoganzfeld procedures of having a known sender. It was felt that this approach would allow a clearer assessment of the contribution of the physical presence of the sender, as well as the psychological effects of knowing that there is a sender. Except for the 'replication' condition, receivers and experimenters were kept blind to the condition of the current session and, of course, experimenters were blind as to target identity until session feedback to participants was given via computer. Only lab personnel were used as senders in all conditions. This was instituted for the current study for several reasons: 1) as a means of avoiding the disappointment that might be felt by friends acting as senders for participants being asked to leave without serving as sender, 2) to address security concerns connected with previous automated ganzfeld work involving the use of senders, and, 3) and to hold sender variables more constant across the different sending conditions. Every third session was in the third condition, the replication condition; the next two sessions would be randomly assigned by the computer to condition 1 or condition 2 (sender or no sender), after the session began. The study was predetermined to terminate when a total of 32 receivers had been completed under each condition. Due to the random assignment of the sender-no sender conditions, a total of 97 sessions were required to meet the pre-specified number of 32 receivers per condition.

Overview of Procedure

Prior to the experiment, participants were given three questionnaires to complete: the NEO-PI (Costa & McCrae, 1992b), the Participant Information Form (PIF), and the subjective creativity questionnaire that was devised by the author. In addition, after the impression period and mentation review, but prior to actually viewing any of the target clips, the participants were asked a series of questions regarding session imagery (i.e. surprising, or very vivid images, etc.), and other information pertaining to the impression period. During this same time, the experimenter also filled out a brief questionnaire regarding their assessment of the session mentation (i.e. was imagery abundant, bizarre or mundane, etc.). The ratings for this questionnaire were the subjective interpretation of the participant's mentation on the basis of the experimenters' prior experience with ganzfeld mentation.

Based on study creativity criteria and responses to the three 'factor' PIF questions, participants returning the PIF were then either contacted by the author, or another member of the Koestler Chair staff, and asked to either take part in the ganzfeld study or offered the opportunity to participate in other currently ongoing research. During this initial phone interview, participants' feeling towards the viability of telepathy and clairvoyance were discussed. Those participants who strongly held the belief that psi could not operate under conditions of 'clairvoyance' (N = 3), were typically deferred to the 'replication' condition. Participant's pronouncing no preference for either telepathy or clairvoyance conditions (this being the majority of responses) were scheduled for inclusion in all other conditions. Each participant contributed one trial each.

Participants were initially contacted by phone, and then mailed the questionnaires and forms to be completed and returned when they came in for the ganzfeld session. Prior to the participant's arrival at the laboratory, the session details were entered into the computer. This included the series code, participant code, experimenter initials, session number and the number of times the target was to be shown. Date and time stamps were automatically assigned by computer and verified later for correctness for each session.

When participant's arrived at the laboratory, they were met by the session experimenter and then introduced to the co-experimenter, who was introduced as the sender if the session was to be a 'replication' one. Otherwise, the co-experimenter was simply introduced as a 'helper' in the upcoming session. Participants were then seated in a lounge area, offered light refreshments, and a period of chat time (approximately 30 minutes to an hour) generally followed, to discuss the upcoming ganzfeld session and allow everyone to get better acquainted. After the discussion period, the participant is given a tour of the experimental rooms, and the relevant apparatus (e.g. target display monitor) is described. It was not felt to be necessary or desirable to deceive participants as to the nature of the experiment, so they had been told during the initial phone interview that the study was designed to help us understand the role of the sender in the psi process. In this way, it was possible to make sure that all participants were equally comfortable with either the clairvoyance or telepathy condition, thus avoiding any possible 'preference effects'. If the session was to be in the replication condition, with a known sender, appropriate sending strategies were discussed between the participant and the session sender. If the session was to be one in either of the other two conditions, the participant was told that while the 'helper' (the co-experimenter) may or may not be in the room observing the target, the target clip would still be shown in the room throughout the entire sending period.

It should be noted here that as physical and psychological comfort are thought to play a large role in the success of the ganzfeld, steps were taken at each step of this procedure to ensure that each participant was made as comfortable as possible without endangering the integrity or security of the experiment. The order of events once the tour of the facilities had been completed and the procedure explained to the participant was as follows: The participant was taken to the receiver's room where they were made comfortable in a reclining chair. Any final questions concerning the procedure and the role each of us would play were answered at this point. Participant's were offered a soft blanket to spread over their legs and feet, to help them stay warm and comfortable. The blanket has the added effect of allowing participants to feel less psychologically 'exposed' during the ganzfeld by having the physical presence of a warm, protective covering over them. The microphone, which attaches to the participant's shirt collar or pocket, was next attached by the experimenter and the participant instructed in its use, as well as the appropriate time during the session to begin speaking out loud. The receiver then put on the headphones, and adjusted the volume to a comfortable level. When the session proper begins, the receiver heard first a 15 minute progressive relaxation exercise, followed by 30 minutes of white noise through the headphones (the impression or mentation period). After adjustment of the headphones, if the session was in the replication condition, the sender for the session was asked to apply the receiver's eye shields, otherwise the experimenter or the receiver themselves performed this task. Eye shields were halved ping pong balls which had been cut in the baseball style, sanded and sterilized, and were attached with non-sticky surgical tape. After the eye shields had been adjusted for maximum comfort, a flexipoise 60 watt red light was switched on and adjusted to about 18 inches in front of the participant's face, providing an even, comfortable light. After one last 'comfort' check, the participant was wished good luck by the experimenter and (possible) sender, and the two doors to the receiver's room were securely closed. The possible sender then left the experimental suite and went to the sender's room and the experimenter locked the door to the experimental suite behind them.

The sender entered the sender's room, locked the door behind them and waited quietly for computer instructions via the monitor on session condition. Within the experimental suite, the experimenter entered the experimenter's room, closed that door, and conducted an audio check with the participant to ensure that the participant was able to hear them through the headphones. It is important to note here that although the receiver and experimenter could hear and converse with each other, and the sender could hear what the receiver said, there was no connection which allowed communication *from* the sender *to* either the receiver or the experimenter. After the audio check, the experimenter initiated the computerized autoganzfeld routine and prepared to take hand-written notes on the receiver's mentation during the impression period.

If the trial was in the sender-no sender conditions, the computer randomly determined whether this would be a session with, or without, a sender and sent this information to the TV monitor in the sending room only. If instructed by the computer to leave, the sender quietly departed the sending room, locking the door securely behind them, and retired to another part of the building. If asked to stay and send, the sender listened to the relaxation tape along with the receiver, then observed the target and heard its sound track when it was shown during the thirty minute impression period. Throughout this time the sender attempted to silently communicate the target material to the receiver. The target was shown eight times during this thirty minute period, and the sender typically drew relevant target material in between showings of the target in order to remain focused on, and continue to send, the target material. During the impression period, the sender could hear the receiver's mentation and attempted to mentally reinforce correct images and impressions.

During the impression period, the participant's spoke out loud describing any images, thoughts, feelings, or impressions that came into their minds. This mentation was both audio tape recorded and hand noted (along with the time) by the experimenter. At the end of the impression period, the experimenter came back onto the receiver's headphones. After first checking to see how they were feeling, the experimenter then reviewed with the receiver their reported impressions. During the review process, the receiver was encouraged to add any details or previously unreported thoughts. After the mentation review, but prior to removing their eye shields or actually viewing any of the target clips, participants were asked a series of questions regarding their imagery, (i.e. surprising, or very vivid images, etc.), and other information pertaining to the impression period (i.e. did they feel there was a sender present). The receiver was then instructed to carefully sit up, push the red light out of their way, and remove their eye shields. During this time, the experimenter filled out a brief questionnaire regarding their assessment of the session mentation (i.e. was imagery abundant, bizarre or mundane). Once the receiver had removed their eye shields, they were instructed to turn on the TV monitor in their room. They were then told they would be shown the four possible target clips one at a time, and were asked to watch the clip all the way through, and then after viewing each one to relate any similarities between the imagery they reported and that particular target clip. The experimenter, who was also blind to the target, could point out any potential correspondences that participant's may have overlooked. After first watching the clips in the sequence randomly selected by the computer, participant's could then view the clips again as many times as they wished during this period, and in whatever order they liked, before proceeding onto the judging phase. After reviewing each of the possible target clips, the receiver then judged each individual clip, by assigning it a rank score of 1 - 4 (1 representing the greatest degree of correspondence), and giving each clip a rating between 1 – 99, with the participants' first choice getting the highest rating. After the judging sequence, the computer stored all experimental data both to disk and to hard drive, and the sender was notified via TV monitor (if they were in the sender room) to return to the ganzfeld suite. The computer then revealed the identity of the target and the session condition to the receiver and experimenter. If the session had been one of the 'no sender' conditions, the helper was contacted via phone if possible, and asked to return to the experimental suite. The experimenter, participant and sender/helper exchanged their thoughts about the session and the target, and the experimenter answered any further questions they may have. The session ended with a promise to send the participant details of the outcome of the study when the analysis was completed.

Participants

The operational definition of creativity for the current study was that presented by Welsch: "Creativity is the process of generating unique products by transformation of existing products. These products, tangible and intangible, must be unique only to the creator, and must meet the criteria of purpose and value established by the creator." (1980, p. 97). This definition allows for inclusion in this study of those individuals who are not involved full time in a paid position of creative standing, yet who nevertheless are considered creative by definition, either their own or society's. In this respect, the present study consisted of creative/artistic participants, as this population has produced positive results in experimental ganzfeld research in the past (Schlitz & Honorton, 1992; Morris et al., 1993). Participants were actively recruited by the author and other staff members from local art and music colleges, with other participants coming from local artistic communities such as writers and actors groups. As each of the three conditions of the study had been pre-specified to have 32 participants, with two of the conditions being randomly assigned, a total of 97 participants contributed one session each to meet this requirement. Each participant in the study was a ganzfeld novice and pre-selected as much as possible to match characteristics associated with ganzfeld-psi success, e.g. positive attitude toward psi, previous psi experiences, considered creative by self or others.

Target Stimuli

The target pool for this study consists of 72 dynamic video clips, each exactly one minute long. Dynamic video clips were chosen because of their prior history of success within the ganzfeld setting (Bem & Honorton, 1994), and because they seem to more closely mimic, or simulate real life. The target clips involve color, sound, motion and emotion, and are typically thematically based, with this theme being reinforced throughout the duration of the video clip. Earlier, a smaller target pool of video clips was originally composed for the Edinburgh semi-automated ganzfeld facility by two other researchers. However, as that target pool was not deemed appropriate for the studies in this thesis, a new target pool was compiled for this study. The 72 dynamic target clips used in this study were composed and compiled by the author. They are comprised primarily of the more successful dynamic targets from PRL, but include several clips from the original Edinburgh pool, as well as several entirely new additions to round out target pools. The 72 clips that were selected for this study underwent a through perusal not only by the author, but also by Robert Morris and Deborah Delanoy. The clips included excerpts from motion pictures, television shows, documentaries and cartoons. The 72 individual video clips were arranged in judging sets of four video clips each, constructed to minimize similarities among targets within a set. Target pools and target clips were randomly selected by the computer during each session, thus enabling the experimenter to remain blind to the actual target for every session until feedback was provided at its conclusion. More detailed information regarding the target presentation system and its intricacies can be found in chapter 6.

Hypotheses and Exploratory Questions

Prior to the beginning of this study, undertaken in conjunction with the Koestler Chair, three hypotheses were prespecified:

H1) That the overall number of direct hits for this study would exceed chance,

H2) That there would be no difference in psi success among the three sender conditions, and

H3) That there would be a positive correlation between psi success and the personality attribute of extraversion.

In addition, two further hypotheses prespecified by the author for the purposes of this thesis alone were examined:

H4) That there would be a positive correlation between psi success and the participants self-reported creativity level.

H5) That there would be a positive correlation between psi success and the geomagnetic field as measured by the *ap* indices.

The alpha level for the primary hypotheses was set at .05. Alpha for the exploratory analyses was set to .02, and the alpha level for all other results was .01.

Exploratory Hypotheses

The exploratory questions focused on the relationship of the aspect of openness to psi success. In particular, the author was interested in seeing whether there would be a positive correlation between openness (as measured by the NEO-PI) and psi success. According to Costa and McCrae (1992b), the authors of the NEO-PI, Agreeableness should correlate positively with F (Feeling) of the MBTI, and Conscientiousness should correlate negatively with the MBTI's P (Perceptive). The relationship of FP with psi success has been noted by other investigators in their ganzfeld research (Honorton, 1992), and I was curious to see if this would translate across into the use of the NEO. The four factor model of success, as put forth by Honorton (1992), was examined to see if its predictive value would be applicable for creative populations. As ganzfeld studies exploring the impact of the emotionality of the target stimuli (Bierman, 1995) have seemed to indicate that video clips with either a high negative or positive content are better target material, this variable was also explored. It was decided that any other factors of note would also be discussed briefly, in case they suggested further exploratory examinations or warranted inclusion in future research studies.

Treatment of the Data

Direct hits were used as the primary measure of whether this study constituted a conceptual replication of previous autoganzfeld research, in particular, that of PRL. In addition, it had been decided to use the more conservative Stanford's z scores (computed by subtracting the mean of the ratings for all four targets from the rating for the target and dividing the result by the standard deviation of the ratings used to compute the mean (Stanford and Sargent, 1983), formula shown in Appendix 11), to analyze the difference among the three conditions, as well as to correlate with the various individual differences scales. A Spearman's rho was conducted as the correlational analyses.

Results and Discussion

Main Hypotheses

Psi Results

Ninety seven individuals took part in the study, (age range was 17 – 61, average age 27). There were 58 artists and 39 musicians, comprising 52 females and 45 males. In 97 trials there were 32 direct hits, resulting in an overall hit rate of 33%, which is just statistically significant at exact binomial p = .047, (ES(h) = .18), confirming Hypothesis 1. Although this effect may be considered to be small, it is still comparable to the hit rate cited in earlier autoganzfeld databases of 34% (Honorton, 1992; Bem & Honorton, 1994). Table 7.1 shows the overall study results for all 97 participants. In order to conduct a more equitable comparison of the three sending conditions involved, it was decided in advance that if more than 32 trials occurred in one of the conditions, the comparison would be conducted only for the first 32 sessions of that condition. Therefore, the extra trial in the sender condition (number 33, a female artist with a rank of 1) was removed from the data pool for this analyses. Results for each of the three sending conditions were nonsignificantly above chance, as is shown in Table 7.1.

Table 7.1
Overall Study Direct Hit Rate and Results by Condition

	Number of Trials	Number of Direct Hits	% Hits	z	ES(h)
Total	97	32	33%*	1.67	.18
Condition					
Sender	32	9	28%	.24	.07
No Sender	32	11	34%	1.02	.21
Replication	32	11	34%	1.02	.21

*Significant at $p < .05$

In order to assess any differences between sending conditions, as stated in Hypothesis 2, Stanford's z scores were used in an ANOVA comparing the three different sending conditions. As can be seen in Table 7.2 the differences between the three conditions were nonsignificant at F = .255, 2/93 df, $p = .775$, supporting Hypothesis 2.

Table 7.2
ANOVA of Sending Conditions

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

It must be noted here that although the results of this study support Hypothesis 2, this result should not be considered conclusive. Given the small number of trials for each condition (n = 32), this effect would have to have been very large in order to detect it statistically. So that complete statistical information is readily available for all conditions in this study, the full distribution of ranks, by condition, is shown in Table 7.3. The values shown are for all 97 participants in the study, including the extraneous trial in the 'sender' condition, as a means of ensuring that data for all participants is reported and available for future inquiry.

Table 7.3
Distribution of Ranks by Sending Condition

	Replication	**Sender**	**No Sender**
Rank			
1	11	10	11
2	7	9	5
3	8	8	7
4	6	6	9

To assess study results by subpopulation, participants were separated into their respective creative groups, that of musicians or artists. The total number of artists in this study was 58, the total number of musicians 39. It can be seen from Table 7.4 that artists achieved an overall hit rate of 38%, which is significant at exact binomial $p < .04$, two tailed. The musicians in this study achieved a nonsignificant hit rate of 26%. Although the difference between the scoring rates for the artists and musicians is not significant (ES(h) = .28), these results appear to reverse the Juilliard student trend discussed in chapter 3 (Schlitz & Honorton, 1992) in which musicians were the high scorers.

Table 7.4
Overall Study Direct Hit Rate and Results by Condition

	Number of Trials	**Number of Direct Hits**	**% Hits**	**z**	**ES(h)**
Total	97	32	33%*	1.67	.18
Subgroup					
Artists	58	22	38%**	2.05	.28
Musicians	39	10	26%	.06	.01

*Significant at $p < .05$
**Significant at $p < .04$, two tailed

Extraversion

Hypothesis 3 predicted a positive correlation between ganzfeld-psi success and the personality attribute of extraversion. The (Spearman) correlation of -.178 between z scores and extraversion is opposite to the predicted direction for which a one tailed test of probability had been planned, and therefore is not statistically significant.

This was a surprising reversal of the typical relationship between extraversion and psi hitting, with those who were classified as 'introverts' according to the NEO-PI the more successful participants at the psi task, and those who were classified as 'extraverts' being less successful. Therefore, Hypothesis 3 was not supported.

Creativity Results

Two questions from the self-report form completed prior to the ganzfeld session were used as the measure of creativity. These two questions dealt with the number and type of creative and/or artistic activities participants were involved in, and provided a rating on a ten point scale of self perceived level of creative ability. Table 7.5 shows the results for these questions, first for the overall study population, and then for the subgroups of artists and musicians. This table shows that there was no sizable relationship between either of the creativity questions and overall study z scores, (rho = .086 for activities, and -.044 for creative level). Of interest here is that the subgroup of artists displays nonsignificant trends towards negative correlation with creativity measures (rho = -.032 for creative activities and rho = -.024 for level of creativity), while the subgroup of musicians produced a significant result with the number of creative activities (rho = .351, $p < .02$) and z scores. However, this same subgroup (musicians) failed to obtain a significant correlation between self perceived level of creativity and z scores (rho = .032). This will be discussed in more detail later in this chapter.

Table 7.5
Results of Creativity Self Report Measure

	# Creative Activities	**Creativity Level**
Group Total	.086	-.044
Artists	-.032	-.024
Musicians	.351*	.032

*Significant at $p < .02$

Geomagnetic Indices

After completion of the study the *ap* indices were retrieved for each day on which a ganzfeld session had been conducted. The geomagnetic analysis was conducted specifically after all data was collected to avoid the possibility that knowledge of geomagnetic parameters during the experiment might bias experimenters' expectations of individual sessions. As the global *ap* indices are derived from quantized variables, their distribution is irregular and therefore a nonparametric correlation (Spearman's) was used to avoid assumption of normal distribution of GMF values. Correlations were conducted with the receiver's rank score, rather than *z* scores, in order to make these results more readily comparable to other geomagnetic research. Due to missing values in the geomagnetic data available from the survey station at time of analysis, this result is based on the data from 96 participants. The correlation between participant's ganzfeld rank scores and the global *ap* indices was significant at rho = .212, $p < .05$, providing support for Hypothesis 5. This finding provides some support for the GMF-psi relationship as described in chapter 5, that of enhanced psi perception on days of low global geomagnetic activity. Although the findings presented here are in direct contrast to the result found by Radin et al., (1993), with a creative population, it does provide a measure of support for previous GMF-ESP studies. For example, this result compares well with the study by Persinger and Krippner (1989), showing a significant correlation ($p = .04$) between geomagnetic values and the twenty-four hour period in which the strongest telepathy for dream ESP experiments occurred.

To examine this result further, participants' ranks were divided into two groups of being either a Hit (rank of 1), or No Hit (rank of 2, 3, or 4). A comparison was then conducted using the Kolmogorov-Smirnov two sample test for the two groups with the *ap* indices. As can be seen in Table 7.6, this yielded a significant difference for the *ap* indices at $p = .04$, indicating that the distribution of the *ap* index was stochastically larger for the Hit group than for the No Hit group.

Table 7.6
Results of Kolmogorov-Smirnov Two Sample Test for Hit and No Hit Groups

Geomagnetic Measure	Maximum Difference	p (1-tailed)
ap by Hit	0.267	0.041

Table 7.7 shows the values from which the above results were derived, and is provided here for statistical completeness.

Table 7.7
Descriptive Statistics for ap Indices for Hit and No Hit Groups

Hitting			Non-Hitting		
Mean	**SD**	**N**	**Mean**	**SD**	**N**
18.8	16.8	32	27.2	25.4	65

Exploratory Questions

Unless otherwise indicated, the following analyses were conducted on the data of all 97 participants. Personality, mentation and creativity variables will be considered first, then the four factor success model, and finally target emotionality results.

Personality Measures

Because prior ganzfeld studies have suggested a link between the personality attribute of openness and ganzfeld-psi performance, a positive correlation was expected between openness (as measured by the NEO) and psi success. However, this was not the case for the creative population in this study. Instead, a slight negative trend was found between study z scores and the factor of openness (rho = -.138) for the overall study. This negative trend is also present in correlations with the factor's six subscales, but again, not significantly so. Musicians had a more positive overall correlation with the openness scale (rho = .101), although neither it nor any of its subscales reached significance. The subgroup of artists manifested a surprisingly significant reversal of the typical relationship between psi scores and openness, with the correlation of rho = -.280 significant at $p < .05$ (two tailed). This finding would seem to indicate that 'closed' artists were marginally more successful at the ganzfeld-psi task than 'open' artists. Additionally, one of the factor subscales (Openness to Aesthetics), is significant (rho = -.338, $p < .02$, two-tailed) in the direction opposite to that of the normal relationship, and two other subscales (Openness to Fantasy and Openness to Feelings) come close to significance, rho = -.257 and -.248 ($p < .06$, two tailed), respectively. While this trend is interesting, and counter to what one might expect from a population that is traditionally viewed as being 'open' by its very nature, it would be premature to take these findings too seriously due to the small numbers comprising the respective participant pools.

Continuing on with this exploration of the NEO subscales, scale six of the extraversion factor (Positive Emotions), correlated negatively with overall *z* scores (rho = -.317, $p < .02$, two-tailed), 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 (Morris et al., 1993) discussed in chapter 3. In terms of the subgroups, only the artists produced any results of note on the subscales for extraversion. Their result on subscale two (Gregariousness) was close to significance (rho = -.240, $p < .06$, two-tailed), and correlations for *z* scores and scale six, (Positive Emotions) were significant at rho = -.405 ($p < .01$, two-tailed). These results indicate that artists who were low in gregariousness and positive emotions were also the artists who performed well on the psi task. Given the small number of participants in the subgroups, these figures must be taken with caution, but it is planned to continue to examine personality correlates of apparent ganzfeld-psi success in later experiments.

Although the MBTI was not used as the personality measure in this study, one 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 (1992b), Agreeableness should correlate positively with F (Feeling), and Conscientiousness should correlate negatively with P (Perceptive). Correlations between *z* scores and the factors of Agreeableness ($r = .053$), and Conscientiousness ($r = .181$), were not statistically significant, thus lending no additional support to F and P as correlates of ganzfeld success in this study.

Mentation Variables

Several interesting items of note dealt with the mentation report experimenters filled out for each session prior to viewing any of the targets for that session. It was found that, for all participants, 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 < .02). This would seem to indicate that participants who produced a large amount of mentation also tended to miss the target. There was a also a significant negative correlation between z scores and the experimenter's rating of the amount of judgable material in the mentation, with those participant's producing an abundance of material also producing a low z score for the actual target (r = -.337, p < .01). This finding is what one might expect, based on the assumption that producing large amounts of mentation (and hence, judgable material) would also introduce large amounts of extraneous noise into the material to be compared against target clips.

In assessing the differences among the three sender conditions, the ratings of session characteristics given before the blind was broken were examined. 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). This finding may simply be the result of the receiver being aware that a third party could also hear their mentation, perhaps leading them to slightly censor, or limit, what they reported.

Creativity Variables

The creativity results for this study, while overall nonsignificant, have been informative. The correlation between overall study creativity level and the factor of openness is significant at the two tailed level (rho = .239, p < .02), but not the correlation between creative activities and openness, rho = .087. This is what one might expect, if participants felt themselves to be very creative, yet preferred to limit their activities to one or two areas. Conversely, participants may have felt that they would be seen as 'boasting' or uncommitted if they listed a wide variety of activities. Or, they might simply have decided to stop after listing a few activities and move on to the next question. These possibilities suggest that a checklist of activities, though less open ended in terms of responses, may be a more appropriate measure for groups who have time limitations on their study involvement.

I was surprised to find significant correlations between self perceived creativity level and the openness subscales of Fantasy and Aesthetics (rho = .343 and .337, $p < .05$, two tailed) for the musician subgroup. As will be recalled, this group showed significant results between the number of creative activities and psi scores ($p < .02$), but not with self perceived level of creativity and psi scores. However, this might be explained in view of the strong negative correlations for this subgroup between both creative activities and creativity level and the subfactor of Compliance (rho = -.364 and -.321, $p < .05$, two tailed), perhaps indicating a reluctance on the part of the more highly creative individuals to comply with the implied 'request' of obtaining a direct hit in the ganzfeld.

This 'reluctance to comply' was not seen within the subgroup of artists, which may in part account for the greater success of this group in the psi task. The only other correlation of note for the artist subgroup is the strong positive tendency (rho = .250, $p < .06$, two tailed) for participants with a higher perceived level of creativity to score highly on the subscale of 'Openness to Feelings'. It is speculated that perhaps this indicates a greater sensitivity to 'intuitive impressions' which generally manifest as an emotional or physiological response.

Success Model

It will be recalled that the automated ganzfeld research 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). Their model was built upon four factors: 1) Prior psi experiences; 2) the practice of some mental discipline; 3) prior laboratory psi testing; and, 4) Feeling/Perception (FP) preferences on the MBTI. As virtually no one in the present study had experienced prior parapsychology laboratory testing (n = 2), I chose to focus upon a three factor model of success: Prior psi experiences; practice of some mental discipline (i.e. meditation, etc.); and, extraversion. These particular participant attributes were chosen on the basis of the prior success of the PRL model and also on results from the Cunningham study (Morris et al., 1993). That study used a similar creative population and showed a significant correlation with scoring success and extraversion (Pearson $r = .428, p <$

.01, one tailed), as well as showing that practitioners of a mental discipline performed significantly better than did non-practitioners (t(30df) = 2.67, $p < .01$, one tailed). According to Costa and McCrae, the factor of openness on the NEO would seem to relate most closely to the FP aspects of the MBTI, but as there is as of yet no experimental evidence empirically supporting this, it was decided not to include openness as a success factor here until its predictive value could be substantiated. In the present study, 37 of the 97 participants met the new three factor model for predicating ganzfeld-psi success. Of these, 13 produced direct hits, a hit rate of 35% (ES(h) = .22), which is similar to the overall success rate for this study, indicating that participants meeting this model were only marginally more successful than those who did not. Of these 37 participants in this study meeting the three factor model, 26 were artists, and 11 were musicians. Of the 26 artists meeting the three factor model, 10 produced direct hits for a hit rate of 38% (ES(h) = .29), which compares well with the PRL population meeting the original three factor model of success (43% hit rate, Honorton, 1992). Of the 11 musicians meeting the three factor model, only three of them obtained direct hits, producing a hit rate of 27% (ES(h) = .05).

Target Emotionality

To evaluate the emotional impact of individual target clips, three independent blind judges rated the emotional impact of each of the 72 targets comprising the study pool. Judges viewed clips one at a time, and were instructed to assess each individual clip on overall emotional theme by placing one check in the category of either neutral, negative or positive. Ratings for each clip were then added together across all three judges to provide one emotionality rating for each target clip. This evaluation revealed a total of 24 emotionally positive target clips, 26 emotionally negative target clips, and 22 emotionally neutral target clips. The total number of direct hits for the study overall was 32 in 97 trials. To assess whether participant's responded differently to the three types of target emotionality, the number of times a target from each category was randomly selected by the computer as the target, and the number of times it was correctly chosen by the participant as the correct target, were examined. As can be seen from Table 7.8, target clips considered to have a positive emotional impact apparently elicited a stronger psi response from this population, representing the highest hit rate (40%) for the three categories of target type. While a strong trend is displayed for an improved hit rate on the positive targets, this trend would not be significant, as can be seen in Table 7.8.

Table 7.8
Target Clip Emotionality Results

	Positive	**Negative**	**Neutral**
Target Type Availability	24	26	22
Times Selected As Target	25	49	23
Times a Direct Hit	10	15	7
% of Direct Hits	40%	31%	30%
Times a Distracter	25	27	13

Experimenter Effects

Of the unexpected results in this study, perhaps the most surprising was the detection of an experimenter effect in the data at study conclusion, indicating that the overall significance of the study could be accounted for by just one experimenter. Those receivers in sessions with Dalton as the experimenter had 48% direct hits in 42 sessions, whereas those sessions with Delanoy as experimenter had 24% in 41 sessions, and sessions with Morris as experimenter produced 14% in 14 sessions. One of the most notable aspects of the PRL autoganzfeld series was that the positive effects were fairly homogeneous from experimenter to experimenter, an important characteristic of any procedure to be used in systematic process-oriented research. However, this 'best case' scenario is not always to be found. In the two exploratory studies described in Morris et al., (1993) one experimenter (Cunningham) obtained significantly positive results while the other experimenter (McAlpine) achieved results that were at flat chance. White (1977) offers an extensive and thorough discussion of different kinds of experimenter effects, and Delanoy (1986) provides an excellent review of this effect in the ganzfeld literature. In the context of the present study, four kinds of explanations are discussed in relation to experimenter effects.

1) Psychological: There is some indication that the experimenter's manner and style of interacting may facilitate enthusiasm, comfort, trust and confidence (Edge & Farkash, 1982; White, 1977), thus leading to the effective deployment of attention to internal states, rich and labile experience, flowing reportage, good recall and low censorship. It is speculated that during judging, the experimenter may boost participants' confidence in their judgements by facilitating the noticing of target correspondences, and discussing judgements about the importance of target correspondences.

2) Experimenter Psi Effects: Various researchers (Irwin, 1994; Kennedy & Taddonio, 1976; Schechter, 1977; White, 1977) have conjectured that 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 extremely difficult to disentangle from the possibility of experimenter knowledge of the target through ordinary means. This possibility is examined further below.

3) Participant Recruitment: In the present study, three experimenters were involved, Morris, Dalton and Delanoy, with Watt acting as a sender in the latter part of the study. Dalton conducted the majority of the participant recruitment, both in terms of initial contact with student groups and in the scheduling of participants by phone. Thus, this experimenter was already more familiar with participants when they first arrived, and vice versa. It could be argued that perhaps consciously or unconsciously Dalton may have inadvertently scheduled participants perceived to have more potential for success for themselves, and participants for Dalton were in fact more conforming to the three factor model described previously. However, it cannot conclusively be said that this model did in fact predict which participants would do

better, for any of the three experimenters. Although Dalton had slightly more artists than Delanoy, (with Dalton having 27 artists and 15 musicians, and Delanoy having 20 artists and 20 musicians), this would not account for experimenter differences as both artists and musicians did better when being run by Dalton. During the course of the study it was agreed that younger participants would be assigned to Dalton and older ones to Delanoy and Morris, as this made for better matches psychologically. There is some support for this choice, as Delanoy's results were significantly positively correlated with participant age, and Dalton's results were nonsignificantly negatively correlated with age. It must be noted here as a related personnel variable that another experimenter, Watt, became available to serve as a sender later in the study, at which time the results began to pick up. The availability of Watt took much of the time pressure off other team members, and Watt and Dalton, being of a same age, tended to work together. When together as a team, Dalton and Watt had seven hits out of eleven sessions, whereas in the two sessions Watt conducted with other experimenters no hits were produced.

4) Experimenter Fraud: Although not an easy issue to address, it is acknowledged that this is an issue likely to be raised in some quarters and therefore it is appropriate here to discuss safeguards and the level of sophistication needed to circumvent them. As will be recalled from chapter 6, there are 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 the possibility 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, the possibility exists that 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. It is difficult to guard against these possibilities with complete

confidence, and safeguards sophisticated enough to detect or prevent any such procedure were not available. However, a viable alternate to prevention is to 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 session's audio 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. This was evaluated by having Dalton's session tapes transcribed up through the mentation review by a typist not involved with the study. As part of another project supervised by Morris, student groups were used to blind judge the material. One student group blind judged the mentation reports alone, and another group blind judged mentation reports with mentation review material added. Each of nine students judged four 'mentation only' transcripts and four different 'mentation plus' review transcripts, for a total of 36 sessions. The remaining six session transcripts were either not used or used as practice sessions. There were 39% hits for the 'mentation only' judgements ($z = 1.73$, $p < .05$, one 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 were actually worse following the review interaction. Of particular interest here 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, $p < .05$). Thus, no supporting evidence for an indication of experimenter fraud was detected.

To further this investigation, the computer printouts were examined by Morris to determine if, during the latter part of the study, it was more likely 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 maximize 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 Delanoy as for Dalton.

In addition to the observation in two earlier ganzfeld studies at Edinburgh of an apparent experimenter effect (Morris et al., 1993), there is concrete empirical evidence to the contrary to be considered here. Thus, it is felt that the experimenter fraud hypothesis can be regarded as extremely unlikely. It is more likely that alternative interpretations of experimenter differences can be found in one or more of the first three options discussed above, that Dalton was able to interact more effectively with participants, that their positive expectations regarding the success of the ganzfeld procedure was readily communicated, and that they have, in the course of their long involvement with the ganzfeld, learned strategies to facilitate participant performance. Additionally, Dalton has been successful in previous ganzfeld studies conducted at other research institutes in conjunction with other researchers. On the other hand, Delanoy has in the past tended to obtain overall chance results as a ganzfeld experimenter, although she has obtained and reported on several significant internal effects. Morris had never conducted a ganzfeld session before, and held a position of prestige that may have seemed intimidating to participants. In addition, the severely time limited schedules of both Delanoy and Morris made extended ganzfeld sessions stressful and difficult for them, which may have added to session complications.

Blind Judging Results

At the conclusion of the experiment, blind judging of session transcripts was conducted to evaluate the presence of psi in the database and as a means of evaluating the possibility of intentional or unintentional experimenter cueing to participants. Two independent judges were recruited from among professional acquaintances of the author's whom she felt would be adequate blind judges, and provided with verbal and written instructions similar to those provided to ganzfeld participants on how to rate ganzfeld session mentation-target correspondences. The two blind judges were kept blind to the actual target identity, and rated the participant's mentation for their degree of correspondence with a pool of four video clips for each ESP session, one of which was the target. Thus, there was a 25% likelihood of the judge's selecting the correct target by chance alone. The video clips in a target pool were ranked so that the film that had the closest correspondence with the participant's mentation was ranked 1, and the clip that was least like the mentation was ranked 4. Of the 97 trials in the study, four (#23, 26, 51 and 73) had technical problems with the audio recording of either the mentation or the judging sequence and were therefore not included in the blind judging, leaving a total of 93 trials for blind judging. None of the four excluded trials had produced direct hits.

Judge 1 achieved 33 direct hits in 93 trials, a hit rate of 35% ($p < .02$, $z = 2.15$, ES(h) = .23), and comparable to the study hit rate of 33%. Judge 2 achieved 29 hits in 93 trials, which is a hit rate of 31% and nonsignificant at $p < .11$, $z = 1.25$, ES(h) = .14. If the hit rate of the two separate judges is averaged together (35% and 31%) it produces an overall hit rate of 33%, which is equal to the hit rate produced in the study. This is what one might expect, based on the assumption of detectable psi in the database, although at what best can only be considered a marginal level. A Spearman rank correlation of +.70 between the two judges z scores was obtained, indicting good interjudge reliability. It should also be pointed out here that while Judge 1 has had prior experience at blind judging free response material (in the form of remote viewing trials), Judge 2 has not. In fact, in spite of several practice sessions before the beginning of the blind judging, a nonsignificant trend towards increased hitting in the latter part of the judging sequence for Judge 2 was seen. The results of this blind judging serves to provide additional evidence against the hypothesis of either intentional or unintentional experimenter cueing to participants.

SUMMARY AND CONCLUSIONS

This experiment succeeded in its primary goal of obtaining significant positive results under more stringent conditions and controls than have been previously instituted in ganzfeld research. The study was designed to eliminate some of the possible sources of artifact previously suggested for the PRL database (e.g. Morris et al., 1993; Wiseman et al., 1994) and to try out a new prototypic automated ganzfeld system. This experiment appears to have been successful in that study results were significant overall and the effect size was comparable to that of the previous ganzfeld database.

The study hypothesis concerning the impact of the sender was confirmed, as no differences was found between the three sending conditions. In this attempt to evaluate the role of the sender in the ganzfeld several factors were taken into consideration. Prior ganzfeld research has often made use of senders for several reasons. Psychologically, to many participants it is somehow more plausible that someone must first observe the target and send them a 'signal' before they can gain any information about the target. Even more importantly, having someone else there as sender acts as a means of increasing the 'teamwork' feeling of the session, and diffuses responsibility for producing psi. Additionally, having another individual as part of a team effort seems to reduce anxiety or fear about the appropriateness of demonstrating psi at all.

If, as some researchers have debated, psi is mediated in some way by the mind, then anomalous communication might take place to a more successful degree when the information is transferred between two minds. Or conversely, it may be that the addition of the sender's mental attention somehow enriches the psi signal itself, 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, (controlling for any psychological biases from the receiver's knowledge of sender's presence or absence), could be expected to affect 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 for the present study. No significant differences were detected between the three conditions, yet the overall reported ganzfeld effect of significant psi hitting was still present. In comparisons of the three conditions on the psychological measures, only one relevant aspect where they appeared to differ significantly was found, namely in mentation report abundance. Upon closer inspection of this measure, it was found that this was due to mentation reports being less abundant when receivers and experimenters 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 given receiver expectation effects, may be due in part to the small N's (32) in each of the three conditions involved. It may also reflect that none of the considerations already listed play a large enough role in obtaining psi in the ganzfeld to make a notable difference, or even that the sender's role in the ganzfeld may not have any sizeable effect on session outcome. A third consideration for this study involves the sole use of lab personnel as senders. In the PRL ganzfeld research, an improvement was noted in the hit rate of participants who brought in their own senders as opposed to those who had lab personnel assigned as their sender (Honorton et al., 1990). While it is outside the confines of this study to examine that aspect of sender/receiver relationship, it is felt to be an area that warrants further examination in future ganzfeld studies.

None of the main hypotheses for individual differences were significantly confirmed, although the data showed some suggestive trends in expected directions. The one preplanned analysis, for extraversion, produced a mild negative correlation with study z scores. In the exploratory analyses, a modest negative correlation between study z scores and the extraversion subscale of 'Positive Emotions' was found (rho = -.317, $p < .02$, two-tailed), as well as a slight negative trend between study z scores and Openness (rho = -.138). While there seems to be no ready explanation for this, it is possible that the laboratory environment itself played a role. If previous correlations with extraversion center around the ability of the extravert to do well in social situations, but the introvert to withdraw due to over-stimulation, then it is possible that in this study, where the experimenters involved would be aware of this difference in response, that experimenters compensated for this in their interactions with the differing personalities. This possibility fits in well with previous research (Crandall, 1985; Harris & Rosenthal, 1985; Honorton et al., 1975; Rosenthal, 1966) examining differences in experimenter-participant interactions which shows that participants with warm, friendly experimenters, who are attentive to their needs, respond by scoring better on psi tasks.

Further support for the relationship between enhanced psi performance and low geomagnetic field fluctuations comes from the statistically significant correlation between participants' ganzfeld rank scores and the global ap indices (rho = .212, $p <$ .05). It is encouraging that this correlation is in the expected direction, and its prevalence in past studies as well as its presence in this study warrants its continued examination in future studies.

The exploration of target emotionality within this study has given some pointers towards strengthening the ganzfeld effect by reducing target noise and increasing the psi information both physically and psychologically. It will be recalled that in the present study participants seemed to respond best to target stimuli that conveyed a positive emotional impact. Although such a study is outside the confines of this thesis, an examination of what constitutes emotionality in target stimuli would make for an interesting and informative future study. In view of the present results, and with an eye to furthering our understanding of what constitutes good target variables, the examination of target emotionality will be included in the remainder of the studies in this thesis.

Creativity Assessments

An important consideration in the identification of psi relevant characteristics is if one can identify theoretically relevant correlations between responses to creativity measures and psi results, one may then be in a better position from which to theorize about the nature and process of psi. While the creative population used in this study confirmed previous research indicating that this population produces superior psi performance in the ganzfeld, it shed no light on the understanding of why this may be so. The use of a self report questionnaire involving perceived level of creativity and listing of creative/artist activities, while allowing correlation with personality measures and participant characteristics, did not provide sufficient information regarding the psi-creativity association. A drawback to using a subjective measure of creativity such as the one for this study, is that it is based on the assumption of accurate self reporting. Given the considerable interest in ganzfeld research among the artist student population — it is, admittedly, a fun and self-informative experiment to take part in, particularly in view of its imagery generating aspect for the artistic community — it is conceivable that potential participants wanting to take part in the study may have felt that if a high level of creativity, or a sufficient number of activities were not given, they might be turned down for participation.

The Cunningham (Morris et al., 1993) study discussed in chapter 3, which also tested creative participants from the Edinburgh area, pre-selected them to have artistic or musical ability. The range reported by these participants on the self-rated creativity scale allowed for correlation between 'high' creatives (score above a five) and 'low' creatives (score below a five) and scoring success. This correlation was positive but not significant, with those who rated themselves high on both artistic and musical creativity scoring significantly better than those rated average to low on both scales. It may have been due to a misperception that a certain level of creativity was required to take part in the present study that nearly everyone rated themselves either nine or ten on the ten point creativity scale, with only three people out of 97 listing themselves as a five or lower. With only three participants fitting the 'low' creative criteria, and 94 meeting the 'high' creative, no meaningful correlation could be conducted. In addition, it must be borne in mind that because creative groups that fall into the categories of 'high' or 'low' may differ on many dimensions other than those relevant to the aspect of creativity being measured, comparisons between them may not be clearly interpretable nor meaningful.

The remaining studies in this thesis were planned to incorporate more stringently defined creative populations, such as 'paid' professionals and those actively involved full time in the production of their art, rather than engaging in the creative activity as a hobby or occasional pastime. It was hoped in this manner to incorporate a larger population of participants with a greater depth of commitment to their creative professions.

This experiment has suggested that the ganzfeld technique is a promising method for exploring the relationship between creativity and psi, but the correlation found between creativity and psi was weak, and not statistically significant. By their very nature, self reports are not open to empirical verification, allowing for no substantive information to be drawn regarding the cognitive process of the creative individual. Perhaps the most important finding relating to creativity to come from this experiment is the demonstration that a more in-depth examination of the association between divergent thinking, functional fixity, and the ability to allow unconscious impressions to enter awareness more readily, is needed. Therefore, a more diverse range of creative assessments has been planned for the next study. In a move away from the structured introspection of self reports to the more relatively structured-unstructured projective type instruments, a variety of creativity assessments were exposed to several small groups of creative and artistic individuals to evaluate the appropriateness of the measure for inclusion in the following studies. These groups provided in-depth feedback about the various tests, whether they were too simplistic or too complex, whether the groups felt they tapped into the artistic ability they were meant to measure, et cetera. After extensive feedback sessions and discussions with these creative groups, several measures were selected. These measures will be discussed in more detail in the next chapter.

While the relationship between psi success and the presence or absence of a sender will not be studied further in this thesis (as it is not the main object of interest), this experiment has nevertheless shown some curious trends that warrant further, more rigorous, experimentation. In particular, this study manifested a reversal of the typical relationship between musicians and significant scoring in the ganzfeld. While this may be due in part to fewer musicians than artists meeting the three factor model for success, or to the inclusion of a large percentage of participants claiming music as a creative activity when it may have been closer to a pastime, neither of these explanations seem sufficient in the face of the artist's results. A more focused approach to the creativity criterion, as well as a more objective means of measuring it, seems called for. The next chapter reports on this more focused approach to the creativity-psi relationship question, and discusses the objective measures chosen to evaluate it.

As the aim of this thesis is to gain a better understanding of the relationship between creativity and enhanced psi performance, the remainder of the experiments in this thesis focus on four creative groups: visual artists, musicians, actors and creative writers. These four experiments were run concurrently to avoid order effects and to allow for the gathering of a large amount of information concerning the performance of differing creative groups on the same psi task. Therefore, the hypotheses and creativity measures were kept the same for all four groups as a means of allowing for a comparison and contrast on these measures at the summary of individual group results in the next two chapters, and for a comparison and contrast of all four groups at the conclusion of the experiments in chapter 10. No analyses on the data from each group was conducted until all four groups had completed the experiment. For consistency, and as a follow up on the results of experiment 1, the next experiment (Experiment 2) dealt with groups of artists and musicians, while Experiment 3 focused on actors and creative writers. Each experiment will discuss the individual groups results first, and then conclude with a comparison of the two groups. The final chapter in this thesis, chapter 10, will provide an overview of all four group results combined, and end with a discussion of what conclusions can be drawn from these findings.

Experiment 2: A Focus on Creativity and Psi in Musicians and Artists Under Conditions of Sensory Deprivation

Chapter 8

Experiment 1, described in chapter 7, enabled the comparison of the sender condition with a creative population using the ganzfeld technique. The study found no significant difference between sending conditions, as had been predicted, but also detected no significant correlations between the creativity measure, a self report form assessing level of perceived creativity, and psi performance. One goal of this conceptual replication (meaning experiments 2 and 3 as well as this entire thesis), is to consider whether measures of creative ability or personality characteristics can be used to identify participants likely to score well at psi tasks. As groups that are ostensibly labeled 'creative' have done consistently well in past ganzfeld studies and other psi research (as discussed in chapter 3), it may be that the creativity instrument used in experiment 1 was inadequate to fully assess participants' creativity. As the questionnaire used in experiment 1 offered only two items directly related to the measurement of creativity, it was not sufficient to measure many aspects of creativity in any depth or detail. In replicating the success of the automated ganzfeld technique in eliciting psi in a creative population, experiment 1 provided support for the use of the ganzfeld procedure in process oriented psi research. Therefore, although the conclusions of experiment 1 regarding the creativity-psi relationship were only tentative, it was worthwhile to conduct another, similar study designed to address some of the possible weaknesses of the first study.

This chapter conducts an investigation of the ganzfeld performance of two creative groups, visual artists and musicians in relation to their performance on several creativity measures. While Experiment 1 replicated the overall effect of the ganzfeld, the performance of the subgroup of musicians (26% hit rate) was contrary to that found by both Schlitz (Schlitz & Honorton, 1992), whose musicians produced a hit rate of 75%, and Cunningham (Morris et al., 1993), where the musicians produced a 41% hit rate. While this may be due in part to fewer musicians than artists meeting the three factor model for success (as discussed in chapter 7), or to the inclusion of a large percentage of participants claiming music as a creative activity when it may have been simply a passing hobby, neither of these explanations seem sufficient in the face of the artists' results in experiment 1. A more likely explanation is the lack of an explicit creativity criterion, and the lack of an objective means of measuring creativity. A more focused approach to the creativity criterion, as well as more objective means of measuring it, is adopted for the remainder of the studies in this thesis. This chapter will first present and discuss results for each individual group, study 2a focusing on the musicians, study 2b the artists, and conclude with a discussion of the combined results for both groups.

For purposes of replication and perhaps later meta-analysis, the design and procedure of the present study will be quite similar to the preceding study, with the exception of participants being requested to bring in their own sender, rather than having a laboratory sender assigned to them or being assigned to different sending conditions as in experiment 1.

This distinction is the primary methodological change for the present study, and as was argued for in chapter 7, was instituted for a number of reasons. While experiment 1 made use solely of laboratory personnel as senders for participants, it will be recalled from chapter 2 that the PRL ganzfeld research found an improvement in the hit rate of participants who brought in their own senders as opposed to those who had lab personnel assigned as sender (Honorton et al., 1990). Additional incentives for using a telepathic design in ganzfeld studies are: (1) Psychologically, to many participants, it is somehow more plausible that someone must observe the target and send them a 'signal' before they can gain any information about the target; (2) it increases the 'teamwork' feeling of the session; (3) it diffuses responsibility for session success or failure and for the appropriateness of producing psi at all; (4) it reduces the need for another experimenter, thus eliminating any concerns with scheduling pressure or time constraints other than those of the participant, who is responsible for scheduling the sender themselves; (5) if, as some researchers have speculated, psi is mediated by some interactive process with the mind, then anomalous communication might take place to a more successful degree when the information is transferred between two minds; and, (6) that the possibility exists that the addition of the sender's mental attention somehow enriches the psi signal itself, adding an extra boost to what normally may be a very small, weak signal. The ganzfeld studies with creative populations by both Schlitz and Cunningham were telepathy protocols, and it is appropriate that the studies here, which essentially are replications of their research, should also involve a telepathy design.

An obvious drawback to using a single experimenter design is the possibility of later criticisms of experimenter fraud. The use of the automated ganzfeld system described in chapter 6 eliminates the majority of these concerns, and chapter 7 demonstrated the presence of concrete experimental evidence against the hypothesis of experimenter fraud. However, as an added security measure, blind judging of all session transcripts for the remainder of the studies in this thesis was conducted by two independent blind judges, and these results are reported and discussed in chapter 10.

While the significant results of experiment 1 confirmed prior research indicating that creative populations produce superior psi performance in the ganzfeld, it contributed no understanding of what might be unique about this particular population. Whether that uniqueness springs from their natural artistic talents or from the less restricted societal expectations and viewpoints remains unclear. It stems from this that 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, is indicated.

Therefore, as the focus of the present study was rather more on the relationship between creativity and psi than in experiment 1, whose focus was divided between sender impact and the creativity relationship, it was decided to expand the repertoire of creative measurements for this study. It was hoped that this approach would allow a more in-depth examination of the creativity-psi relationship, as well as shedding light on whether a particular level or type (i.e., artist or musician) of creative individual has more impact on that relationship. In view of assisting this examination, participant's were required to complete both objective and subjective measures of creativity. Creativity tests selected were restricted to those requiring less than two hours of participants' time to complete. The final selection of creativity tests for use in this thesis was identified prior to study onset as those found to be the most interesting for participants, and the most informative for the needs of this thesis, through evaluations conducted by the author with small representative groups of artists and musicians.

Although the geomagnetic results from experiment 1 were both significant and positive, in view of the focus on creativity measures and their relationship to psi in the following experiments, and in view of the small size of each individual group (n=32), it was decided to conduct the geomagnetic data analysis at the conclusion of all experiments. Thus, geomagnetic results for all four experimental groups combined will be presented in chapter 10. Likewise, the results from the target emotionality analyses, blind judging analyses, and the examination of the three factor model of success put forth in chapter 7, will be presented in chapter 10 for the same reasons.

Creativity Measures

When assessing the creative endeavor, tests of divergent thinking are the ones most often used in educational settings and in educational and psychological research (Wallach et al., 1990). Divergent thinking tests, developed from Guilford's Structure-Of-Intellect model (SOI) discussed in chapter 4, are designed to evaluate the cognitive processes of fluency, flexibility, originality, and elaboration. Taken together, these are thought to comprise the cognitive components of creative thinking (Dowd, 1989). The divergent thinking approach to the study of the creative process is one that has the most robustly developed theoretical base, underlies most creativity tests, and has generated the most empirical research. When used in conjunction with tests examining attitudes, personality attributes and creative activities, divergent thinking tests can provide a balanced view of the creative person and process (Runco, 1993; Treffinger, 1987). In view of this, the divergent thinking paradigm, assisted by personality, attitude, and activity inventories, was chosen as best suited to the aims of this thesis.

The Torrance Tests of Creative Thinking (TTCT) were developed by Torrance (1979) as a way of studying and predicting creative behavior in people. His model identified abilities, skills and motivations as important and interrelated factors in creative behavior, and emphasized the need to consider more than just ability when trying to understand and predict creative behavior. The Torrance tests dominate the field of creativity research to such an extent that they were used in 40% of all published studies of creativity with college students and adults by 1984 (Torrance & Presbury, 1984), and are still dominate today. Torrance's methods of assessment of creative potential, like Guilford's, concentrate on the cognitive processes of fluency, originality, flexibility, and elaboration. In addition to scores in these four areas, the Torrance tests furnish an overall creativity index. These scores can be used separately, as measures of the component skills of divergent thinking, or combined into an overall divergent thinking index score. During the creativity session of this experiment, all participants completed the 'Verbal' form of the TTCT (Torrance, 1990), as well as a single test from Guilford's SOI model, 'Possible Jobs' (Gershon & Guilford, 1963), hereafter referred to as 'Jobs'. As chapter 4 contains a detailed description of these assessments, as well as their development backgrounds, that information will not be given here. In addition to the Verbal form of the TTCT, artists also completed the 'Figural' form of the TTCT (Torrance, 1990), and musicians completed the 'Sounds and Words' aspect of the TTCT (Khatena & Torrance, 1973), hereafter referred to as 'Sounds'.

To provide a balanced view of the creative individual, divergent thinking tests should be used in conjunction with inventories of attitude, activities and personality. Therefore, the 'Something About Myself' (SAM) component of the Khatena-Torrance Creative Perception Inventory (also detailed in chapter 4) was used to assess participants' creative interests and abilities (Khatena & Torrance, 1976). The Khatena-Morse Multitalent Perception Inventory (KMMPI) was selected as the creativity assessment providing information on participants' creative activities and achievements (Khatena & Morse, 1990).

All creativity assessments were conducted with participants in a separate session prior to their ganzfeld trial. The specialized creativity assessments (e.g., TTCT Figural or Sounds) were administered on the basis of creative backgrounds (i.e., artists completed figural drawings, musicians responded to musical sounds) to allow assessment of creativity level in the individual's area of specialty. Both groups completed the Verbal TTCT to provide a common baseline for analysis and comparison across the two groups.

Personality Measures

As most schools of thought hold that everyone is creative to some degree, however small or large a degree that may be, one approach to defining who is more likely to be highly creative is to examine those characteristics that are often associated with the creative individual. Most theorists explicitly or implicitly view creativity as both an intervening variable (MacCorquodale & Meehl, 1948), something not directly observable but used to explain relations between stimuli and responses, and a trait, something that a person 'possesses' and that varies among people (Turner, 1968). Personality inventories, when used in combination with inventories examining creative attitudes, activities and achievements, as well as tests of divergent thinking, can help to provide a balanced view of both the creative individual and the creative process.

It should be noted here that a recent factor analysis of the NEO-PI has cast doubt on the assumed orthogonality of the classification of certain facets within a specific factor (Church & Burke, 1994). Given this, and the lack of any significant findings in terms of the subscales, the next two studies will make use of the NEO-FFI, a shortened version of the NEO-PI. The NEO-FFI (Costa & McCrae, 1992b) also measures Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness but dispenses with the added information of the factor subscales. It is faster and easier for participants to complete, as well as being quicker and easier to score for experimenters. It provides the same information as the NEO-PI for the major factors, but lacks the individual ratings on factor subscales. The participant scoring is included as part of the form itself, rather than a separate sheet such as for the NEO-PI. Additionally, the NEO-FFI meets the same standards of reliability and validity as its parent form (Costa & McCrae, 1992b), as discussed in chapter 3. For these reasons, the NEO-FFI was chosen as the personality inventory to replace the NEO-PI (see Appendix 2) and will be used as a more effective and efficient personality measure for the remainder of the studies in this thesis.

As creativity is a multi-faceted and complex concept, several approaches to understanding the links between creativity and enhanced psi performance were taken. In addition to the creativity measures, individual and personality differences were examined.

Individual Differences Measures

As was discussed in experiment 1, the author was particularly interested in seeing whether there would be a positive correlation between openness (as measured by the NEO-FFI) and psi success for the creative populations. The surprising slight negative trend between openness and *z* scores in the preceding study is counter to what one might expect from a population that is traditionally viewed as being 'open' by their very nature (see chapter 3 for a further discussion of this). In view of the persistent findings of prior research (Broughton & Alexander, 1995; Van Kampen et al., 1994) of a positive relationship between openness and psi success, it was decided to examine this relationship further in the present study.

Although experiment 1 found a slight negative trend between psi success and extraversion, it is thought that in view of the significant ESP-extraversion relationship shown in the meta-analysis conducted by Honorton et al. (1990), these results may be more the exception rather than the rule. Participants meeting the three factor model of success put forth in experiment 1, one of which was extraversion, evidenced a higher rate of success than those participants who did not possess these factors. It should also be borne in mind that experiment 1 made use of very loosely defined creative groups. Therefore, as the present study involves more stringent creativity criteria, extraversion as a personality correlate of apparent ganzfeld-psi success was included for examination.

Participant Information Form

The Participant Information Form (PIF) used for the remainder of studies in this thesis was a modified form of the Koestler Chair 77 item questionnaire covering different aspects of the participant's background, prior experiences, interests, characteristics, etc. The modified PIF used in the present study, shown in Appendix 9, was shortened to 55 items, and included three creativity related questions: (1) Did they engage in any creative or artistic activities; (2) how they rate themselves (on a five point scale) for level of creative/artistic ability; and, (3) did they feel nervous or confident about performing, or displaying their work (also on a five point scale).

Dissociative Experiences Scale

Dissociation is thought to occur to some degree in everyone (Ross et al., 1991), and has been linked to reports of psychic experiences (Irwin, 1994; Richeport, 1992). Schmeidler (1982), in examining gifted psychics, found evidence that the ability to dissociate was strongly characteristic of psi success, and laboratory research (Pekala et al., 1995), has indicated that dissociative states are viewed as 'psi conducive'. Thus, the ability to dissociate has been linked with the achievement and enhancement of both the psi state (Braude, 1988) and the creative state (Barron, 1990). It is considered of interest then, to examine the relationship between the ability to dissociate and psi success in creative individuals, as a means of exploring the creativity-psi association. The Dissociative Experiences Scale (DES) was originally developed to meet the need for a means of reliably measuring dissociation in both normal and clinical populations (Bernstein & Putnam, 1986; Ross et al., 1988). The finalized version of the DES is a 28-item self report scale that subjects respond to by circling the appropriate number showing where they fall on a continuum for each question. This instrument, discussed in detail in chapter 3, was chosen as the means of measuring dissociative ability for the present study.

Tellegen Absorption Scale

As was pointed out in chapter 5, characterization of the state of consciousness during both creativity and psi experiences shows strong concordance with a psychological dimension known as absorption (Irwin, 1985; Stanford, 1987). Absorption represents the capacity and inclination of an individual passively, and more or less exclusively, to engage total attention in some object or experience, either internal or imagined (Tellegen & Atkinson, 1974). While only a few psi studies have attempted to measure the domain of absorption, these have given somewhat conflicting results. Sondow (1986) reported no significant relationships between a four-item, three point absorption scale devised by Bowers (1978) and creativity measures or ganzfeld-psi results, which were at chance overall. At about the same time, a correlational study by Lynn and Rhue (1986) reported strong support for an association between creativity and absorption, hypnotizability, and expanded awareness as indexed by the scale developed by Tellegen and Atkinson (1974). Hence, the Tellegen Absorption Scale (TAS) may be more sensitive as an absorption instrument, particularly in view of the fact that it contains 34 items rather than only the four used by Bowers (1978). As a variable that has been linked to both creativity and psi, participants' absorption levels were examined in relation to ganzfeld-psi success using the TAS as part of the exploratory analyses for this study. The 34 item questionnaire measure of an individuals' capacity for absorbed experience developed by Tellegen and Atkinson (1974) as discussed in chapter 3 was used. The TAS questions were embedded in a questionnaire with 12 buffer items, to comprise a 46 item absorption instrument entitled 'Styles of Experience'. This form was described to participants as a way of measuring their approach to life.

Pre-Selection of Participants

Although the relationship between creativity and psi in experiment 1 was tenuous at best, the study did provide several pointers towards increasing the strength of the ganzfeld effect by reducing noise introduced by unmotivated or unsuitable participants. The examination of the three factor model put forth in chapter 7, that of having prior psi experiences, practice of some mental discipline, and extraversion, showed a higher rate of success (35%) for those 37 participants meeting this model of success than for those who did not. On the basis of the success of this model, and the prior history of success for similar factors in the PRL population (discussed in chapter 2), it was decided to use only creative participants who responded affirmatively to the PIF questions of psi belief, prior psi experiences and the question of whether they felt psi could be demonstrated in the current study.

To conduct a systematic and comprehensive comparison of creative groups in the ganzfeld it was decided to focus on four different groups, with two groups taking part in each experiment. These four groups were run concurrently to avoid order effects and yet still allow for a comparison of all four groups at the conclusion of the investigation of each individual group. The first two groups to be examined were artists and musicians, as the preceding study had yielded several findings with these groups that the author felt needed to be pursued. Additionally, the author also had several contacts already established in the art and music communities, and potential participants had already begun contacting her to take part in the present study. It was decided to terminate the experiment when data had been gathered from 32 individuals in each group. As none of the participants had ever taken part in automated ganzfeld research before, all were considered ganzfeld novices, and each participant contributed one trial.

METHOD

Participants

Creative volunteer participants, who had not taken part in experiment 1, and met study criteria, were invited to participate. It had been decided to actively recruit participants who fit a more stringently defined creative definition, such as 'paid' professionals and those actively involved full time in the production of their art. The majority of these participants were recruited from local art and music colleges and studios, although some had contacted the parapsychology unit out of interest in the subject, or word of mouth from the previous study, or had attended local talks given by the author on creativity and psi. Potential participants were sent the modified PIF form which, after completion, was returned to the author. If participants' responses matched study criteria - involved full time in a creative activity, professed a belief in psi, had had prior psi experiences, and felt that they could produce psi in the laboratory - they were contacted by phone and asked to take part in the creativity study. Participants not meeting the creativity study criteria were contacted and offered the opportunity to participate in other research if they wished. Participants for the creativity study had any questions answered during this phone interview and a time was arranged for the creativity session which proceeded the ganzfeld trial. Participant's were asked to bring in senders for the ganzfeld trial, but informed that they were not needed for the creativity session of the study, which could last up to two hours.

Overview of Procedure

The procedure was quite similar to that of the previous study, so only the procedural changes are described here. As before, prior to the participant's arrival at the laboratory, the computer program for the automated ganzfeld session was initiated and session details entered into the computer. When participant's arrived for the creativity session they were met at the door of the psychology department by the experimenter and escorted upstairs to the experimental suite for tea, cookies and chat time. After a tour of the experimental rooms, participant's completed the creativity assessments. As these were somewhat self paced, this could take anywhere from an hour and thirty minutes to two hours. As will be recalled, while at the laboratory, all participant's completed the 'Verbal' form of the TTCT, and Guilford's 'Possible Jobs'. Additionally, musicians completed the 'Sounds and Words' aspect of the TTCT, and artists completed the 'Figural' form of the TTCT. Before leaving the creativity session, participants were given a packet containing the 'Something About Myself' (SAM) form from the Khatena-Torrance Creative Perception Inventory, the Khatena-Morse Multitalent Perception Inventory, the NEO-FFI, which is a shortened version of the NEO-PI, the TAS, and the DES. Participants were instructed to complete these at home before returning with their sender for session two, the ganzfeld trial.

The ganzfeld procedure was conducted as described in chapter 7, with only a few modifications. All sessions in the present study were conducted under a telepathy protocol, therefore all senders were provided with the same instructions to remain silent throughout the session as before. Senders were escorted back up to the sending room after receiver preparation, and the experimenter verified that the door was securely closed and locked before returning to the experimental room. It should be noted here that the electronic sensing device attached to the sender's room door was fully activated for every session. The target clip was shown nine times rather than eight to provide extra stimulation for senders and to cut down on any possible 'unfocused' time. Senders were given verbal and written (see Appendix 6) instructions to immerse themselves in the target clip when shown, and to remain focused on the target clip in-between showings by drawing. They were also asked to mentally re-inforce any correct correspondences the receiver might voice. At trial conclusion the sender was instructed via computer to return to the experimental suite where they revealed the name of the target clip to the experimenter and the receiver, and watched the computer controlled playback of the clip with the receiver. After this, the session de-briefing proceeded as normal. After all sessions had been completed and the data collected and analyzed, each participant received a letter detailing the main findings of the study, their personal scores, and how to interpret them.

An issue addressed in the preceding study concerned the blind judging of session transcripts to ascertain whether experimenters may have influenced target selection or caused target biasing for the receiver during review of the four possible target clips (the judging sequence). Of interest for the present study is that while the blind judging results in that study found no evidence of experimenter biasing towards the correct target, they did show that results were actually worse following the review interaction with the experimenter. Thus, in the present and following studies, experimenter interaction with receivers during judging was kept to a minimum to allow the participant the fullest opportunity for success.

The Automated Ganzfeld System

Although details of the apparatus and experimental program which have already been outlined in chapter 6 will not be repeated here, other procedural refinements and details are discussed. The apparatus for this experiment was identical to that used in experiment 1, with the following programming modifications. All sessions were conducted in 'sender' mode, with senders receiving computer controlled instructions via monitor once the session had began. At completion of the ganzfeld trial, and after senders had returned to the experimental suite, trial feedback was completed by a computer controlled playback of the target clip rather than simply listing the clip title, as was done in the preceding study. This was instituted both to build up the impact of the target material and to allow the sender and receiver the opportunity to point out correspondences to each other.

Target Stimuli

Another methodological alteration was to improve and increase the target pool for this study. As will be recalled from the preceding study, participants seemed to respond best to target stimuli that conveyed a positive emotional impact. This supports previous evidence (Bierman, 1995) suggesting that emotionally impactful stimuli make better target material. The original target pool of 72 dynamic target clips was re-evaluated, and those targets giving indication of being 'good' targets (clip correctly selected when the target, not selected as the target when it was not) were kept, and targets indicated as 'distracters' (clip usually chosen as target even when not) were discarded. New clips were chosen from a variety of sources, including excerpts from motion pictures, television shows, documentaries and cartoons. These were edited into new pools, to bring the number of target clips available to 100. This new target pool was then arranged in judging sets of four video clips each, constructed to minimize similarities among targets within a set, to comprise 25 sets of four clips. Target pools and target clips were randomly selected by the computer during each session, thus enabling the experimenter to remain blind to the actual target for every session until feedback was provided at session conclusion.

Randomness Checks

As will be recalled from chapter 7, prior to the beginning of each study a global randomness certification test is conducted on the target generating system. This consists of extracting the target generating instructions from the controlling program and embedding them in a program that generated a large number of autoganzfeld targets ranging from 1-100, the number of targets available for the present study. In the pre-series test 100,000 trials were generated, and chi-square tests revealed no consistent departures from the expected uniform distribution. At completion of the present study, 100,000 trials were once again generated, and again no consistent departures from the expected uniform distribution were detected. 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. It should be noted that the program itself places a new call for the target information during every session (after the participant is in the ganzfeld stimulation), which is generated fresh at that time, and is not stored.

Predictions

Based primarily on the findings of previous creativity-psi research, and to a lesser extent, the results of the preceding study, the main predictions of this experiment were concerned with the relationship between the primary indices of creativity as shown by the creativity instruments, and psi hitting in the ganzfeld. Hypotheses were the same for each group, and while results for the combined overall group are reported at the conclusion of this chapter, it must be kept in mind that it is the individual groups that are of interest in this thesis. With this in mind, it was predicted that for each group:

H1) The number of direct hits would exceed chance; and,

H2) There would be a positive correlation between psi success and participant's primary creativity scores.

In view of the purported relationship between dissociation and the creative process it was further predicted that:

H3) There would be a positive correlation between psi success and dissociation as measured by the DES.

And, finally, the creativity-psi literature firmly supports the notion that both openness and extraversion may be directly related to psi success, and indirectly related to creativity. For these reasons, it was predicted that:

H4) There would be a positive correlation between psi success and the personality attribute of openness; and,

H5) There would be a positive correlation between psi success and the personality attribute of extraversion.

The alpha level for the primary hypotheses (1-5) was set at .05. Alpha for the exploratory analyses was set to .02, and the alpha level for all other results was .01.

Exploratory Analyses

The primary focus of the exploratory analyses was on the subscales of the creativity inventories, which were calculated and correlated with participants' *z* scores to assess the relationship, if any, between these aspects of creativity and psi success. No direction was predicted, as it was not known what to expect for these relationships.

As absorption had been identified as a variable linked to both creativity and psi it was explored in relation to ganzfeld-psi success. In an attempt to better comprehend the association between creativity and enhanced psi performance, participants' absorption levels were assessed using the TAS, and then correlated with session *z* scores. A positive relationship between high absorption levels and ganzfeld-psi success was predicted.

As with experiment 1, questionnaires on session mentation variables were filled out by both the experimenter and the receiver. As before, these were completed after the impression period and mentation review, but prior to the participant's removing the eyeshields or actually viewing any of the target clips. While there had been several interesting items of note for mentation variables in the previous experiment, in particular the indication that participant's producing a large amount of mentation also tended to miss the target, no direction was predicted.

Treatment of the Data

Direct hits were used as the primary measure of whether this study constituted a conceptual replication of previous autoganzfeld research with creative populations. In addition, it was decided to use Stanford's z scores (Stanford and Sargent, 1983), calculated on each receiver's target ratings, to analyze correlations with the creativity measures, as well as to correlate with the various individual differences scales. Spearman correlation coefficients were calculated for the correlational analyses.

EXPERIMENT 2A: ARTISTS

The visual artists in this study represent a diversity of backgrounds, including but not limited to, sculpture, painting, tapestry, drawing, and graphic art. Participants were primarily artists currently engaged full time in the production of their art, either as a student, teacher, or lecturer, or who worked as a paid professional artist. There were 32 participants in the artist group, 23 females and 9 males, mean age 23, range 18 – 56.

Psi Results

In 32 trials there were 16 direct hits, resulting in a hit rate of 50%, which is statistically significant at exact binomial $p = .002$ (ES(h) = .52), and confirming Hypothesis 1 for the artist group. This is comparable to the hit rate cited in earlier creativity-ganzfeld databases (Morris et al., 1993; Schlitz & Honorton, 1992), and provides additional support for the enhanced psi performance abilities of 'creative' populations. Table 8.1 shows the psi results for this group.

Table 8.1
Direct Hit Rate For Artists

	N- Trials	**N- Hits**	**% Hits**	**ES(h)**
ARTIST	32	16	50%	.52*

*Significant at $p < .002$

Creativity-Psi Results

At the completion of the study, the Verbal, Figural, and Sounds forms of the TTCT were sent to Scholastic Testing Service which professionally scored all forms and mailed the results back to the author. All other creativity measures were scored by the author in accordance with instructions provided with the tests. All p values are one tailed unless otherwise noted.

As can be seen in Table 8.2, the correlation results for artists between z scores and the creativity index for the Verbal TTCT form, while in the predicted direction, were not significant, rho = .188. This was also true for the correlation with the 'Jobs' creativity index, rho = .084, but not for the remaining two creativity indices. The artists produced a significant reversal of the expected relationship with the SAM indices, rho = -.401, $p < .05$, two tailed. This surprising trend was carried over even more strongly in the correlation between z scores and the KMMPI creativity index, rho = -.500, $p < .01$, two tailed. Therefore, no positive relation between creativity indices and psi success is detected, as was predicted in Hypothesis 2.

Table 8.2
Creativity and Psi Results

	Verbal	Jobs	SAM	KMMPI
Artist	.188	.084	-.401*	-.500**

*Significant at $p < .05$, two tailed
**Significant at $p < .01$, two tailed

At first glance these relationships seem perplexing. The relationship with the TTCT, while nonsignificant, is in the predicted direction and so would seem to indicate that the Verbal form of the TTCT, at least, is tapping into some facet of creativity associated in a minor way with psi success for artists. However, the relationship between artists' z scores and the inventories designed to assess both creative interests and activities would seem to denote that artists indicating a high number of activities or interests did poorly at the psi task. An explanation of this may be related to the quantity of artistic commitments and the amount of time needed to participate in this study. As these inventories are scored by counting up the number of interests or activities involved in, someone who indicates a large number of various artistic activities may, in fact, be indicating a certain level of *over* involvement. Over involvement may result in the participant becoming over committed, stressed, harried, and rushed. Trying to then take part in a study which requires a certain amount of relaxation, physically and mentally, as well as a certain amount of time commitment, could possibly result in the 'mixed bag' of creativity and psi results shown in Table 8.2. The relationship between artists psi scores and aspects of creativity shown in the subscales of the creativity measurements is discussed in more depth in the exploratory analyses later in this section.

Dissociation and Personality Data

DES scores were correlated with participants' z scores and, along with results from the personality correlations, are shown in Table 8.3. As can be seen, artists produced a slightly nonsignificant negative trend between psi success and the ability to dissociate (rho = -.084), thus providing no support for Hypothesis 3.

Table 8.3
Dissociation and Personality Results

	DES	Openness	Extraversion
Artist	-.084	-.195	-.341*

*Significant at $p < .05$, two tailed

It will be recalled that, based on previous ganzfeld-openness findings, the author predicted openness to correlate positively with participants' z scores. In fact this prediction was not confirmed: the openness scores for the artist group showed a nonsignificant negative trend of rho = -.195. Therefore, Hypothesis 4 was not supported for the artist population. However, while this finding may not support previous ganzfeld-psi research, or the prediction made in this experiment for this variable, it does support a similar finding in experiment 1 showing a slight negative trend between psi success and level of openness for a creative population.

Turning now to extraversion, we find that the correlation between z scores and extraversion for artists produces a significant finding in the direction opposite to that predicted, at rho = -.341, $p < .05$, two tailed. This would seem to indicate that introverted artists performed better on the psi task than did extraverted artists. While not supporting Hypothesis 5 in this study, this result does support a similar finding in experiment 1, which reported a trend towards introversion for the psi hitters in that study, who, it will be recalled, were predominantly artists.

Exploratory Results

Creativity Indices and Subscales

In keeping with the procedure used in the Schlitz and Honorton (1992) study, correlations between participants' *z* scores and the aspects of fluency, flexibility, and originality, as measured by the Verbal TTCT, will be reported for all creative groups in this thesis as a matter of interest and regardless of significance. Similar to the creativity measures already discussed, none of the creativity aspects shown in Table 8.4 reach significance for the artist group.

Table 8.4
Verbal TTCT: Fluency, Flexibility and Originality

	Fluency	**Flexibility**	**Originality**
ARTIST	.113	.157	.149

As a stand-alone creativity test specifically designed to measure different aspects of creative functioning in the area of the visual arts, artists also completed the Figural form of the TTCT (Torrance, 1990). This pictorial approach to creativity assessment is designed to evaluate fluency, flexibility, originality, and elaboration. The correlation of artists *z* scores with the overall creativity index for this measure was nonsignificant, showing a slight negative trend at rho = -.033. The other four aspects of creativity measured by the Figural also demonstrated slight nonsignificant negative trends, as shown in Table 8.5.

Table 8.5
Figural TTCT: Fluency, Flexibility, Originality and Elaboration

	Figural	**Fluency**	**Flexibility**	**Originality**	**Elaboration**
ARTIST	-.033	.019	-.067	-.006	-.240

Of the four aspects comprising the Figural TTCT, elaboration demonstrates the greatest degree of an inverse relationship with psi success (rho = -.240, ns). This aspect embodies the ability of the artist to embellish, and add to, a picture or a product. However, in the ganzfeld situation, where the psi information that is present may be sparse and fairly weak, the embellishing of psi related imagery may distort or change it past recognition when viewed in the context of the possible target choices, with the 'embellishments' then carrying more weight than the original psi image. In this regard, the ability to embellish, or elaborate on an image, may be counter productive to psi success.

Several other creativity subscales reached significance in the exploratory analyses. The first of these is from the SAM inventory, and is listed as 'Artistry'. This subscale is concerned with artistic production (i.e., production of objects, carvings, paintings, etc.) and the significant negative correlation (rho = -.536, $p < .02$, two tailed) with z scores for this scale is contrary to what one might logically expect, based on the population (visual artists) completing this form. However, when viewed in light of the over commitment theory put forth earlier, this finding does not then seem so unreasonable.

Two subscales from the KMMPI also reached significance for the artist group. The first of these, the 'Musical' subscale, had a negative correlation with artists' z scores of rho = -.400 ($p < .03$, two tailed), which is not surprising for a group predominantly focusing on the visual arts as their expression of creativity. The second KMMPI subscale, Leadership, also had a negative correlation (-.431, $p < .02$, two tailed) with artists' z scores. This subscale is linked to achievement, responsibility, and participation. As the artists doing well in this study were also predominantly introverted, it is speculated that the aspect of leadership, particularly as defined here (participation and responsibility) is more closely linked to extraversion than introversion. Thus, as it was the introverts who performed well at the psi task, a negative relationship with leadership (defined as extraversion) with psi success is understandable. No other subscales on any of the creativity measures reached significance.

Absorption

As will be recalled, a positive relationship between high absorption levels (as assessed by the TAS) and ganzfeld-psi success was predicted. A nonsignificant negative correlation was found with session z scores, rho = -.288, indicating that absorption did not play a significant role in the psi success of artists.

Mentation Variables

Several items of interest in the analyses of mentation variables for experiment 1 were noted and explored further in the present study. In experiment 1 there was a significant negative correlation between the amount of participant mentation, as assessed by the experimenter, and session z scores ($r = -.342, p < .02$), indicting that participants who produced a large amount of mentation also tended to miss the target. In examining this same variable in the present experiment (2a), a similar finding is shown which, while strongly in the expected direction, does not reach significant at rho = -.235. While not significant, this result is seen as providing support for the relationship between psi success and participants who produce a relatively low amount of mentation while in the ganzfeld. One could speculate that participants who spoke very little in the ganzfeld might have done so due to being very deeply in an altered state, during which most people find it difficult or disturbing to talk aloud. At the end of the ganzfeld period, participants are asked to relate how deeply they felt they entered an altered state, on a ten point scale, with ten being a very deeply altered state. The relationship between amount of mentation and depth of state does in fact show a significant result, albeit in a positive direction (rho = .489, $p < .01$). In other words, participants who felt themselves to have been deeply altered during the ganzfeld were also those participants who tended to produce a greater amount of mentation. Therefore, the depth of altered state could not account for the relation between low mentation and psi success noted with this population. A look at the relationship between the TTCT aspect of fluency and mentation abundance shows no strong correlation (rho = .084), indicating that word fluency is not likely to be responsible for the relationship seen here. No other mentation variables reached significance for this population.

Conclusions

While generating additional support for the ganzfeld in facilitating psi success, and for the reputation of creative populations in achieving a relatively high level of success, this experiment was unable to show any significant positive links between the indices of creativity measures or their subscales.

In fact, the only significant relationships detected in this experiment were those indicating a negative relationship between the inventory of creative interests and attitudes (SAM), and the inventory assessing creative activities and achievements (KMMPI) with psi success for this artistic population.

The outcome of the Figural TTCT, used as the stand alone measure of creativity designed especially for artistic populations, was probably the most interesting for this author. As was discussed in chapter 3, creative populations do fairly well in psi research. Creative populations in the ganzfeld have tended to produce what can be considered exceptional results. In the present study, a population recognized and sanctioned by society as creative (as paid professionals) have produced what are, admittedly, exceptionally good psi results. So why do none of the creativity indices in this study reflect some indication of why or how this recognizably creative population demonstrated such an exceptional level of psi performance? Is it a problem with the creativity measures under use, or the creative population under scrutiny? The next experiment made use of a different creative population, musicians, and was conducted using the same hypotheses and the same inventory of creativity assessments. As will be recalled, this group was run concurrently with the artists group, as a means of avoiding order effects and the biasing of expectations for one creative group over another. Conducting the experiments in this manner allowed for the gathering of a large amount of information concerning the performance of differing creative groups on the same psi task. Hypotheses and creativity measures were kept the same for all groups as a means of allowing for comparison and contrast on creativity measures and psi results at the conclusion of the experiments. No analyses on the data from each group was conducted until all four groups had completed the experiment. In place of the Figural TTCT, the Sounds form of the TTCT was used as a stand alone measure of creativity for musicians.

EXPERIMENT 2B: MUSICIANS

The musicians recruited for this study were predominately students from the local music college or those who were currently engaged full time in the music profession, either as a teacher or lecturer, or who worked as a paid professional musician. Their backgrounds include, but are not limited to, pianists, cellists, oboists, flutists, singers, and drummers. There were 32 participants in the music group, 16 females and 16 males, mean age 23, range 18 – 54.

Psi Results

For the musicians group, there were 18 direct hits in 32 trials, resulting in an overall hit rate of 53%, which is statistically significant at exact binomial $p = .0001$ (ES(h) = .65). This result confirms Hypothesis 1 for the music group. As a replication attempt of the Schlitz and Cunningham studies, the author was pleased to see that the results for the musicians in this study (53%) closely replicated the results of the musicians in those studies, 75% for the Schlitz and Honorton (1992) study and 41% for the Cunningham study (Morris et al., 1993). Table 8.6 shows the psi results for this group.

Table 8.6
Direct Hit Rate For Musicians

	N- Trials	**N- Hits**	**% Hits**	**ES(h)**
MUSICIAN	32	18	53%	.65*

*Significant at $p < .0001$

Creativity-Psi Results

All TTCT forms (Verbal, Figural and Sounds) were professionally scored by Scholastic Testing Service. All other creativity measures were scored by the author in accordance with test and scoring instructions. All p values are one tailed unless otherwise noted.

Hypothesis 2 was only partially supported in the present study. For musicians, the correlation between *z* scores and the Verbal TTCT form was significant at rho = .358, $p < .02$ as is shown in Table 8.7. Correlation between musicians' *z* scores and the 'Jobs' creativity index was nonsignificant at rho = .199. The musicians also manifested the same strong negative relationship between *z* scores and the SAM index that the artist group did, although slightly less so (rho = -.302). The correlation with the KMMPI index also displays a trend in the direction opposite to that expected, but not significantly so, at rho = -.159.

Table 8.7
Creativity and Psi Results

	Verbal	Jobs	SAM	KMMPI
MUSICIAN	.358**	.199	-.302	-.159

**Significant at $p < .02$

At first glance, the almost equally strong findings in opposite directions for the Verbal TTCT and the SAM seem contradictory. But, bearing in mind that these two indices measure two very different aspects of creativity, these results become a bit easier to interpret. It will be recalled that divergent thought, which is what the Verbal TTCT measures, has been defined as exploratory, creative and intuitive, oriented towards the development of possibilities rather than data, and to speculation rather than conclusions (Dowd, 1989). From this, it would seem that the more a musician is able to engage in intuitive, speculative thought processes, the greater is their ability to produce psi hitting in the ganzfeld.

Conversely, as with the artists, the negative relationship for musicians between the quantity and depth of their involvement with creative activities and psi missing in the ganzfeld may be due more to an over commitment of limited resources, especially as those resources relate to time involvements, than to a high level of creative ability interfering with the psi process.

Dissociation and Personality Data

Dissociation results for the musicians are shown in Table 8.8. As can be seen, while correlations between DES scores for the musicians were strongly in the predicted direction, they were not significantly so, rho = .205, thus providing no support for Hypothesis 3.

Table 8.8
Dissociation and Personality Results

	DES	Openness	Extraversion
MUSICIAN	.205	-.487**	.297*

*Significant at $p < .05$
**Significant at $p < .01$, two tailed

The negative trend of the relationship between openness and psi scores seen with the artists is also seen in the musicians group as shown by Table 8.8. This reversal of the predicted relationship for musicians is pronounced and statistically significant at rho = -.487, $p < .01$, two tailed. This finding therefore adds no weight to the predicted positive relationship between openness and psi scores as put forth in Hypothesis 4.

The predicted relationship between extraversion and psi success is supported in the musician population with rho = .297 ($p < .05$), confirming Hypothesis 5. This result is also similar to that of the Cunningham study (Morris et al., 1993), which demonstrated a significant correlation between psi success and extraversion (r = .428, $p < .01$, one tailed) for a music population.

Exploratory Results

Creativity Indices and Subscales

As was stated in the artist section, correlations between z scores and the aspects of fluency, flexibility, and originality, as measured by the Verbal TTCT (refer to Table 8.9), will be reported here for completeness and regardless of significance. However, what is of interest in this table is that two of the three Verbal factors are significant at the two tailed level, flexibility (rho = .367, $p < .05$), and originality (.359, $p < .05$). Flexibility of thinking would seem to fit well with the picture of the successful psi participant, being associated with open-mindedness and the entertaining of new ideas and paradigms. Originality would also seem to fit well with this model, as it denotes thinking processes that, in order to be original, must first be open to the original, which typically involves less censoring and discarding of unusual perceptual inputs. The flexibility result shown here is similar to a finding reported by Schlitz (Schlitz & Honorton, 1992) showing a suggestive correlation between flexibility and z scores for her creative population on the Verbal TTCT ($p < .06$, two tailed).

Table 8.9

Verbal TTCT: Fluency, Flexibility and Originality

	Fluency	**Flexibility**	**Originality**
MUSICIAN	.280	.367*	.359*

*Significant at $p < .05$, two tailed

The TTCT test, Sounds and Words, was used as a stand alone creativity test for musicians and is comprised of two parts, Sounds and Images (SI) and Onomatopoeia and Images (OI). This test is specifically designed to measure creative functioning in the area of music using a series of sounds and spoken words. As is shown in Table 8.10 correlations with both measures and musicians z scores are in the direction opposite to that predicted for them, but not significantly so, with rho = -.199 for Sounds and Images, and -.114 for Onomatopoeia and Images.

Table 8.10

Sounds TTCT: Images and Onomatopoeia

	SI	**OI**
MUSICIAN	-.199	-.114

The only other subscale reaching significance for this group is that of 'Intellectuality' on the SAM inventory. This aspect is described as being related to curiosity, liking adventure, and imagination. The correlation is significantly negative with session z scores, rho = -.487, $p < .01$. As the expectation was that imagination and curiosity would relate to psi success, the author is at a complete loss to explain this result. No other subscale correlations reached significance for this population.

Absorption

Similar to the artist group, the correlation for musicians' z scores and absorption scores displayed a negative trend, rho = -.095, but not significantly so.

Mentation Variables

For musicians, the relationship between amount of mentation and session z scores was in the right direction, but nonsignificant at rho = .016. A look at the relationship between mentation amount and the TTCT aspect of fluency shows a suggestively significant negative relationship (rho = -.310, $p < .05$), indicating that those musicians providing the highest scores in word fluency also produced the lowest amount of mentation in the ganzfeld. This would seem to suggest that any relationship between psi hitting and low mentation amount could not be due to a spurious relationship with word fluency for musicians. A significant negative correlation was detected with one other mentation variable; how structured mental activity was during the ganzfeld session (rho = -.504, $p < .01$). This variable was included as a means of assessing the appearance and impact of primary process thinking in the ganzfeld. However, the negative correlation with session z scores would indicate that the appearance of unstructured thought was more of a distraction or inhibitor of the psi process than a facilitator for the musician group.

Conclusion

While mirroring the artist group in their negative relationships with the SAM and the KMMPI, the musicians evidenced a more positive relationship with the creativity measures examining divergent thinking. In particular, the creativity index for the Verbal TTCT yielded a significantly positive relationship with participant z scores at $p < .02$. In looking at this relationship further, we see that the aspects of flexibility and originality, as measured by the Verbal TTCT, also correlate positively with psi success. Thus, the ability to engage in divergent thought is related to enhanced psi performance for the musician group.

The question follows then as to whether a similar relationship would hold for other creative populations. It may even be that other creative groups would produce creativity-psi relationships similar to that of the artists – predominantly negative. Or, conversely, other creative groups may yield creativity-psi relationships that are unique to that population. This is an issue that was addressed in the next experiment, presented in chapter 9, and is discussed further following a presentation of the combined study results for the two creative groups in this experiment.

COMBINED GROUP RESULTS

Although combined group results were not analyzed as part of a formal hypotheses, they are presented here in view of their possible contribution to the aims of this thesis: providing information regarding the relationship between creativity and enhanced psi performance. Data from the artist and musician groups were combined in an effort to discover any patterns or trends that might emerge related to the creativity-psi relationship. Data from a total of 64 participants was available, for a total of 39 females and 25 males, mean age 23, age range 18 – 56.

Psi Results

Combining the trials and direct hits for both groups yields 64 trials with a total of 34 direct hits, which is an overall hit rate of 53%, and statistically significant at exact binomial $p = .000001$ (ES(h) = .59). Table 8.11 shows the hit rate results for the combined study.

Table 8.11
Combined Study Direct Hit Rate

	N- Trials	**N- Hits**	**% Hits**	**ES(h)**
STUDY TOTAL	64	34	53%	.59*

*Significant at $p < .000001$

To ensure statistical completeness, Table 8.12 shows the full distribution of ranks for this study, by group.

Table 8.12
Distribution of Ranks by Group

	Musician	Artist	Total
Rank			
1	18	16	34
2	9	9	18
3	4	4	8
4	1	3	4

As can be seen from Table 8.13, correlation between combined group *z* scores and the creativity index for the Verbal form of the TTCT was significant at rho = .234, $p < .05$. However, correlation between Guilford's 'Possible Jobs', while in the predicted direction, was nonsignificant at rho = .110. The correlations for the creativity indices derived from SAM were significant but in the direction opposite to that predicted at rho = -.352, $p < .05$, two tailed. Similarly, the correlation between *z* scores and the KMMPI was significant but in the direction opposite to that predicted at rho = -.376, $p < .05$, two tailed.

Table 8.13
Creativity and Psi Results

	Verbal	Jobs	SAM	KMMPI
STUDY TOTAL	.234*	.110	-.352**	-.376**

*Significant at $p < .05$
**Significant at $p < .05$, two tailed

Dissociation and Personality Data

Examination of combined study dissociation scores and *z* scores reveals an overall slightly negative trend, shown in Table 8.14, which does not reach significance at rho = -.027.

Table 8.14
Dissociation and Personality Results

	DES	Openness	Extraversion
STUDY TOTAL	-.027	-.353*	-.090

*Significant at $p < .05$, two tailed

Correlation between the combined study z scores and openness scores reflects the trends seen in the two individual groups, and yields a significantly negative correlation of rho = -.353, $p < .05$, two tailed, as is shown in Table 8.14.

In examining the extraversion results for the study group, we find that correlations between z scores and extraversion for the study group support the consistent but nonsignificant negative trend found in the two separate groups, as would be expected.

EXPLORATORY MEASURES

Creativity Indices and Subscales

Correlation results of the Verbal TTCT aspects of fluency, flexibility, and originality with combined study z scores are reported here for completeness and are shown in Table 8.15. Group results on these measures reflect the overall positive trend for this creativity measure with psi success, in particular, the aspects of flexibility and originality show the strongest positive trend.

Table 8.15

Verbal TTCT: Fluency, Flexibility and Originality

	Fluency	**Flexibility**	**Originality**
STUDY TOTAL	.158	.224	.215

Combined study results revealed several significant subscales. The first of these is the subscale of 'Intellectuality' on the SAM inventory (rho = -.300, $p < .02$, two tailed). This is primarily due, I feel, to the influence of the strong negative result on this subscale in the musicians' data. A speculation is that a high score on this scale may relate to the participants' inclination to rationalize or intellectualize and explain away unusual occurrences. This approach is at the extreme opposite to that needed for success in the ganzfeld, which by its very nature encourages the manifestation of bizarre and unusual imagery and irrational thought processes. Over rationalization and dismissal of imagery by participants typically leads to dismissal of target relevant imagery and thus, psi missing in the ganzfeld.

The second and third subscales to reach significance for the combined study results have the same heading under both the SAM and KMMPI inventories and are labeled 'Artistry'. The SAM 'Artistry' subscale was significant at rho = -.402, $p < .01$, and the KMMPI 'Artistry' subscale at rho = -.308, $p < .02$, both two tailed. Like the preceding subscale of 'Intellectuality' for the musicians, the subscale of 'Artistry' produced a strongly negative correlation with artists' z scores and this is primarily responsible for its presence here. Although the musicians manifested a similar negative relationship with this variable, it was not to such a significant degree. The rationale for its manifestation in the artists' data is also relevant here, that of a certain amount of over commitment in the study populations, perhaps leading to a conflict between experimentation requirements of time involvement and mental relaxation, and the participants' ability to engage in such.

Absorption

When combined, the groups' absorption scores show a strong negative correlation with psi success. This correlation (rho = -.231) just misses significance at the .05 level (two tailed) and indicates that, contrary to the author's expectations, participants who displayed strong absorption tendencies were also those participants who tended to psi miss in the ganzfeld.

Mentation Variables

The examination of the relationship between psi success and low mentation production in the ganzfeld for the overall study results continues to support this finding. Although nonsignificant for combined results, the relationship was in the predicted direction at rho = -.146.

SUMMARY AND CONCLUSIONS

The aim of this experiment was to more fully explore the relationship between the concept of creativity and enhanced psi performance using a ganzfeld procedure. To this end, this study enabled an exploration of various aspects of creativity in relation to ganzfeld-psi performance. Two creative groups, artists and musicians, were subjected to a variety of creativity assessments and then completed a ganzfeld trial.

The direct hits rates from both populations support the reputation of the ganzfeld technique as a psi facilitating procedure, and provided replicative support for the studies of Schlitz (Schlitz & Honorton, 1992) and Cunningham (Morris et al., 1993).

Three different types of creativity measures were used with these two populations; divergent thinking assessments, inventories of creative attitudes and interests, and inventories of creative activities and achievements. Of these, only the divergent thinking tests, in the form of the TTCT Verbal test, seemed to bear any relation to psi success in the ganzfeld. The musicians, in particular, displayed a significantly positive correlation with the Verbal test (rho = .358, p < .02), although both populations display positive trends on both the overall indices and the related aspects of this form.

Personality assessments were used to round out the picture of the creative person and process. Although a positive prediction for extraversion and study z scores had been made in spite of experiment 1 producing a modest negative correlation with extraversion and study z scores, this relationship once more failed to materialize. Instead, overall study results again produced a mild negative correlation with extraversion and z scores. As individual groups, while musicians did manifest the predicted relationship to a significant degree (p < .05, one tailed), the artists produced a strong negative correlation with extraversion (p < .05, two tailed). When viewed in light of the social aspects of the two different creative professions, this apparently contradictory result makes more sense. Artists typically produce their art alone, and work in solitary environments, thus, it might be safe to say that most artists are introverts where production of their art is concerned. Musicians, on the other hand, perform in groups, and generally practice their music with others, and 'solo' musicians are a rarity. In this context, musicians can be seen as extraverts where their creative talent is concerned. So, given the two disparate approaches to their art, the relationship between psi success and introversion for artists, and psi success and extraversion for musicians, becomes clearer.

While expectations dictated a positive relationship with psi success on the dimensions of openness, the more successful creative participant's revealed themselves to be overwhelmingly 'closed', as measured by the NEO-FFI. This finding is both surprising in its consistency, as a similar result was seen for the creative population in chapter 7, and for its depth of significance ($p < .01$, two tailed). This interesting finding suggests that, if a high level of openness is related to psi success, then in this particular experiment, contrary to parapsychological lore, a high degree of openness did not appear to facilitate psi performance. However, both this study and the previous one have used visual artists and musicians as participants. Perhaps this relationship with openness and psi success is intrinsic to those two populations. In that case, the next experiment, conducted with actors and creative writers, could be expected to see a reversal of the relationship found here, and display the more 'conventional' relationship between openness and psi.

The question follows then as to whether these two populations, actors and creative writers, would also produce the same types of relationships with the creativity measures used here that the visual artists and musicians have. It is not unforeseeable that other creative groups could produce creativity-psi relationships similar to those of the artists – predominantly negative. Or, conversely, produce creativity-psi relationships that are more in line with the musicians results on the divergent thinking tests, predominantly positive.

The examination of the creativity-psi-relationship within other creativity groups is the logical next step in the exploration of that relationship. The experiment described in the next chapter (chapter 9) was run concurrently with the present one in order to avoid order effects while providing a means of comparing and contrasting differing creative groups on the same psi task and in relation to the same creativity measures. The same hypotheses and creativity measures are maintained for the next two groups as in the present study, thus allowing for later comparison of all four creative groups. As was the case in the present experiment, individual groups results will be presented first, and the chapter will conclude with a comparison of the two creative groups.

Experiment 3: Examination of Creativity and Psi in Actors and Writers Under Conditions of Sensory Deprivation

Chapter 9

Chapter 8 detailed the use of two creative groups, visual artists and musicians, in an investigation of the relationship between performance on several creativity measures and ganzfeld-psi results. A confirmation of the ganzfeld technique as a psi facilitative procedure was produced in both creative populations, while the correlations between creativity and psi success were somewhat ambiguous. The tests of divergent thinking, while not reaching significance for the two groups combined, showed an overall positive relationship with successful psi results. In the case of the musicians in experiment 2a, it was significant. However, assessments examining creative interests and achievements displayed an overwhelmingly negative trend for both groups. The question then becomes whether these same creativity measures would produce the same or disparate results for other creative populations in relation to ganzfeld-psi performance. If similar results are produced, then this would lend some credence to the idea that is not necessarily the way a person is 'creative', so much as the way their cognitive thought processes operate, that leads to enhanced psi performance in the ganzfeld. This chapter reports on the continuance of the exploration of the creativity-psi relationship with the use of two different creative groups, actors and creative writers, in an automated ganzfeld experiment. As was done in chapter 8, the initial focus will be on individual group results, study 3a examining the actors, study 3b the writers, and concludes with a discussion of the combined group's results. The combination of group results allows the evaluation of any overall patterns or trends that might emerge out of this data. In this way, the creativity-psi results from individual creative groups may be applicable to a more diverse participant population.

There were several reasons for choosing actors as one of the creative groups under assessment in the present experiment. Perhaps the most significant of these reasons was the inclusion in the Juilliard study (Schlitz & Honorton, 1992) of ten drama students, producing a hit rate of 40% for that population. This gives some indication that this group stands a good chance of achieving success in the ganzfeld situation, thus enabling an examination of the creativity-psi relationship. Actors are a population that is generally recognized by our society as embodying a certain amount of creativity, as evidenced by the rather high salaries some of the more well know actors are reputed to enjoy. Although recruitment was a bit more difficult because of the widespread dispersal of this creative population, the availability of the acting population was assessed to be reasonable given that the majority of participants were student actors and not yet at the stage of being considered 'paid professionals'. This being a consideration associated with both the actors' and writers' groups, the criteria for these groups included those individuals whose professional life focus or aspirations were on the production of their creative art, even though they may not currently be engaged in that production on a full time or paid basis.

While the population of creative writers had not been used in ganzfeld-psi research before and were not as easily recruitable as the actors, their inclusion was deemed appropriate for this study as a group also recognized and valued by society for its production of creative products, namely in the form of best selling books, articles and poems. While it is true that non-fiction writers also produce books, et cetera, that end up on the best selling list, it is the fiction writers, those who produce works of fantasy, science fiction, and the classics who make the material up as a product of their own imaginations or machinations of their minds that are typically considered to be the more creative of these two types of writing styles. Therefore, creative writers were chosen as the second creative group under examination in this study.

For purposes of replication and the eventuality of a later meta-analysis, the design and procedure of the present study is exactly the same as the studies in experiment 2. Both studies (3a & 3b) were run concurrently with the two groups in experiment 2 to avoid order effects and yet still allow for later comparison of all four of the creative groups. Participants were still required to bring their own senders with them, as this was found to be a rather successful approach in experiment 2, adding to the 'fun' and 'adventure' of the study for participants. As in the preceding study, no data were collected from senders other than to note their gender and relationship to the participant.

Creativity Measures

The general creativity measures used in the previous experiment were also used with these two groups, and will be briefly reviewed here. All participant's completed the 'Verbal' form of the TTCT (Torrance, 1990), as well as a single test from Guilford's SOI model, 'Possible Jobs' (Gershon & Guilford, 1963). For a further review of these instruments, please refer to chapter 4. The actors and writers did not complete any stand alone creativity measures for two reasons: (1) The correlations in the previous study with the stand alone tests for both creative groups yielded nothing of note or interest; and, (2) investigations into the availability of stand alone creativity tests applicable to acting and writing groups revealed only the Verbal form of the TTCT as appropriate for adult populations. As this measure had already been chosen for use with all four groups in this thesis, it was decided to dispense with the additional stand alone creativity tests for the two current groups.

As noted in chapter 8, divergent thinking tests are typically used in conjunction with inventories of attitude, activities, and personality to provide a balanced view of the creative individual. Therefore, the 'Something About Myself' (SAM) component of the Khatena-Torrance Creative Perception Inventory was used to assess participants' creative interests and abilities and the KMMPI provided the means of information on participants' creative activities and achievements (Khatena & Morse, 1990). Creativity measures and assessments were completed by participants in a separate session prior to their ganzfeld trial.

Other Measures

Analogous to experiment 2, participants in the present experiment completed the PIF, the NEO-FFI, the DES, and the TAS. Participant pre-selection continued in the present study as was outlined in experiment 2, focusing on participants who responded affirmatively to the PIF questions of psi belief, prior psi experiences and whether they felt psi could be demonstrated in the current study.

METHOD

Participants

Study populations were comprised of participants who had not taken part in experiment 1 or 2, met study criteria, and volunteered their time. The majority of these participants were recruited from local theatre and writing groups and classes, and selection of study participants proceeded as outlined in experiment 2.

Overview of Procedure

As this study was a continuation and extension of experiment 2, the procedure was virtually the same. The only procedural change for the present study was the absence of a stand alone creativity test for either group. This had the effect of shortening the creativity session for participants by approximately 25 minutes. It should also be noted here that, in view of the blind judging results discussed in chapter 7, and in keeping with the same procedure outlined in chapter 8, the experimenter's interaction with receivers during the judging process was kept to a minimum to allow participants the best opportunity for success.

Details of the apparatus and experimental program were described in chapter 7 and are identical for the present study. The target pool developed for experiment 2 was also used for this experiment, and target emotionality results will be presented in chapter 10 along with those from experiment 2. While results of the data combined from the two groups is reported at the conclusion of this chapter, it is the individual groups that are of primary interest in this thesis.

Hypotheses

As the present study is an continuation of experiment 2, the same predictions will be made for the two new creative groups. It will be recalled that the main predictions for these experiments are concerned with the relationship between the primary indices of creativity as shown by the creativity instruments, and psi hitting in the ganzfeld. Predictions were the same for each group as it is the individual groups that are of interest in this thesis. It was predicted that for each group:

H1) The number of direct hits would exceed chance;

H2) There would be a positive correlation between psi success and creativity index scores;

H3) There would be a positive correlation between psi success and dissociation as measured by the DES;

H4) There would be a positive correlation between psi success and the personality attribute of openness; and finally, that,

H5) There would be a positive correlation between psi success and the personality attribute of extraversion.

For the primary hypotheses (H1-5) the alpha level was set at .05, for exploratory analyses alpha was set to .02, and for all other results, the alpha level was .01.

Exploratory Analyses

Although this continuation was taking place with two new, different creative groups, it had been decided in advance to explore the same variables, with the same predicted directions as in experiment 2. Therefore, the subscales of the creativity indices were examined in relation to participants' *z* scores to assess the relationship, if any, between these aspects of creativity and psi success. No direction was predicted, as the expected relationships for these two creative groups was unknown.

Absorption was also correlated with *z* scores for the two groups, and a positive relationship with psi success was predicted, as in experiment 2. The session mentation variables, with special attention to that of mentation amount, was explored in relation to participants' success in the ganzfeld, with no directions predicted.

Treatment of the Data

As was done in experiment 2, direct hits were used as the primary measure of whether this study constituted a conceptual replication of previous ganzfeld research with creative populations. Stanford's *z* scores (Stanford and Sargent, 1983), calculated on each receiver's target ratings, were used to analyze correlations with the creativity measures as well as with the various individual differences scales. Correlational analyses were calculated using Spearman correlation coefficients.

The actors who participated in this study were drawn from a variety of theatrical backgrounds, including, but not limited to, dramatists, comedians, and mimes. Actors were recruited from local theater groups and stage productions, as well as from acting classes and workshops. Participants were primarily engaged full time in the production of their art, either as student or instructor, or working as a paid professional actor. There were 32 participants in the actors group, 18 females and 14 males, with a mean age of 30, and age range of 18 – 70.

Psi Results

The psi results for this group, while significant overall, were not as impressive as those obtained by the musicians or the artists in experiment 2. For the 32 trials in this experiment a total of 13 direct hits were obtained, which yields a hit rate of 41%. This is a statistically significant result at exact binomial $p = .04$ (ES(h) = .33), and confirms Hypothesis 1 for the actors. Table 9.1 shows the psi results for this group.

Table 9.1
Direct Hit Rate For Actors

	N- Trials	**N- Hits**	**% Hits**	**ES(h)**
Actor	32	13	41%	.33*

*Significant at $p < .04$

Creativity-Psi Results

As will be recalled, actors completed the same Verbal form of the TTCT as used in experiment 2, and after completion of all experiments in this thesis, these were professionally scored by Scholastic Testing Service. Those scores, and the results from the remaining creativity measures – scored by the author in accordance with test instructions – were correlated with participants' psi results. All p values given here are one tailed unless otherwise noted.

The actors who scored highly on the divergent thinking measure, the Verbal TTCT, tended to do poorly on the psi task, with the correlation between the creativity index of the Verbal TTCT and participants' z scores being significantly negative, and in the direction opposite to that predicted. This correlation, rho = -.336, is significant at $p <$ .05, (two tailed), as shown in Table 9.2. This relationship is examined further in the discussion of the three aspects comprising the Verbal TTCT (fluency, flexibility, and originality) later in this chapter. Also in the direction opposite to that predicted was the correlation between actors' z scores and the creativity index for 'Jobs', another divergent thinking measure. This correlation, rho = -.002, while negative, was not significantly so. The interaction between actors' z scores and the inventory used to assess participants' creative interests and abilities (SAM) was positive, although again not significantly so, rho = .032. Correlation between actors' z scores and the inventory used to assess participants' creative activities and achievements (KMMPI) was also positive, but again, not to a significantly level. Therefore, Hypothesis 2 was not confirmed.

Table 9.2
Creativity and Psi Results

	Verbal	**Jobs**	**SAM**	**KMMPI**
ACTOR	-.336*	-.002	.032	.030

*Significant at $p < .05$, two tailed

A closer look at Table 9.2 reveals creativity-psi relationships for divergent thinking measures and the inventories of creative abilities and achievements that are in the opposite direction to that found for either the artists or the musicians in study 2. This would seem to indicate that, for actors, the ability to engage in divergent thought processes may actively hamper or distract them from being successful on the psi task. Conversely, their level of ability and achievement correlates weakly but positively with psi success and may indicate the use of a more goal driven, rather than intuitive, approach than that of the musicians, who, as we saw in chapter 8, had a significantly positive relationship between psi success and divergent thinking, but an almost equally as significant negative relationship with the SAM inventory. Another thought here is that actors are generally the 'jack-of-all-trades' in the creative arts, being required to dance, sing, and even paint scenery, as well as act upon occasion, and their scores on the inventories assessing interests and achievements may reflect this diverse background.

Dissociation and Personality Data

Scores from the DES were correlated with participants' *z* scores and are shown in Table 9.3, along with results from the personality correlations. As can be seen, actors produced a nonsignificant negative trend between psi success and the ability to dissociate (rho = -.222). This negative result is similar to that detected for the artists, but more pronounced, possibly indicating a more focused approach to the psi task than that taken by the artists, and provides no support for Hypothesis 3 for this group.

Table 9.3
Dissociation and Personality Results

	DES	**Openness**	**Extraversion**
ACTOR	-.222	.057	.175

In view of past ganzfeld research showing positive correlations between openness and psi success, the same type of relationship was predicted for this population. As was expected, this relationship for actors was positive, albeit nonsignificantly so, providing no significant support for Hypothesis 4. Thus, while experiment 2 produced overall negative correlations with openness, the actors' openness result was more in line with previously seen relationships for openness and psi (Broughton & Alexander, 1995), as well as with experimental expectations.

As can be seen in Table 9.3, the extraversion correlation for actors continues in this vein of reflecting the expected relationship, as indicated by prior ganzfeld research, with personality variables. With this population, the positive relationship between extraversion and psi success was more in evidence, although nonsignificantly so, at rho = .175. While providing support for the extraversion-psi relationship, this result fails to attain significance, therefore Hypothesis 5 fails to be supported.

Exploratory Results

Creativity Indices and Subscale

As was explained in chapter 8, correlations between participants' *z* scores and the aspects of fluency, flexibility, and originality as measured by the Verbal TTCT will be reported for all creative groups in this thesis as a matter of interest and regardless of their level of significance.

As will be recalled, participants produced a significantly negative correlation (rho = -.336, two tailed) with the overall creativity index for the Verbal measure. Table 9.4 shows the breakdown of the Verbal TTCT into its three component aspects and while negative correlations were produced for all of them, this was significantly so for the flexibility aspect, rho = -.432, ($p < .02$, two tailed). Actors who were flexible in their thinking, able to shift or change the focus of their attention to a large degree, also tended to psi miss in the ganzfeld. This relationship may reflect that too many shifts in thinking is confusing, leading to the inability to detect the correct target due to a mass of conflicting or contradictory images or impressions. However, an equally plausible explanation may be related to the creativity measure itself. It is entirely possible that actors felt there were only a finite number of correct responses to test questions, as it could be argued that there are typically only a finite number of correct responses or character reactions, in the portrayal of their acting craft. While every effort was made to present this creativity measure as looking for as many varied and imaginative responses as participants could produce, this alternative explanation cannot be ruled out, especially in view of the presence of this strong trend in the two remaining aspects, fluency and originality. No other subscales on any of the creativity measures reached significance for this population.

Table 9.4
Verbal TTCT: Fluency, Flexibility and Originality

	Fluency	**Flexibility**	**Originality**
ACTOR	-.177	-.432*	-.285

*Significant at $p < .02$, two tailed

Absorption

Participants' absorption scores reflect the type of relationship that would be expected of these participants if the speculation concerning the inability to focus for very long on one goal, as was put forth in discussing the negative flexibility result, were true. The definition of absorption, as will be recalled from chapter 5, is, "a 'total' attention, involving a full commitment of available perceptual, motoric, imaginative and ideational resources to a unified representation of the attentional object", (Tellegen & Atkinson, 1974, p. 274). Actors produced a suggestive correlation between z scores and absorption levels, rho = .269 ($p < .06$), perhaps implying that the ability to correctly select the target for this population was related to their level of absorption in the task.

Mentation Variables

Exploratory analyses on the session mentation variables produced nothing of interest in this study. As a matter of interest, the correlation between amount of mentation for actors and z scores was noted to be rho = .006, and a look at the correlation between TTCT fluency and mentation amount was rho -.020, indicating no real relationship between these two. A low amount of session mentation was shown to be related to psi success in both experiments 1 and 2, but the actor population does not seem to reflect this same trend, albeit the positive correlation seen here is very low.

Conclusions

This study continued the exploration of creative performance in the ganzfeld using a new creative population comprised solely of actors. Creativity assessments of attitudes and interests, cognitive styles, and achievements and activities in relation to psi performance in the ganzfeld were evaluated in the effort to detect any links between creativity and enhanced psi performance.

Only the first of the main hypotheses for this study was significantly confirmed, that of psi hitting in the ganzfeld for a creative population ($p < .04$), although the personality data showed some suggestive trends in the expected directions. Both openness and extraversion showed mild positive trends with psi success, although neither finding reached significance. Creativity indices for the tests of divergent thinking were predominately negative, and in the case of the Verbal TTCT, significantly so (rho = -.336, $p < .05$). There were moderate positive correlations between z scores and the attitudes and achievement inventories for actors, which, while in the predicted direction for this study, was contrary to results produced on the same measures by artists and musicians in the preceding study. A more in-depth comparison of these differences is presented in chapter 10.

Apart from the unexpected negative finding on the measures of divergent thinking, it was encouraging to see a continuation of the creativity-psi effect for the ganzfeld technique. Although the psi demonstrated in this study was admittedly at a lower level to that demonstrated in the previous experiment, it still re-enforces the reputation of creative participants as being highly successful at psi tasks.

The patterns and trends shown by the actors on the various creativity measures and their related aspects in some respects contradicts that shown by the artists or the musicians in the previous study. The next experiment in this series is conducted with a fourth creative group, creative writers, and makes use of the same inventory of creativity assessments in order to provide further insight into the psi performance of creative populations in the ganzfeld.

EXPERIMENT 3B: WRITERS

The writers in this study were primarily recruited from creative writing courses, writing clubs, and the professional writing community. As such, they represent diverse writing areas and backgrounds, including, but not limited to, adventure, fantasy/science fiction, script writing, poetry, and general fiction literature. Participants were primarily writers currently engaged full time in the area of writing, either as a teacher, lecturer, or student, or who worked as a paid professional writer. There were 32 participants in the writers group, 20 females and 12 males, with a mean age of 33, and age range 18 – 63.

Psi Results

The psi results for the writers group were similar to those in the previous study with actors, with a total of 13 direct hits in 32 trials, resulting in a hit rate of 41%. This is statistically significant at exact binomial p = .04 (ES(h) = .33), confirming Hypothesis 1 for the writers group. This is comparable to the hit rate of 41% cited by Cunningham in an earlier creativity-ganzfeld database (Morris et al., 1993), and provides additional support for the enhanced psi performance abilities of creative populations. The psi results for this group are shown in Table 9.5.

Table 9.5
Direct Hit Rate For Writers

	N- Trials	N- Hits	% Hits	ES(h)
WRITER	32	13	41%	.33*

*Significant at $p < .05$

Creativity-Psi Results

Scores from the Verbal TTCT, Jobs, SAM, and the KMMPI were correlated with participants' z scores and these results are shown in Table 9.6. All p values shown are one tailed unless otherwise noted.

In a mode similar to the actors, the correlation results for writers between z scores and the Verbal TTCT creativity index were nonsignificantly in the negative direction, rho = -.166. This was also true for the correlation with the 'Jobs' creativity index, rho = -.090. This negative correlation with the tests of divergent thinking, while nonsignificant for both measures, is surprising to find in a population that could be supposed to engage in divergent thinking as a matter of routine in the course of producing novel and entertaining works of fiction. This unexpected result will be discussed further in the exploratory analyses of the components of the Verbal TTCT later in this section.

Results for the remaining two creativity indices showed the expected positive correlations with participants' z scores, the SAM inventory significantly so, rho = .301 ($p < .05$), and the KMMPI less so, rho = .055. Writers who indicated a wide variety of creative interests also tended to show a higher level of psi success in the ganzfeld than their less creatively interested counterparts. As the SAM inventory is an assessment of participants' attitudes and interests, and writers generally cultivate a wide variety of interests as a means of making characters and stories 'come alive', and to provide more depth to their writing skills, a high score on the SAM may indicate a higher degree of willingness to experience the unusual, a trait thought to be conducive to successful ganzfeld (Dalton, 1997).

Table 9.6
Creativity and Psi Results

	Verbal	Jobs	SAM	KMMPI
WRITER	-.166	-.090	.301*	.055

*Significant at $p < .05$

Dissociation and Personality Data

While the ability to dissociate is less highly associated with the writing process than with the mentality of the visual artist, writers were also asked to completed the DES form to examine this aspect in the creative writing population. Hypothesis 3 stipulated a positive correlation between DES results and participants' z scores but this was not supported. In fact, a slight nonsignificant correlation was detected (rho = -.081) as depicted in Table 9.7, disconfirming this hypothesis.

The personality attribute of openness was also correlated with participants' z scores and again a positive correlation was expected for this relationship. However, this relationship was not confirmed either: the openness scores for the writers group showed a nonsignificant negative trend of rho = -.036. Therefore, as shown in Table 9.7, Hypothesis 4 was not supported for this population. Even though this finding does not support the prediction made for it in the present experiment, it does provide a measure of support for a similar finding in experiment 1 showing a modest negative trend (rho = -.138) between psi success and level of openness. Additionally, experiment 2 also found negative correlations between openness and psi success for both artist and musician populations, significantly so for the musicians ($p < .01$), who were the most successful group in that study ($p = .0001$), for psi results.

Table 9.7
Dissociation and Personality Results

	DES	Openness	Extraversion
WRITER	-.081	-.036	.211

Turning our attention to extraversion, the correlation with z scores is found to be in the predicted direction, but not quite reaching significance for this group at rho = .211 ($p < .07$). This result, while less pronounced than that seen in the musicians group in the previous study, may still be viewed as providing a measure of support for the relationship between free response psi studies and extraversion, as noted in the meta-analysis by Honorton et al., (1990). However, as this result does not reach significance, it may not be viewed as providing support for Hypothesis 5.

Exploratory Results

Creativity Indices and Subscale

As is consistent with the previous experiments, the correlations between participants' z scores and the aspects of fluency, flexibility, and originality from the Verbal TTCT will be reported here as a matter of interest, and regardless of significance.

Writers evidenced an overall nonsignificant negative correlation (rho = -.166) with the primary measure of divergent thinking in this study, the Verbal TTCT. In exploring this result further, we see that negative correlations were produced for all components of the Verbal TTCT, shown in Table 9.8. The aspect of fluency is perhaps the strongest of these inverse relationships, and seems the most unexpected for a population whose creativity focuses on the prolific production of words. It must be noted here that participants in this group reported a greater feeling of frustration with this task than other groups, indicating more dissatisfaction with timed responses which they felt allowed them little time to build a story line. However, as all groups were so equally timed, this cannot really be said to account solely for the relationships shown here. Furthermore, it should be borne in mind that similar relationships with these aspects were produced by the actors in experiment 3a.

Table 9.8
Verbal TTCT: Fluency, Flexibility and Originality

	Fluency	**Flexibility**	**Originality**
WRITER	-.245	-.081	-.145

Examination of the creativity subscales revealed three that attained significance in the exploratory analyses. The first of these is from the SAM inventory, and is listed as 'Self Strength'. This subscale indicates self-confidence, resourcefulness and versatility, and correlated quite strongly and significantly with participants' *z* scores at rho = .419 ($p < .02$, two tailed). The clearest interpretation of this is that those writers displaying a high level of self confidence tended to correctly select the target in the ganzfeld situation, which fits in well with the view put forth by Schlitz (Schlitz and Honorton, 1992) of the Juilliard students performing so well in the ganzfeld due to their high levels of self esteem. This result is reinforced in the next subscale to reach significance, also from the SAM, which is listed as 'Individuality' and indicates self starters, thinking for oneself, and being somewhat eccentric. This scale was also significant for writers at rho = .423, ($p < .02$, two tailed). The final subscale indicating significance for this group was from the KMMPI and is termed 'Initiative', rho = .409 ($p < .02$, two tailed). This scale reinforces the correlations of the SAM subscales as it encompasses elements from both, indicating self-starters, self confidence and resourcefulness, along with leadership qualities.

The exploratory analyses also revealed a significant positive relationship between the personality attribute of 'Conscientiousness' and writers' *z* scores, rho = .419, ($p < .02$, two tailed). At first blush, this personality variable would seem to have very little to do with the aspect of creativity, having strong associations with 'orderliness' and 'dutifulness'. However, it is also associated with 'competence' which in many regards is analogous to self-confidence, and with 'achievement striving' which may translate into the motivation and drive to do well in the ganzfeld, a necessary component of psi success (L. E. Rhine, 1956). No other subscale correlations reached significance for this population.

Absorption

Turning briefly to the relationship between participants' z scores and absorption levels, a positive correlation is shown in the predicted direction, although nonsignificantly so, rho = .080. This correlation is similar in direction, but not amplitude, as that seen in experiment 3a for actors and absorption (rho = .269, $p < .06$).

Mentation Variables

Of particular interest regarding session mentation variables has been the association between the amount of participant mentation, as assessed by the experimenter, and session z scores. In experiment 1, there was a significant negative correlation for this relationship ($r = -.342$, $p < .02$, two tailed), indicating that participants who produced a large amount of mentation also tended to fail to select the correct target. In the present study, this relationship was also manifest, with correlations between participants' z scores and amount of mentation showing a negative relationship, (rho = -.165), although that relationship did not reach significance. What is of interest for this group is the correlation between TTCT fluency and mentation amount, which is significantly positive at rho = .477, $p < .01$. This correlation shows a strong relationship between word fluency for writers and the amount of mentation they produced in the ganzfeld. If writers who are more fluent say more in the ganzfeld, but writers who say less produce better results, then this result may indicate that writers who are less fluent in word production may do better in the ganzfeld situation.

Conclusions

This experiment explored the ganzfeld-psi performance of a creative writers population in relation to their scores on the outcomes of several measures of creativity and personality assessments. Support for previous ganzfeld research depicting the ganzfeld as a psi facilitating technique for creative populations was once again confirmed in this study, with participants producing a significant level of ganzfeld-psi success ($p < .04$).

The relationships between creativity measures and psi success, as measured by participants' z scores, revealed overall negative correlations with measures of divergent thinking, but positive ones with inventories of creative interests and achievements. The negative correlations with divergent thought measures could indicate that, for creative writers, divergent thought is counter-productive to the manifestation, or recognition, of psi information. Of the unexpected creativity results seen in this study, the outcome of the Verbal TTCT, and its creativity components (in particular those of fluency and originality), were the most thought provoking. One would expect that a writer's creativity would be closely linked to the abundant production of words, given the large vocabulary that writers would be expected to have at their command. However, in the present study, writers who were particularly fluent and original were also those who tended to miss the target in the ganzfeld. As creative groups have seemed to do consistently well in the ganzfeld, and creative writers are considered to compose an acknowledged group of creative individuals, then the expectation here would be that the more fluent and original writers (hence, the more 'creative') would be those who would be most successful at the psi task rather than the opposite, which is what was found here.

Openness scores for writers showed a mild negative correlation with psi success, contrary to prediction, but the extraversion correlation produced positive results with psi success, which, while nonsignificant, do lend some weight to previous findings in the ganzfeld-psi literature as discussed in chapter 2. A combination of the results from studies 3a and 3b may give some insight into the creativity-psi relationship by allowing examination of the patterns and trends that may evolve out of the larger database. A presentation of the combined group results is presented here with a view to providing any additional insight into the relationship between creativity and enhanced psi performance in the ganzfeld.

COMBINED GROUP RESULTS

As was done at the conclusion of experiment 2, combined group results will be given here and discussed. Although not part of any formal hypotheses, they are presented in view of possible contribution to the aims of this thesis: providing information regarding the relationship between creativity and enhanced psi performance. The data from the actor and creative writer groups were combined in an effort to discover any patterns or trends that might emerge related to the creativity-psi relationship. Available data consisted of a total of 64 participants, 38 females and 26 males, mean age 32, and age range 18 – 70.

Psi Results

As is shown in Table 9.9, the combining of individual group trials and direct hits yields 64 trials producing a total of 26 direct hits. This is an overall direct hit rate of 41%, which is statistically significant at exact binomial $p = .004$ (ES(h) = .33). This result for the actors/writers compares fairly well with the combined results from experiment 2 (artist/musicians), which had a hit rate of 53% ($p = .000001$).

Table 9.9
Combined Study Direct Hit Rate

	N- Trials	N- Hits	% Hits	ES(h)
STUDY TOTAL	64	26	41%	.33*

*Significant at $p < .05$

To ensure statistical completeness, Table 9.10 shows the full distribution of ranks for this study, by group.

Table 9.10
Distribution of Ranks by Group

	Writer	Actor	Total
Rank			
1	13	13	26
2	6	3	9
3	9	9	18
4	4	7	11

Study correlations for the creativity index of the Verbal TTCT and participants' z scores produce the same overall negative trend as was noted for each of the individual populations, in this case to a nonsignificant degree, rho = -.252, two tailed. As can be seen from Table 9.11, correlation results for Guilford's 'Possible Jobs' also display this same negative trend, although to a lesser degree (rho = -.048). Participants who did not score highly on the tests of divergent thinking in the present study tended to have the most success at the ganzfeld-psi task, a finding at direct odds with the predicted relationship. The indication here is that, unlike the two creative groups from experiment 2, the two creative groups in this study found the ability to engage in divergent thought to be in some manner repressive, or inhibitory, for the psi process or the recognition of psi. It is interesting that the study correlations for the creativity indices derived from the SAM inventory were in the predicted direction, but not significantly so, at rho = .144, as the SAM is the assessment instrument for creative attitudes and interests, and does not attempt to assess cognitive processes. The positive trend was also evident for the indices derived from the KMMPI, the measure for creative activities and achievements (but does not assess cognitive processes), and which was nonsignificantly in the predicted direction, at rho = .042.

Table 9.11
Creativity and Psi Results

	Verbal	Jobs	SAM	KMMPI
Study Total	-.252	-.048	.144	.042

Dissociation and Personality Data

The dissociation results for the overall study again reflect the negative trend noted first in the individual groups. While dissociation is a trait thought to be linked to the creative state (Barron, 1990), this does not appear to be true for the two creative populations here. Correlation between dissociation results and participant z scores exhibit a nonsignificant negative trend, rho = -.162, suggesting that participants who displayed high dissociative tendencies on the DES failed to select the correct target in the ganzfeld.

Examination of the correlation between combined study openness scores and participants' z scores shows a mild trend in the expected direction, rho = .023. This result was seen in only one of the current individual populations, the actors, and is contradictory to that shown in overall study results for experiment 2. The second predicted personality trait, extraversion, also demonstrated a positive relationship with psi success. This positive correlation, while modestly stronger than the openness correlation, supports the consistent but nonsignificant positive trend found in the two separate groups, as would be expected, and is shown here to be nonsignificant at rho = .161.

Table 9.12
Dissociation and Personality Results

	DES	**Openness**	**Extraversion**
STUDY TOTAL	-.162	.023	.161

EXPLORATORY MEASURES

Creativity Indices and Subscales

The correlation results of the Verbal TTCT aspects of fluency, flexibility, and originality with combined study z scores are reported here for completeness and are shown in Table 9.13. The group results on these measures reflect the strong overall negative trend for the two individual groups on this creativity measure in relation to psi success. The aspects of flexibility and originality show the strongest negative correlation, with flexibility nearly reaching significance (rho = -.268).

As discussed in experiment 3a (actors), flexibility of thinking is usually associated with the ability to shift or change the focus of one's attention to a large degree. While the ability to attention shift may be beneficial in the creative process, the relationship seen here with psi success may reflect that too many shifts in thinking is confusing, creating a mass of conflicting or contradictory images/impressions that make it difficult to correctly select the target in the ganzfeld situation. Or, it may be the creativity measure itself that this result stems from. Even though the creativity measures were presented as 'tasks' and 'inventories', the feeling of a test situation, in which there were 'right' and 'wrong' answers', may have been perceived. However, in looking back at the combined results for experiment 2, we see an almost mirror image of the results shown here. Therefore, the possibility of 'test pressure', while feasible, does not seem to have made itself present in the artist/musicians group, providing no support for this interpretation. The only real conclusion we can draw at this point for the actor/writer group then is: participants who engage, to a high degree, in the type of speculative, intuitive thought that the tests of divergent thinking measure, do not do as well in the ganzfeld-psi situation as participants who do not engage in such thought to a high degree.

Table 9.13
Verbal TTCT: Fluency, Flexibility and Originality

	Fluency	**Flexibility**	**Originality**
STUDY TOTAL	-.206	-.268	-.219

Two creativity subscales reached significance for the combined study results, one from each of the inventories, and both significant at $p < .05$, two tailed. The first subscale discussed here is from the SAM, and is given as 'Individuality' (rho = .252), being associated with characteristics of self reliance, thinking for oneself, and eccentricity. The second scale to reach significance was from the KMMPI and reinforce the finding from the SAM. The KMMPI subscale is 'Initiative' (rho = .266) and also indicates self-starters, self confidence and resourcefulness. These results reinforce the concept of the successful psi participant as a confident, independent and unique individual (Schlitz & Honorton, 1992; L. E. Rhine, 1956).

Absorption

When combined, the actor/writer groups' absorption score shows a modest positive correlation with psi success, although not to a significant degree, rho = .187. Participants in the present study who displayed strong absorption tendencies also tended to be successful at the ganzfeld-psi task, which is unlike what was found for the participants in experiment 2. While the original expectations for this variable had been that of a positive relationship with psi success, it has also been found to be one of the more inconsistent results, with two of the four creative groups producing nonsignificant negative relationships, and the other two groups producing nonsignificant positive relationships. For this reason, this particular variable would not be recommended for inclusion in future ganzfeld studies in any form other than that of strictly exploratory.

Mentation Variables

The detection of a relationship between psi success and low mentation production in the ganzfeld for experiment 1 led to the examination of that relationship in session mentation from both experiment 2 and the present experiment. The combined study results from the actor/writer experiment continues to provide support for that relationship, albeit nonsignificantly so, with rho = -.079.

SUMMARY AND CONCLUSIONS

This experiment aimed to extend and further the investigation begun in experiment 2, that of the examination of the relationship between creativity and enhanced psi performance by using a technique known to be particularly psi facilitative for creative populations. The need to be able to assess various aspects of creativity in relation to ganzfeld-psi performance led to the use of three different types of creativity measures: divergent thinking assessments, inventories of creative attitudes and interests, and inventories of creative activities and achievements. Two creative groups were examined in the present study, actors and creative writers, and both groups first completed a variety of creativity, personality and background assessments before taking part in a ganzfeld trial. Direct hit rates from each population were independently significant at $p = .04$ (ES(h) = .33), providing replicative support for previous ganzfeld studies conducted with creative populations, in particular the studies of Schlitz and Honorton (1992) and Cunningham (Morris et al., 1993).

Of the creativity assessments conducted with this group, only the inventories of creative attitudes and interests, and of creative activities and achievements, seemed to bear any relation to psi success in the ganzfeld for either group. Both groups evidenced a negative relationship between psi success and measures of divergent thinking, as well as negative relationships with all three aspects of divergent thinking (fluency, flexibility and originality) most typically associated with creativity. Conformity pressure is typically viewed as being detrimental to creativity, and as these creativity assessments may be viewed as tests, it may be that these two populations felt pressured to perform.

Writers and actors displayed an inverse relationship to each other, to approximately the same amplitude, on the personality attribute of openness, with actors producing the expected relationship and writers, the reverse. However, both groups displayed the predicted positive relationship between psi success and extraversion, although this result did not reach significance for either population, and provided only weak support for that relationship.

The last four experiments, 2a, 2b from chapter 8, and 3a and 3b in the present chapter, have demonstrated the efficacy of the creative population in producing what can be viewed as superior psi performance in the ganzfeld procedure. However, the creativity assessments for each group were both contributory and contradictory for the significance of various results, and thus difficult to interpret in view of the prevailing relationship between creativity and enhanced psi performance.

As a means of distilling the creativity, personality and exploratory variables from the four individual groups into a comprehensive 'big picture' of the creativity-psi relationship, the final chapter of this thesis synthesizes, where possible, the main findings of experiments 2a/b and 3a/b, and suggests directions for future research.

Comparison of the Four Creative Groups: Summary, Conclusions and Future Directions

Chapter 10

The systematic examination of four creative groups on measures of creativity and ganzfeld-psi performance was presented in chapters 8 and 9. Measures of creative ability and activities, divergent thinking, and creative achievements and interests, were correlated with participants' psi scores. Creativity assessments for each group, while providing the expected relationship for some groups in some areas, failed to do so for others, providing contributory evidence for some results in some groups and producing contradictory evidence for the significance of these same results in others. In this respect, the individual groups results are difficult to interpret in terms of the comprehensive view of the prevailing relationship between creativity and enhanced psi performance. A complete listing of the overall results for each group can be found in Table 10.8, at the end of this chapter. After the detailed examination of the individual groups presented in the preceding chapters, it is perhaps informative to combine the data from all four groups in order to look at patterns and trends that might emerge as a result of the increased statistical power.

Another reason to examine the combined data of all four groups is the exploration of some variables of interest that would not have been meaningful for the smaller groups. Of particular interest here were target emotionality, correlations with the geomagnetic field, and the three factor model put forth in chapter 7. The final chapter of this thesis will synthesize, where possible, the main findings of the experiments that have been conducted, discuss related variables and conclude with suggested directions for future research.

A cautionary note must be interjected here: while many of the results under discussion here are exploratory in nature, it must be borne in mind that multiple analyses of a data base increases the chances of obtaining a significant outcome for those results by chance. It is hoped that the presence and level of significance of these results in this study justify their being reported here to stimulate and inform future ganzfeld research.

The presentation of the target emotionality results for the combined four creative groups may give some pointers towards strengthening the ganzfeld effect by reducing target noise and increasing the psi information psychologically by increasing the emotionality aspect of the target and its emotional impact upon the receiver. It will be recalled from chapter 5 that ganzfeld studies exploring the impact of emotional versus neutral target stimuli (Bierman, 1995) indicated that video clips embodying a high emotional content (either negative or positive) made better target material in the ganzfeld than similarly evaluated 'neutral' targets. In experiment 1 (chapter 7) participants seemed to respond best to target stimuli that conveyed a positive emotional impact. An evaluation of the target stimuli and responses for the experiments in chapters 8 and 9 was conducted and is presented here.

Target Emotionality

As was described in the preceding chapter, at the completion of all experimental trials in this thesis, three independent blind judges rated the emotional impact of each of the 100 targets comprising the study pool. Each individual clip was assigned either a positive, negative, or neutral impact. This evaluation revealed a total of 35 emotionally positive target clips, 32 emotionally negative target clips and 33 emotionally neutral target clips. To assess whether participants responded differently to the three types of target emotionality, the number of times a target from each category was selected by the computer as the target, and the number of times it was correctly chosen by the participant as the correct target, were examined. As can be seen from Table 10.1, target clips considered to have a positive emotional impact elicited a slightly stronger psi response, and represents the highest hit rate (51%) for the three categories of target type. Neutral targets represent the lowest hit rate for the three types, although, with the overall high significance level of these studies, none of the three categories of target type can be said to have really not done well.

Table 10.1
Target Clip Emotionality Results

	Positive	Negative	Neutral
Target Type Availability	35	32	33
Times Selected As Target	45	43	40
Times a Direct Hit	23	20	17
% of Direct Hits	51%	47%	42%
Times a Distracter	26	29	13

Combining the data from the four separate creative groups provides data for 128 participants, all of whom were ganzfeld novices and contributed one session each to the data base. Of the total of 128 participants, 77 were females and 51 males, the age range was 18 - 70, and the average age was 28. In 128 trials, 60 direct hits were produced, which is a 47% hit rate (p = .00000007, ES(h) = .46), and directly comparable to the overall direct hit rate from the Schlitz and Honorton (1992) study of 50% (p = .014, ES(h) = .52).

Success Model

It will be recalled that chapter 7 put forth a new three factor model of success for the creative populations in this thesis, built upon the four factor model developed by PRL as a result of their ganzfeld research (Honorton, 1992), and the findings reported by Cunningham with her study population comprised solely of musicians (Morris et al., 1993). The three factors given in my model are: Prior psi experiences; practice of some mental discipline (i.e. meditation, etc.); and, extraversion. Of the 128 participants available from the combined data, 42 of the 128 met this three factor model for predicating ganzfeld-psi success. Of these, 20 produced direct hits, a hit rate of 48% (ES(h) = .22), which compares well with experiment 1 in which, it will be recalled, 37 participants met the three factor success model and 13 produced direct hits, a hit rate of 35%. As is shown in Table 10.2, of the 42 participants in the present study meeting the three factor model, seven musicians obtained three direct hits for a hit rate of 48%, 13 artists obtained five hits for a hit rate of 38%, 17 actors produced nine hits for a hit rate of 53%, and five writers produced three hits for a hit rate of 60%. This result, 48% hit rate for all participants meeting the three factor model, is similar to the overall direct hit rate obtained by all 128 participants, and so cannot really be said to show any comparable difference to the rest of the study population. Additionally, the numbers shown here for the individual groups are so small as to be almost meaningless, and thus must be taken with caution as to their import.

Table 10.2
Three Factor Success Model

	3 Factor	Hits	%
Total	42	20	48%
Group			
Musician	7	3	43%
Artist	13	5	38%
Writer	5	3	60%
Actor	17	9	53%

Geomagnetic Indices

In experiment 1 (chapter 7) the relationship between participants' psi scores (as assessed by target ranks) and the *ap* indices from the geomagnetic field rating for the day of their trial displayed a significantly positive relationship. Because of the prevalence of the low geomagnetic field-high psi relationship in parapsychology literature, and the presence of that relationship in experiment 1, that relationship was also evaluated for the combined results. Therefore, after completion of all experimental trials for experiments 2 and 3, the *ap* indices were retrieved for each day on which a ganzfeld session had been conducted. The geomagnetic analysis was conducted specifically after all data was collected to avoid any possibility of knowledge about the geomagnetic-psi relationship during the study causing a bias in the experimenters' expectations of individual sessions. Global *ap* indices are derived from quantized variables which makes their distribution irregular, therefore a nonparametric correlation (Spearman) was used to avoid the assumption of normal distribution of GMF values. Correlations were conducted with the receiver's rank score, rather than participant's z scores, in order to make these results more readily comparable to other geomagnetic research, and experiment 1.

The relationship between participant's ganzfeld rank scores and the global ap indices was nonsignificantly in the direction opposite to that predicted, at rho -.119, showing an inverse relationship with psi scoring. This trend, psi hitting on days of noisy geomagnetic activity, was first noticed for a creative population in an analysis conducted by Radin (1993) on both ganzfeld studies from the Morris et al., (1993) study. His report showed that the creative population (the Cunningham study) was evidencing a higher hit rate during periods of high geomagnetic activity, although at a nonsignificant level. As both that study and the present one used a fairly stringently defined creative population (professional at some level), then perhaps the negative result seen here identifies the type of geomagnetic environment conducive to highly creative groups but not for the more general populations.

Blind Judging Results

At the conclusion of the experiment, blind judging of session transcripts was conducted as a means of evaluating the possibility of intentional or unintentional experimenter cueing to participants, and to evaluate the presence of psi in the database. Two independent judges were recruited from among professional acquaintances of the author's whom she felt would be adequate blind judges, and provided with verbal and written instructions similar to those provided to ganzfeld participants on how to rate ganzfeld session mentation-target correspondences. These two judges had previously blind judged transcripts from other free response studies, as well as the transcripts from experiment 1, so are considered experienced blind judges. These two independent judges were kept blind to the actual target identity, and rated the participant's mentation for their degree of correspondence with the four possible video clips for that session, one of which was the target (MCE = .25). The four video clips in the target pool were ranked so that the clip that had the closest correspondence with the participant's mentation was ranked 1, and the clip that was least like the mentation was ranked 4. Blind judging of all 128 transcribed ganzfeld sessions took place by each of the two independent judges, and a Spearman rank correlation of +.78 between the two judges z scores was obtained, indicting good interjudge reliability. Judge 1 found a total of 58 direct hits in the 128 trials, for a hit rate of 45% ($p < .001$). Judge 2 found a total of 54 hits in the same

128 trials, for a hit rate of 42% ($p < .01$). These results provide a realistic indication of the presence of psi in this database, as well as well as providing evidence that intentional or unintentional experimenter prompting is not responsible for the results seen in this study. These blind judging results are viewed as evidence of both the psi facilitative nature of the ganzfeld technique and the superior psi ability of the creative population under scrutiny in this thesis.

Target Positioning Effects

As noted earlier, the random number generator (RNG) was subjected to a number of periodic randomness checks and program interpretation throughout the course of this thesis. To investigate further the efficacy of its operating system, and to check for any possible response biasing of participants during the judging sequence as an alternative explanation for the significant results in this study, the positioning (first, second, third, fourth) of the actual target clip during the judging sequence was examined. Table 10.3 displays the results of this analysis, which show that while the majority of the time the target was placed first or last – which may be conducive to participant's response biases (Hyman, 1994), it was actually correctly chosen as the target most often when it was in the third place position, which is generally viewed as the least auspicious of target positions. No significant differences (x^2 = 2.31 (3df)), in target positions were detected, leading to the conclusion that target positioning could not have contributed artifactually to the hit rates.

Table 10.3
Target Clip Position

	Placement	**Chosen 1st**	**Percentage**
First	35	17	48%
Second	32	14	44%
Third	25	13	52%
Fourth	36	16	44%

Biologically Related Pairs

A report by Broughton and Alexander (1995) after the current research had begun described an unexpected finding in their database of automated ganzfeld trials of an exceptional success rate of 62% for pairs that were biologically related. In following this finding up, they also noted a success rate of 60% for biologically related pairs in the PRL ganzfeld database (Broughton & Alexander, 1995).

Following on the Broughton and Alexander (1995) report there was an expressed interest by other parapsychological researchers that this variable be assessed in other ganzfeld databases, therefore, that result for the experiments in this thesis is reported here. As experiment 1 used only laboratory staff as senders, that relationship was not applicable there, but experiments 2 and 3 requested that receivers bring in their own senders. This resulted in 15 biologically related pairs in the present database, yielding 10 direct hits, which is a direct hit rate of 66% ($p = .0007$, ES(h) = .86). This result is very similar to that reported by the Broughton study (62%), and the hit rate for the PRL biologically related pairs (60%).

Combined Creativity-Psi Results

As reported earlier, there were 60 hits in 128 trials for overall creativity-psi results, and Table 10.4 shows the distribution of ranks and overall z scores for the four groups. As can be seen from this table, the z scores for the groups clearly show that musicians performed much better ($z = .74$) at the psi task than any of the other three creative groups. While the artists also produced a fairly respectable z score (.53), the remaining two groups were rather low and fairly close to one another (writers $z = .28$, and actors $z = .22$). The results shown here should be viewed with the possibility in mind of other moderating factors which might have in some manner confounded these results. For example, the uneven distribution of participants meeting the three factor success model (discussed in more detail later in this chapter), or the prevalence of highly scoring biologically related pairs in one group, but not others, may have influenced study outcome.

Table 10.4
Distribution of Ranks by Group

	Musician	Artist	Writer	Actor	Total
Rank					
1	18	16	13	13	60
2	9	9	6	3	27
3	4	4	9	9	26
4	1	3	4	7	15
Average z Scores	.74	.53	.28	.22	

Without wishing to make any strong claims about the definitive relationship between creativity and psi, the combined group results do show some interesting trends. The results of the divergent thinking tests were of particular interest for the author. Divergent thinking has strongly been associated with creativity (Guilford, 1977; Torrance, 1990; Dowd, 1989), and the Torrance tests of creative thinking used in this thesis not only comprised 40% of all published studies (Torrance & Presbury, 1984) with adults by 1984, but are still considered to dominate the field of creativity research (Baer, 1993; Rose & Lin, 1984; Runco, 1993).

In spite of the strong positive correlation for the musicians ($p < .02$) with the creativity index for the Verbal TTCT, the *z* scores for all four creative groups combined produce an overall negative correlation, nonsignificant at rho = -.068. This mild negative trend is continued in the correlations with the Verbal TTCT components, as shown in Table 10.5.

Table 10.5
Creativity and Psi Results

	Verbal	Fluency	Flexibility	Originality
Total	-.068	-.072	-.064	-.056

This slight negative trend would suggest that for a creative population the ability to produce psi hitting in the ganzfeld may be linked to the relative absence of divergent thinking, a trait that has been directly linked with creativity. The correlation of *z* scores with the secondary measure of divergent thinking in this thesis, Guilford's 'Possible Job's', produced a flatly null result at rho = .000.

The question then becomes, if it is not the cognitive approach of creative populations that produces the superior psi performance we have seen here, then is there some other aspect to creativity that may be influencing or enhancing this ability? To address this possibility, all creative groups had also completed inventories designed to assess their creative interests and attitudes (SAM) and their creative activities and achievements (KMMPI).

As can be seen from Table 10.6, the results with these measures also produced overall negative correlations, SAM at rho = -.087 and the KMMPI at rho = -.117, again indicating no apparent relationship between these areas and enhanced psi performance in the ganzfeld.

Table 10.6
Creativity and Psi Results

	SAM	**KMMPI**
Total	-.087	-.117

An examination of the descriptive data from the Verbal TTCT, in the form of group norms and averages for the four creative groups, may be informative and is provided here in Table 10.7. Data for each group on the three aspects of the Verbal TTCT, as well as the overall creativity index (labeled 'Verbal') is shown, along with the range of scores for each group, and the group's score in relation to the national percentile scales as shown by the normative data for the Torrance scale (1990). It should be kept in mind that the normative data used in the Torrance tests are those for predominantly American populations. As can be seen from Table 10.7, all four groups scored near the midpoint of the national percentiles, with the writers and actors group producing the overall highest standard score (in the 56 and 58 percentiles), and the artists and musicians producing the lowest (in the 52 and 45 percentiles, respectively). The combined group is shown as scoring just above the national percentiles, in the 54^{th} percentile. Interestingly, this table clearly shows that the musicians, who produced the highest psi scores, also produced the lowest creativity scores on the Verbal TTCT, in relation to the other three groups and in relation to other creative populations taking this test. This does, however, replicate the finding by Schlitz with her best scoring group, the musicians, who scored in the 40^{th} percentile on these same norms when compared with other college students.

Table 10.7
Group Creativity Norms and Averages

	Fluency	Flexibility	Originality	Verbal	Range	Percentile
Musician	100.2	104.4	91.5	98.6	63-131	45
Artist	102.2	107.3	94.4	101.3	78-143	52
Writer	105.1	109.9	93.6	102.9	60-146	56
Actor	103.2	109.7	98.3	103.7	78-146	58
All Grps	102.6	107.8	94.4	101.6	60-146	54

The question must then be asked: If the creativity measures used in this thesis produced an accurate portrayal of the creative cognitive processes, and the creative interests, activities, attitudes, and achievements, of the creative individual, and review of the relevant literature and creativity tests have indicated that they do (chapter 4), then why did none of the expected positive relationships with any of these measures manifest? The answer to this question may be four fold.

The first of these is obviously that the creativity tests selected for use in this thesis may not be measuring the aspect of creativity responsible for the enhanced psi performance for creative populations. In view of the widely varying responses to the Verbal test amongst the four groups, with musician's producing a significantly positive relationship ($p < .02$), and actor's a significantly negative ($p < .05$), this may be true. Additionally, responses to the two inventories were quite variable, with artist's z scores producing a significant negative correlation with the SAM and the KMMPI, and the writer's z scores producing a nearly equal positive correlation with the SAM, and a lesser but still positive response to the KMMPI. Although every effort was made to involve measures of creativity that would provide insight into the areas under scrutiny in this thesis, it is possible that the area responsible for the superior psi performance noted in creative populations is not one that was selected for examination in this thesis.

The second possibility is that superior psi ability *is* related to one of the aspects chose for examination here, *but* that the creativity tests themselves are not adequately assessing this aspect. Some of the problems inherent in measuring the creativity construct were presented in chapter 4, where we also discussed the ongoing debate in creativity research, not only over the validity of creativity tests, but even over the definitions of what it is the tests measure.

The third possibility for consideration here, is that the exceptional psi performance of the creative population is not linked to creativity, or to any of its aspects, but instead is a related variable, perhaps associated with perceptual styles rather than cognitive ones, or with family backgrounds and traditions. Given what little we know about what psi is, how it operates and why it manifests when it manifests, it is even possible that it is in some form genetically linked, a trait that is usually, but not always, seen in combination with possible or potential genes linked with creativity, such as the gene for color blindness most often (but not always) being linked with the male sex.

And finally, the fourth consideration presented here is that the good results seen here for psi, but not for any of the creativity related questions, may be the result of the testing environment, or of some component of the testing environment. Amabile (1987) points out that creativity is killed in atmospheres that are fraught with time and evaluation pressures, restriction of choice, and anything else that takes the focus off the intrinsic properties of the work itself. She also adds that expecting that one's performance will be evaluated and having others present during the task undermine creativity (Amabile, 1983). Koestler (1964) viewed conformity pressure as being detrimental to creativity, and testing environments typically involve conformity to time restrictions and responses to test material. This possibility will be discussed further in the section on testing environment in this chapter.

Dissociation and Personality Data

None of the main hypotheses concerning the relationship of personality variables with psi success were confirmed. Combined group z scores show a negative correlation with openness, rho = -.190, a result also seen in experiment 1 (chapter 7). This correlation is perhaps the most unexpected, as almost by definition, creative populations are seen as being 'open' on a number of levels. Correlations between the overall psi results and the various creativity measures do show some interesting findings. While the relationship between openness and the Verbal TTCT was not significant (rho = .006), that for the SAM was, at rho = .417, $p < .01$, two tailed. Additionally, the correlation between openness and the KMMPI came close to significance at rho = .210, $p < .06$, two tailed. These results fit in with the definition of openness put forth by the NEO, that of 'openness to experience' which might be indicated here by the listing of many creative activities and interests on the SAM and KMMPI. However, in view of the overall relationship between psi and openness for the group (rho = -.190), as with the creativity results themselves, these findings should be taken with the view of the individual group results in mind.

Extraversion demonstrated a nonsignificant trend in the expected direction for the combined study scores (rho = .021) , but again should be viewed in the context of the individual groups results as this measure may be related to the type of person, extravert or introvert, most likely to be found in that area of creative endeavor. The author remains unconvinced of the validity of this variable as directly related to psi, but rather views it more as a predictor of who is most likely to be more psychologically comfortable in the laboratory setting, and in this manner an indirect predictor variable to indicate who is more likely to produce psi in the laboratory. It is also plausible that the correlation with extraversion may also in some respects be associated very closely with self confidence. People who are viewed as self confident are typically identified with the same descriptors applied to the extraversion trait. The exploration of this particular trait in psi research is one that seems increasingly important in view of the extraversion/introversion findings and the lack of any good measure of self confidence in psi research to date.

The ability to dissociate produced an overall negative correlation for combined z scores, although at a relatively mild level, rho = -.091. Additionally, correlations between dissociation and the various creativity measures produced nothing of note.

In future studies that incorporated this variable for examination it would perhaps be beneficial to break the scale down into its component aspects in order to explore it more fully. That was not done in this study as only the overall trait had been indicated as associated with psi (chapter 2), and no information was available as to the possible relations with its component subscales.

Testing Environment Aspects

This section provides alternative possibilities for the good results produced in the experiments in this thesis outside of the aspect of creativity links. One such possibility is the pre-selection of participants. As will be recalled, all participants in the experiments in this thesis underwent a certain amount of pre-selection, primarily on a positive attitude toward psi, prior psi experiences; practice of a mental discipline, and whether they felt psi could be demonstrated in the experiment. These factors in combination may be partially responsible for the good results seen here, as they were primarily selected as a result of prior ganzfeld research indicating their usefulness for selecting potentially successful ganzfeld participants.

The social environment itself, a topic not typically discussed in experimental research, may have played a role in study success. As has been pointed out by parapsychological research into this area (e.g., Honorton, Ramsey, & Cabibbo, 1975; Parker, 1975b; White, 1977) both the experimenter and the experimental surroundings that the participant finds themselves in can play a profound role in their success, or lack thereof. A conscious effort was made in these experiments to provide a warm, accepting and open atmosphere for participants. Extra time was made available in all sessions for plenty of chat time beforehand, as well as discussing the experience during the de-briefing, with the participant setting the pace and length of such interactions.

Of course, the good results observed here could have been due entirely to the ganzfeld procedure as a psi facilitating technique. However, as this technique is not always successful for every experimenter, this possibility should be viewed as perhaps less likely than others. There is, of course, the possibility that these results are due to an undetected experimental flaw or procedure, as has been suggested with other automated ganzfeld research (Wiseman et al., 1994; Hyman, 1994). As pointed out in chapter 6, every effort has been made to rule out this possibility. However, it is noted that this concern is one that will only be completely ruled out through extended replications of this work by other experimenters, and the use of the same automated system presented here in other psi research. Just such a study has recently been completed (Dalton, Steinkamp and Sherwood, 1996) involving remote dreaming by participants at their respective homes, who later came in to independently complete the judging process. This study was significantly successful ($p < .05$), and the possibility of sound leakage to the receiver, who in this case was at home, or any of the other criticisms of automated ganzfeld research where the participant came in contact with the testing system as set forth in chapter 6, can be ruled out.

A more likely explanation for the results seen here is a combination of the first three possibilities: pre-selection of participants on the basis of psi conducive characteristics; the warm accepting ambiance of the testing environment; and the use of a technique known to be psi facilitative. While these results have provided minimal insight into the links underlying the creativity-psi relationship, they may lend further support to the notion that creative people are more intuitive than others as having some meaning in 'real life'.

THESIS SUMMARY

The links between creativity and psi have been thought by many parapsychologists to reside in the creative abilities and skills of the individuals involved. Based on research indications that possession of 'creativity' in an individual also indicates the potential for enhanced psi performance, examination of the creative individual in an environment known to facilitate psi, namely the ganzfeld, might inform the current understanding of the psi process.

Resting on this assumption then, the aims of this thesis were: to develop a more secured experimental ganzfeld procedure without interfering with its effectiveness; to contribute to the study of the creativity-psi relationship by conducting a conceptual replication and extension of the creativity-ganzfeld-psi studies; and to explore the process-related questions of how creative personality characteristics and attributes correlate with psi scoring.

MAIN FINDINGS

Ganzfeld Procedure

A review of relevant meta-analyses and ganzfeld literature (chapter 2) revealed the need for replication of automated ganzfeld studies, but pointed out difficulties with the use of automated systems. A consideration of the security criticisms of automated ganzfeld research identified several problem areas, and led to the development of a fully automated prototype system (chapter 6). After initial development of this methodology, five experiments were carried out. These experiments continued to refine the ganzfeld operational procedure (chapter 7), as well as enabling the comparison of the impact of a sender in the ganzfeld situation (chapter 7, experiment 1), and the systematic examination of psi performance and creativity variables for four different creative groups (chapter 8, experiment 2a and 2b; chapter 9, experiment 3a and 3b), finally allowing for a comparison of all four groups (chapter 10).

While the picture for the creativity-psi relationship was unclear, psi performance was found to be significant overall. These experiments, therefore, conceptually replicate the findings of previous creativity-ganzfeld research, as well as other free response creativity research.

Creativity and Psi

Chapter 4 revealed creativity as a complex, multi-faceted construct, whose definition and related attributes continue to cause debate and discussion. Several areas of creative endeavor were identified as appropriate for study within the confines of this thesis, as well as several creativity measures identified as adequate for this examination. Chapter 3 examined previous explorations of the creativity-psi link, illuminating areas and attributes of creativity thought to be associated with the psi process. In particular, the cognitive processes associated with divergent thinking were of interest, as well creative activities, attitudes and achievements and the personality attributes of openness, extraversion and dissociation. The experiments presented in chapters 7, 8 and 9 allowed for examination of these attributes and variables.

The examination of secondary areas of interest within this thesis, as described in chapter 5, allowed the process-oriented study of psi performance when different kinds of target emotionality were involved: negative, positive and neutral. There has been little research into the characteristics of successful psi targets, but the dimensions of complexity, novelty, and emotionality are generally considered by parapsychologists to be important, so this aspect of the thesis was intended to contribute to answering the question of what makes a good psi target. Emotionally impactful targets were found to represent somewhat more successful target stimuli, with targets demonstrating a positive impact producing slightly better results in this population. And finally, the relationship of psi success with the geomagnetic *ap* indices was found to be ambiguous overall in the present experiments, with some indication that highly creative populations may perform better on days of relatively high geomagnetic activity.

Despite the failure to detect any consistent relationship between creativity and psi performance, it was felt that the methodology and ganzfeld procedure outlined and developed in this thesis were well suited to an exploration of psi performance, whether creativity related or otherwise. Methodologically and conceptually, the experiments in this thesis have served to illustrate that correlations with differing creative groups will vary quite a bit from creative group to group. The collective blending or mixing together of different creative groups may serve to mask any real relationships particular to that group, making it important to examine each group results individually. Thus, the overt form of creativity shown must be taken into account in order to understand any meaningful relationships.

Suggestions have been made throughout this thesis for future research directions. Questions remaining unanswered include: the use of creativity ratings provided by teachers or peers as a creativity measure; a 'self confidence' measure to compare with psi scores and extraversion results; and, an in-depth examination of the target emotionality issue, assessing whether certain kinds and levels of 'positive' emotions (i.e. joy, awe, pleasure) or 'negative' emotions (fear, anger, pain) are more successful than others. These are admittedly intriguing questions, and since a major part of this thesis was concerned with the assessment and detection of links between creativity and psi, it seems appropriate to comment on how this might proceed from here.

Given the limited resources of time and money associated with a project such as this, it was not possible to expand the creative groups to include other populations, such as dancers, to increase the number of participants in each group. Future creativity research with the ganzfeld procedure should, however, attempt to increase the number of creative groups involved as well as the number of trials in the study.

Further assessment of session variables, such as the amount of session mentation or the presence of primary process imagery, should continue as these may provide some clue not only to who is most likely to manifest psi, but also to who is most likely to recognize it when it does appear. In the present study, time constraints made it unrealistic to try to collect more sender data than has been discussed previously. However, in view of the findings related to biological pairings, information on sender variables should be routinely collected as a means of better understanding this and other relationships. In the past, ganzfeld research has focused on the role of the receiver and the characteristics of 'good' receivers, and the additional time required to collect the same data from senders was considered unnecessary. In view of the strong evidence for a biological link in this and other ganzfeld databases, it is felt that the gathering of information from senders should become more the standard, and less the exception.

Improvements in the ganzfeld procedure itself could focus on a more adequate means of shielding out the full range of electronic signaling equipment, as it is felt that electromagnetic shielding of the receiver's rooms is necessary in order to reduce the possibility of readily available electronic signaling systems. This consideration would be of more importance in the case of special 'talented' pairs, or in cases where the same participants repeatedly take part in a large number of ganzfeld trials.

The use of predictor models, involving such factors as was outlined by the four factor model developed at PRL, or the smaller three factor model used in this thesis, should continue to be used in ganzfeld-psi research and some thought should be given to their extension. Currently, these models would appear to be a successful method of anticipating who is most likely to be successful at the ganzfeld psi task. The three factor model used in this thesis served to illustrate the point that viewing individual creative groups as a homogeneously creative whole may mask, or wash out, relationships that are clear for the individual groups. The three factor model was a much more powerful discriminator of who would be successful at the psi task for the writers' group than for any of the other three. The writers meeting the three factor model (prior psi experiences, belief in psi and extraversion), tended to produce a very high hit rate (60%), while the artists meeting this same model produced about the same hit rate (38%) as would be expected with a more general population (34%). Thus, the use of such predictor models may improve overall ganzfeld-psi results when one is knowledgeable about the population under study. Verification and extension of the efficacy of these models through correlation with personality characteristics and traits may allow us to conduct process oriented research narrowing down the variety of characteristics thought to be psi facilitative.

Another related question to be considered in the future is the role of the target material. Using only emotionally impactful material, without the addition of neutral targets, may serve to increase the chances of psi retrieval and recognition in ganzfeld research. However, an added caution here is that currently it is unknown whether the neutral targets provide a buffer function for the more emotional targets, allowing a comparison against something that is less compelling during the judging sequence. It should be borne in mind that the studies presented in this thesis made use of 'intermediate' target material in terms of emotional impact. Target pools were specifically devised in which excessively arousing target material, or extremely strong negative material, had been filtered out. This was primarily done for ethical reasons, as well as because violent clips are customarily viewed as unpleasant and offensive, and sexual material is typically suppressed in ganzfeld situations. Thus, research investigating the level and type of emotional impact in targets might inform future studies on the most appropriate type of target stimuli.

And finally, future ganzfeld research in creativity might want to take a different approach than the one used in this thesis. Instead of a scrutiny of fairly large numbers of differing types of creativity, researchers might want to consider an in-depth examination of the most successful creative population in this, and other, ganzfeld-creativity research, the musicians. Focusing on only a few individuals, this approach would be more individually time intensive, but allow the gathering of in-depth biographical information, ratings from teachers and peers, and extensive background investigations, as well as incorporating a wider range of creativity measures in the assessment of the successful creative psi participant.

CONCLUSION

It is acknowledged that far more work must be done before the creativity-psi relationship is understood and the ganzfeld technique becomes a procedure that any one can use and be assured of success with. Nevertheless, the direct hit results seen in the studies conducted for this thesis compares favorably with those found in the Schlitz and Honorton (1992) study and the Cunningham (Morris et al., 1993) study. The experiments are thus considered a successful conceptual replication of those studies, using a more stringently secure ganzfeld methodology.

In sum, the prototypic automated ganzfeld system presented in this thesis has shown promise as a tool to facilitate the study of the creativity-psi relationship. With further development, it may come to be a useful tool for both parapsychologists and psychologists. Its potential application ranges widely: the detailed examination of process related questions including the best participant-target-methodology combinations for successful psi scoring; its possible practical use in research psychology as a tool to examine imagery differences among creative populations; and, perhaps most usefully, to facilitate the enhancement of creativity in individuals who are experiencing 'blocks' through its aspects of relaxation, free-association and altered state induction. Many participant's in the ganzfeld studies in this thesis later stated that they felt the ganzfeld helped to 'unblock' creative impulses, and seemed to give them a fresh perspective and orientation to their creative art. The imagery facilitating aspects of the ganzfeld, as well as the internal focus of the technique, may prove to be effective as a means of enhancing creative abilities. Acknowledging that the enhancement and complete understanding of both psi and creativity is still a long way down the road, it is hoped that this thesis has taken the first steps on that road.

Table 10.8
Listing of Study Results by Group

	Musician	Artist	Writer	Actor
Psi Results:	32 trials-18 hits	32 trials-16 hits	32 trials-13 hits	32 trials-13 hits
Hit Rate	53%	50%	41%	41%
p Value	.0001	.002	.04	.04
Effect Size	.65	.52	.33	.33
Verbal Creat:	.358*	.188	-.166	-.336
Fluency	.280	.113	-.245	-.177
Flexibility	.367**	.157	-.081	-.432**
Originality	.359**	.149	-.145	-.285
Jobs	.199	.084	-.090	-.002
SAM	-.302	-.401**	.301*	.032
KMMPI	-.159	-.500**	.055	.030
Dissociation	.205	-.084	-.081	-.222
Openness	-.487**	-.195	-.030	.057
Extraversion	.297*	-.341**	.211	.175
Absorption	-.095	-.288	.080	.269
Ment. Abun.	.016	-.235	-.165	.006
3FactorModel Success Rate	43%	58%	60%	53%

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APPENDICES

Appendix 1

The 108 ganzfeld-psi studies conducted by 1995 are listed below in alphabetical order. The 28 ganzfeld-psi studies analyzed in the Hyman-Honorton meta-analyses of 1985 are denoted by *. The full references can be found in the reference section of this thesis.

*Ashton, Dear, and Harley: 1981

Bierman, Bosga, Gerding and Wezelman: 1993

Bierman, Brendson, Koenen, Kuipers, Louman and Maisson: 1984

Bierman: 1987

Bierman: 1995

Braud, Ackles and Kyles: 1984

Braud and Wood: 1977

*Braud, Shafer and Mulgrew: 1983 (2 experiments reported)

Braud, Wood and Braud: 1975

Braud: 1978 (2 experiments reported)

Broughton and Alexander: 1995

Broughton, Kanthamani and Khilji: 1990

*Child and Levi: 1979

Child and Levi: 1980

Child and Levi: 1981

Dalton: 1994

Delanoy, Parker and Wilson: 1981

Delanoy: 1982

Dunne, Warnock and Bisha: 1977

Habel: 1976

Haraldsson: 1979

Haraldsson and Gissurarson: 1985

*Honorton: 1976b

*Honorton and Harper: 1974

Honorton, Berger, Varvoglis, Quant, Derr, Schechter and Ferrari: 1990 (11 experiments reported)

Houtkooper, Gissurarson and Haraldsson: 1988-1989

Ianuzzo: 1985 (7 experiments reported)

Johansson and Parker: 1995

Kanthamani and Broughton: 1992

Kanthamani and Broughton: 1994 (Manual Series – 8 experiments reported)

Kanthamani, Khilji and Rustomji-Kerns: 1988

Kanthamani and Khilji: 1990

Kanthamani and Palmer: 1993

Keane and Wells: 1979

Kelly and Varvoglis: 1979

McDonough, Don and Warren: 1994

Milton: 1984

Milton: 1985

Morris, Cunningham, McAlpine and Taylor: 1993 (2 experiments reported)

Murre, van Dalen, Dias and Schouten: 1988

*Palmer and Aued: 1975

Palmer and Leiberman: 1975

Palmer and Lieberman: 1976

*Palmer, Bogart, Jones and Tart: 1977

*Palmer, Khamashta and Israelson: 1979

Palmer, Whitson and Bogart: 1980

Palmer: 1979

Parker, Millar and Beloff: 1977

Parker: 1975a

*Raburn and Manning: 1977 (2 experiments reported)

*Rogo, Experiment I: 1976a

*Rogo, Experiment II: 1976b

*Rogo, Smith and Terry: 1976

Rogo: 1977

Roney-Dougal: 1979

Roney-Dougal: 1982

Sargent and Harley: 1982

*Sargent and Matthews: 1982

Sargent, Bartlett and Moss: 1982

*Sargent, Experiment I: 1980a

*Sargent, Experiment II: 1980a

*Sargent, Experiment III: 1980a

*Sargent, Experiment V: 1980a

*Sargent, Experiment VI: 1980a

*Sargent, Harley, Lane and Radcliffe: 1981

Sargent: 1982

Schacter and Kelly: 1975

Schacter and Kelly: 1976

Schlitz and Honorton: 1992

*Schmitt and Stanford: 1978

Smith, Tremmel and Honorton: 1976

*Sondow: 1979

Sondow: 1986

*Sondow, Braud and Barker: 1982

Stanford and Angelini: 1984

Stanford and Frank: 1991

Stanford and Neylon: 1975

Stanford, Angelini and Raphael: 1985

Stanford, Frank, Kass and Skoll: 1989

Stanford: 1979

*Terry and Honorton: 1976 (2 experiments reported)

Terry, Tremmel, Kelly, Harper and Barker: 1976

Terry: 1976

Williams, Roe, Upchurch and Lawrence: 1994

*Wood, Kirk and Braud: 1977

*York: 1977

Appendix 2

NEO-PI

NEO-FFI

NEO PI-R™

Revised NEO Personality Inventory (NEO PI-R)

Item Booklet–Form S

Paul T. Costa, Jr., Ph.D. and Robert R. McCrae, Ph.D.

Instructions for use with the Hand-Scoring Answer Sheet

For use with the Machine-Scoring Answer Sheet, turn to page 2.

Please read all these instructions carefully before beginning. Mark all your answers on the answer sheet and write only where indicated. **DO NOT** write in this test booklet.

On the accompanying answer sheet, please write your name in the space provided. Indicate your sex by placing a check in the appropriate box under "Sex." Enter the date and your identification number, if you have been given one, in the spaces provided. Check "Yourself" in the space labeled "Person being rated" since you are describing yourself. Write in your age and check the box next to "S" in the space labeled "NEO Form."

This questionnaire contains 240 statements. Please read each item carefully and circle the one answer that best corresponds to your agreement or disagreement.

Circle "SD" if the statement is definitely false or if you **strongly disagree.**	SD	D	N	A	SA
Circle "D" if the statement is mostly false or if you **disagree.**	SD	D	N	A	SA
Circle "N" if the statement is about equally true or false, if you cannot decide,or if you are **neutral** on the statement.	SD	D	N	A	SA
Circle "A" if the statement is mostly true or if you **agree.**	SD	D	N	A	SA
Circle "SA" if the statement is definitely true or if you **strongly agree.**	SD	D	N	A	SA

There are no right or wrong answers, and you need not be an "expert" to complete this questionnaire. Describe yourself honestly and state your opinions as accurately as possible.

Answer every item. Note that the answers are numbered down the columns on the answer sheet. Please make sure that your answer is marked in the correctly numbered space. If you make a mistake or change your mind, **DO NOT ERASE!** Make an "X" through the incorrect response and then draw a circle around the correct response. After you have answered the 240 items, answer the three questions labeled A, B, and C on the answer sheet. Turn to page 3 in this booklet and begin with item 1.

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Instructions for use with the Machine-Scoring Answer Sheet

Please read all these instructions carefully before beginning. Use a No. 2 pencil to complete your responses on the accompanying answer sheet. Please mark all your answers on the answer sheet. **DO NOT** write in this test booklet.

On the answer sheet, fill in the circle next to "Self" in the box labeled "Person Rated" since you are describing yourself. Enter your name and/or identification number, if you have been given one, in the spaces provided and then fill in the corresponding circles below each box. In the box labeled "Test Form" fill in the circle next to the letter "S." In the spaces provided, fill in your sex, age, and today's date. Turn the answer sheet over.

This questionnaire contains 240 statements. Please read each item carefully and fill in the one answer that best corresponds to your agreement or disagreement.

Fill in "SD" if the statement is definitely false or if you **strongly disagree.**	● (D) (N) (A) (SA)
Fill in "D" if the statement is mostly false or if you **disagree.**	(SD) ● (N) (A) (SA)
Fill in "N" if the statement is about equally true or false, if you cannot decide,or if you are **neutral** on the statement.	(SD) (D) ● (A) (SA)
Fill in "A" if the statement is mostly true or if you **agree.**	(SD) (D) (N) ● (SA)
Fill in "SA" if the statement is definitely true or if you **strongly agree.**	(SD) (D) (N) (A) ●

There are no right or wrong answers, and you need not be an "expert" to complete this questionnaire. Describe yourself honestly and state your opinions as accurately as possible.

Answer every item and be sure to fill in the circles completely. Note that the answers are numbered down the columns on the answer sheet. Please make sure that your answer is marked in the correctly numbered space. If you make a mistake or change your mind, erase your first answer completely. Then fill in the circle that corresponds to your correct answer. After you have answered the 240 items, please answer the three questions labeled A, B, and C on the answer sheet. Turn to page 3 in this booklet and begin with item 1.

. I am not a worrier.
. I really like most people I meet.
. I have a very active imagination.
. I tend to be cynical and skeptical of others' intentions.
. I'm known for my prudence and common sense.
. I often get angry at the way people treat me.
. I shy away from crowds of people.
. Aesthetic and artistic concerns aren't very important to me.
. I'm not crafty or sly.
. I would rather keep my options open than plan everything in advance.
. I rarely feel lonely or blue.
. I am dominant, forceful, and assertive.
. Without strong emotions, life would be uninteresting to me.
. Some people think I'm selfish and egotistical.
. I try to perform all the tasks assigned to me conscientiously.
. In dealing with other people, I always dread making a social blunder.
. I have a leisurely style in work and play.
. I'm pretty set in my ways.
. I would rather cooperate with others than compete with them.
. I am easy-going and lackadaisical.
. I rarely overindulge in anything.
. I often crave excitement.
. I often enjoy playing with theories or abstract ideas.
. I don't mind bragging about my talents and accomplishments.
. I'm pretty good about pacing myself so as to get things done on time.
. I often feel helpless and want someone else to solve my problems.
. I have never literally jumped for joy.
. I believe letting students hear controversial speakers can only confuse and mislead them.
. Political leaders need to be more aware of the human side of their policies.
. Over the years I've done some pretty stupid things.
. I am easily frightened.
. I don't get much pleasure from chatting with people.
. I try to keep all my thoughts directed along realistic lines and avoid flights of fancy.
. I believe that most people are basically well-intentioned.
. I don't take civic duties like voting very seriously.
. I'm an even-tempered person.
. I like to have a lot of people around me.
. I am sometimes completely absorbed in music I am listening to.
. If necessary, I am willing to manipulate people to get what I want.
. I keep my belongings neat and clean.
. Sometimes I feel completely worthless.
. I sometimes fail to assert myself as much as I should.
. I rarely experience strong emotions.
. I try to be courteous to everyone I meet.
. Sometimes I'm not as dependable or reliable as I should be.

46. I seldom feel self-conscious when I'm around people.
47. When I do things, I do them vigorously.
48. I think it's interesting to learn and develop new hobbies.
49. I can be sarcastic and cutting when I need to be.
50. I have a clear set of goals and work toward them in an orderly fashion.
51. I have trouble resisting my cravings.
52. I wouldn't enjoy vacationing in Las Vegas.
53. I find philosophical arguments boring.
54. I'd rather not talk about myself and my achievements.
55. I waste a lot of time before settling down to work.
56. I feel I am capable of coping with most of my problems.
57. I have sometimes experienced intense joy or ecstasy.
58. I believe that laws and social policies should change to reflect the needs of a changing world.
59. I'm hard-headed and tough-minded in my attitudes.
60. I think things through before coming to a decision.
61. I rarely feel fearful or anxious.
62. I'm known as a warm and friendly person.
63. I have an active fantasy life.
64. I believe that most people will take advantage of you if you let them.
65. I keep myself informed and usually make intelligent decisions.
66. I am known as hot-blooded and quick-tempered.
67. I usually prefer to do things alone.
68. Watching ballet or modern dance bores me.
69. I couldn't deceive anyone even if I wanted to.
70. I am not a very methodical person.
71. I am seldom sad or depressed.
72. I have often been a leader of groups I have belonged to.
73. How I feel about things is important to me.
74. Some people think of me as cold and calculating.
75. I pay my debts promptly and in full.
76. At times I have been so ashamed I just wanted to hide.
77. My work is likely to be slow but steady.
78. Once I find the right way to do something, I stick to it.
79. I hesitate to express my anger even when it's justified.
80. When I start a self-improvement program, I usually let it slide after a few days.
81. I have little difficulty resisting temptation.
82. I have sometimes done things just for "kicks" or "thrills."
83. I enjoy solving problems or puzzles.
84. I'm better than most people, and I know it.
85. I am a productive person who always gets the job done.
86. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.
87. I am not a cheerful optimist.
88. I believe we should look to our religious authorities for decisions on moral issues.
89. We can never do too much for the poor and elderly.
90. Occasionally I act first and think later.

91. I often feel tense and jittery.
92. Many people think of me as somewhat cold and distant.
93. I don't like to waste my time daydreaming.
94. I think most of the people I deal with are honest and trustworthy.
95. I often come into situations without being fully prepared.
96. I am not considered a touchy or temperamental person.
97. I really feel the need for other people if I am by myself for long.
98. I am intrigued by the patterns I find in art and nature.
99. Being perfectly honest is a bad way to do business.
00. I like to keep everything in its place so I know just where it is.
01. I have sometimes experienced a deep sense of guilt or sinfulness.
02. In meetings, I usually let others do the talking.
03. I seldom pay much attention to my feelings of the moment.
04. I generally try to be thoughtful and considerate.
05. Sometimes I cheat when I play solitaire.
06. It doesn't embarrass me too much if people ridicule and tease me.
07. I often feel as if I'm bursting with energy.
08. I often try new and foreign foods.
09. If I don't like people, I let them know it.
10. I work hard to accomplish my goals.
11. When I am having my favorite foods, I tend to eat too much.
12. I tend to avoid movies that are shocking or scary.
13. I sometimes lose interest when people talk about very abstract, theoretical matters.
14. I try to be humble.
15. I have trouble making myself do what I should.
16. I keep a cool head in emergencies.
17. Sometimes I bubble with happiness.
18. I believe that the different ideas of right and wrong that people in other societies have may be valid for them.
19. I have no sympathy for ~~panhandlers~~. beggars.
20. I always consider the consequences before I take action.
21. I'm seldom apprehensive about the future.
22. I really enjoy talking to people.
23. I enjoy concentrating on a fantasy or daydream and exploring all its possibilities, letting it grow and develop.
24. I'm suspicious when someone does something nice for me.
25. I pride myself on my sound judgment.
26. I often get disgusted with people I have to deal with.
27. I prefer jobs that let me work alone without being bothered by other people.
28. Poetry has little or no effect on me.
29. I would hate to be thought of as a hypocrite.
30. I never seem to be able to get organized.
31. I tend to blame myself when anything goes wrong.
32. Other people often look to me to make decisions.
33. I experience a wide range of emotions or feelings.
34. I'm not known for my generosity.
35. When I make a commitment, I can always be counted on to follow through.

36. I often feel inferior to others.
37. I'm not as quick and lively as other people.
38. I prefer to spend my time in familiar surroundings.
39. When I've been insulted, I just try to forgive and forget.
40. I don't feel like I'm driven to get ahead.
41. I seldom give in to my impulses.
42. I like to be where the action is.
43. I enjoy working on "mind-twister"-type puzzles.
44. I have a very high opinion of myself.
45. Once I start a project, I almost always finish it.
46. It's often hard for me to make up my mind.
47. I don't consider myself especially "light-hearted."
48. I believe that loyalty to one's ideals and principles is more important than "open-mindedness."
49. Human need should always take priority over economic considerations.
50. I often do things on the spur of the moment.
51. I often worry about things that might go wrong.
52. I find it easy to smile and be outgoing with strangers.
53. If I feel my mind starting to drift off into daydreams, I usually get busy and start concentrating on some work or activity instead.
54. My first reaction is to trust people.
55. I don't seem to be completely successful at anything.
56. It takes a lot to get me mad.
57. I'd rather vacation at a popular beach than an isolated cabin in the woods.
58. Certain kinds of music have an endless fascination for me.
59. Sometimes I trick people into doing what I want.
60. I tend to be somewhat fastidious or exacting.
61. I have a low opinion of myself.
62. I would rather go my own way than be a leader of others.
63. I seldom notice the moods or feelings that different environments produce.
64. Most people I know like me.
65. I adhere strictly to my ethical principles.
66. I feel comfortable in the presence of my bosses or other authorities.
67. I usually seem to be in a hurry.
68. Sometimes I make changes around the house just to try something different.
69. If someone starts a fight, I'm ready to fight back.
70. I strive to achieve all I can.
71. I sometimes eat myself sick.
72. I love the excitement of roller coasters.
73. I have little interest in speculating on the nature of the universe or the human condition.
74. I feel that I am no better than others, no matter what their condition.
75. When a project gets too difficult, I'm inclined to start a new one.
76. I can handle myself pretty well in a crisis.
77. I am a cheerful, high-spirited person.
78. I consider myself broad-minded and tolerant of other people's lifestyles.
79. I believe all human beings are worthy of respect.
80. I rarely make hasty decisions.

181. I have fewer fears than most people.
182. I have strong emotional attachments to my friends.
183. As a child I rarely enjoyed games of make believe.
184. I tend to assume the best about people.
185. I'm a very competent person.
186. At times I have felt bitter and resentful.
187. Social gatherings are usually boring to me.
188. Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.
189. At times I bully or flatter people into doing what I want them to.
190. I'm not compulsive about cleaning.
191. Sometimes things look pretty bleak and hopeless to me.
192. In conversations, I tend to do most of the talking.
193. I find it easy to empathize—to feel myself what others are feeling.
194. I think of myself as a charitable person.
195. I try to do jobs carefully, so they won't have to be done again.
196. If I have said or done the wrong thing to someone, I can hardly bear to face them again.
197. My life is fast-paced.
198. On a vacation, I prefer going back to a tried and true spot.
199. I'm hard-headed and stubborn.
200. I strive for excellence in everything I do.
201. Sometimes I do things on impulse that I later regret.
202. I'm attracted to bright colors and flashy styles.
203. I have a lot of intellectual curiosity.
204. I would rather praise others than be praised myself.
205. There are so many little jobs that need to be done that I sometimes just ignore them all.
206. When everything seems to be going wrong, I can still make good decisions.
207. I rarely use words like "fantastic!" or "sensational!" to describe my experiences.
208. I think that if people don't know what they believe in by the time they're 25, there's something wrong with them.
209. I have sympathy for others less fortunate than me.
210. I plan ahead carefully when I go on a trip.
211. Frightening thoughts sometimes come into my head.
212. I take a personal interest in the people I work with.
213. I would have difficulty just letting my mind wander without control or guidance.
214. I have a good deal of faith in human nature.
215. I am efficient and effective at my work.
216. Even minor annoyances can be frustrating to me.
217. I enjoy parties with lots of people.
218. I enjoy reading poetry that emphasizes feelings and images more than story lines.
219. I pride myself on my shrewdness in handling people.
220. I spend a lot of time looking for things I've misplaced.
221. Too often, when things go wrong, I get discouraged and feel like giving up.
222. I don't find it easy to take charge of a situation.
223. Odd things—like certain scents or the names of distant places—can evoke strong moods in me.
224. I go out of my way to help others if I can.
225. I'd really have to be sick before I'd miss a day of work.

6. When people I know do foolish things, I get embarrassed for them.
7. I am a very active person.
8. I follow the same route when I go someplace.
9. I often get into arguments with my family and co-workers.
0. I'm something of a "workaholic."
1. I am always able to keep my feelings under control.
2. I like being part of the crowd at sporting events.
3. I have a wide range of intellectual interests.
4. I'm a superior person.
5. I have a lot of self-discipline.
6. I'm pretty stable emotionally.
7. I laugh easily.
8. I believe that the "new morality" of permissiveness is no morality at all.
9. I would rather be known as "merciful" than as "just."
0. I think twice before I answer a question.

NEO
Five-Factor Inventory

Form S

Paul T. Costa, Jr., Ph.D., and Robert R. McCrae, Ph.D.

Instructions

Write only where indicated in this booklet. Carefully read all of the instructions before beginning. This questionnaire contains 60 statements. Read each statement carefully. For each statement fill in the circle with the response that best represents your opinion. Make sure that your answer is in the correct box.

Fill in (SD) if you *strongly disagree* or the statement is definitely false.

Fill in (D) if you *disagree* or the statement is mostly false.

Fill in (N) if you are *neutral* on the statement, you cannot decide, or the statement is about equally true and false.

Fill in (A) if you *agree* or the statement is mostly true.

Fill in (SA) if you *strongly agree* or the statement is definitely true.

For example, if you *strongly disagree* or believe that a statement is definitely false, you would fill in the (SD) for that statement.

Example

● (D) (N) (A) (SA)

Fill in only one response for each statement. Respond to all of the statements, making sure that you fill in the correct response. DO NOT ERASE! If you need to change an answer, make an "X" through the incorrect response and then fill in the correct response.

Note that the responses are numbered in *rows*. Before responding to the statements, turn to the inside of the booklet and enter your name, age, and sex and the date.

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Name____ Age____ Sex____ Date__________

1. I am not a worrier.
2. I like to have a lot of people around me.
3. I don't like to waste my time daydreaming.
4. I try to be courteous to everyone I meet.
5. I keep my belongings clean and neat.

6. I often feel inferior to others.
7. I laugh easily.
8. Once I find the right way to do something, I stick to it.
9. I often get into arguments with my family and co-workers.
10. I'm pretty good about pacing myself so as to get things done on time.

11. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.
12. I don't consider myself especially "light-hearted."
13. I am intrigued by the patterns I find in art and nature.
14. Some people think I'm selfish and egotistical.
15. I am not a very methodical person.

16. I rarely feel lonely or blue.
17. I really enjoy talking to people.
18. I believe letting students hear controversial speakers can only confuse and mislead them.
19. I would rather cooperate with others than compete with them.
20. I try to perform all the tasks assigned to me conscientiously.

21. I often feel tense and jittery.
22. I like to be where the action is.
23. Poetry has little or no effect on me.
24. I tend to be cynical and skeptical of others' intentions.
25. I have a clear set of goals and work toward them in an orderly fashion.

26. Sometimes I feel completely worthless.
27. I usually prefer to do things alone.
28. I often try new and foreign foods.
29. I believe that most people will take advantage of you if you let them.
30. I waste a lot of time before settling down to work.

31. I rarely feel fearful or anxious.
32. I often feel as if I'm bursting with energy.
33. I seldom notice the moods or feelings that different environments produce.
34. Most people I know like me.
35. I work hard to accomplish my goals.

36. I often get angry at the way people treat me.
37. I am a cheerful, high-spirited person.
38. I believe we should look to our religious authorities for decisions on moral issues.
39. Some people think of me as cold and calculating.
40. When I make a commitment, I can always be counted on to follow through.

41. Too often, when things go wrong, I get discouraged and feel like giving up.
42. I am not a cheerful optimist.
43. Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.
44. I'm hard-headed and tough-minded in my attitudes.
45. Sometimes I'm not as dependable or reliable as I should be.

46. I am seldom sad or depressed.
47. My life is fast-paced.
48. I have little interest in speculating on the nature of the universe or the human condition.
49. I generally try to be thoughtful and considerate.
50. I am a productive person who always gets the job done.

51. I often feel helpless and want someone else to solve my problems.
52. I am a very active person.
53. I have a lot of intellectual curiosity.
54. If I don't like people, I let them know it.
55. I never seem to be able to get organized.

56. At times I have been so ashamed I just wanted to hide.
57. I would rather go my own way than be a leader of others.
58. I often enjoy playing with theories or abstract ideas.
59. If necessary, I am willing to manipulate people to get what I want.
60. I strive for excellence in everything I do.

Enter your responses here—remember to enter responses *across the rows*.

SD = *Strongly Disagree*; D = *Disagree*; N = *Neutral*; A = *Agree*; SA = *Strongly Agree*

1 SD D N A SA	2 SD D N A SA	3 SD D N A SA	4 SD D N A SA	5 SD D N A SA
6 SD D N A SA	7 SD D N A SA	8 SD D N A SA	9 SD D N A SA	10 SD D N A SA
11 SD D N A SA	12 SD D N A SA	13 SD D N A SA	14 SD D N A SA	15 SD D N A SA
16 SD D N A SA	17 SD D N A SA	18 SD D N A SA	19 SD D N A SA	20 SD D N A SA
21 SD D N A SA	22 SD D N A SA	23 SD D N A SA	24 SD D N A SA	25 SD D N A SA
26 SD D N A SA	27 SD D N A SA	28 SD D N A SA	29 SD D N A SA	30 SD D N A SA
31 SD D N A SA	32 SD D N A SA	33 SD D N A SA	34 SD D N A SA	35 SD D N A SA
36 SD D N A SA	37 SD D N A SA	38 SD D N A SA	39 SD D N A SA	40 SD D N A SA
41 SD D N A SA	42 SD D N A SA	43 SD D N A SA	44 SD D N A SA	45 SD D N A SA
46 SD D N A SA	47 SD D N A SA	48 SD D N A SA	49 SD D N A SA	50 SD D N A SA
51 SD D N A SA	52 SD D N A SA	53 SD D N A SA	54 SD D N A SA	55 SD D N A SA
56 SD D N A SA	57 SD D N A SA	58 SD D N A SA	59 SD D N A SA	60 SD D N A SA

Have you responded to all of the statements? ______Yes ______No

Have you entered your responses in the correct boxes? ______Yes ______No

Have you responded accurately and honestly? ______Yes ______No

Appendix 3

Dissociative Experiences Scale
(DES)

Daily Life Experiences

Name: ______________________ Age: _____

Date: ______________________ Sex: M F

Study: ______________________

Directions

This questionnaire consists of twenty-eight questions about experiences that you may have in your daily life. We are interested in how often you have these experiences. It is important, however, that your answers show how often these experiences happen to you when you are not under the influence of alcohol or drugs. All responses are held in strictest confidence.

To answer the questions, please determine to what degree the experience described in the question applies to you and circle the number to show what percentage of the time you have the experience.

Example:

0%	10	20	30	40	50	60	70	80	90	100%
(never)										(always)

---

1. Some people have the experience of driving or riding in a car or bus or subway and suddenly realizing that they don't remember what has happened during all or part of the trip. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

2. Some people find that sometimes they are listening to someone talk and they suddenly realize that they did not hear part or all of what was said. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

3. Some people have the experience of finding themselves in a place and having no idea how they got there. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

4. Some people have the experience of finding themselves dressed in clothes that they don't remember putting on. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

5. Some people have the experience of finding new things among their belongings that they do not remember buying. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

6. Some people sometimes find that they are approached by people that they do not know who call them by another name or insist that they have met them before. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

7. Some people sometimes have the experience of feeling as though they are standing next to themselves or watching themselves do something and they actually see themselves as if they were looking at another person. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

8. Some people are told that they sometimes do not recognize friends or family members. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

9. Some people find that they have no memory for some important events in their lives (for example, a wedding or graduation). Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

10. Some people have the experience of being accused of lying when they do not think that they have lied. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

11. Some people have the experience of looking in a mirror and not recognizing themselves. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

12. Some people have the experience of feeling that other people, objects, and the world around them are not real. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

13. Some people have the experience of feeling that their body does not seem to belong to them. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

14. Some people have the experience of sometimes remembering a past event so vividly that they feel as if they are reliving that event. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

15. Some people have the experience of not being sure whether things that they remember happening really did happen or whether they just dreamed them. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

16. Some people have the experience of being in a familiar place but finding it strange and unfamiliar. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

17. Some people find that when they are watching television or a movie they become so absorbed in the story that they are unaware of other events happening around them. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

18. Some people find that they become so involved in a fantasy or daydream that it feels as though it were really happening to them. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

19. Some people find that they are sometimes able to ignore pain. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

20. Some people find that they sometimes sit staring off into space, thinking of nothing, and are not aware of the passage of time. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

21. Some people sometimes find that when they are alone they talk out loud to themselves. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

22. Some people find that in one situation they may act so differently compared with another situation that they feel almost as if they were two different people. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

23. Some people sometimes find that in certain situations they are able to do things with amazing ease and spontaneity that would usually be difficult for them (for example, sports, work, social situations, etc.). Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

24. Some people sometimes find that they cannot remember whether they have done something or have just thought about doing this (for example, not knowing whether they have just mailed a letter of have just thought about mailing it). Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

25. Some people find evidence that they have done things that they do not remember doing. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

26. Some people sometimes find writings, drawings, or notes among their belongings that they must have done but cannot remember doing. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

27. Some people sometimes find that they hear voices inside their head that tell them to do things or comment on things that they are doing. Circle a number to show what percentage of the time this happens to you.

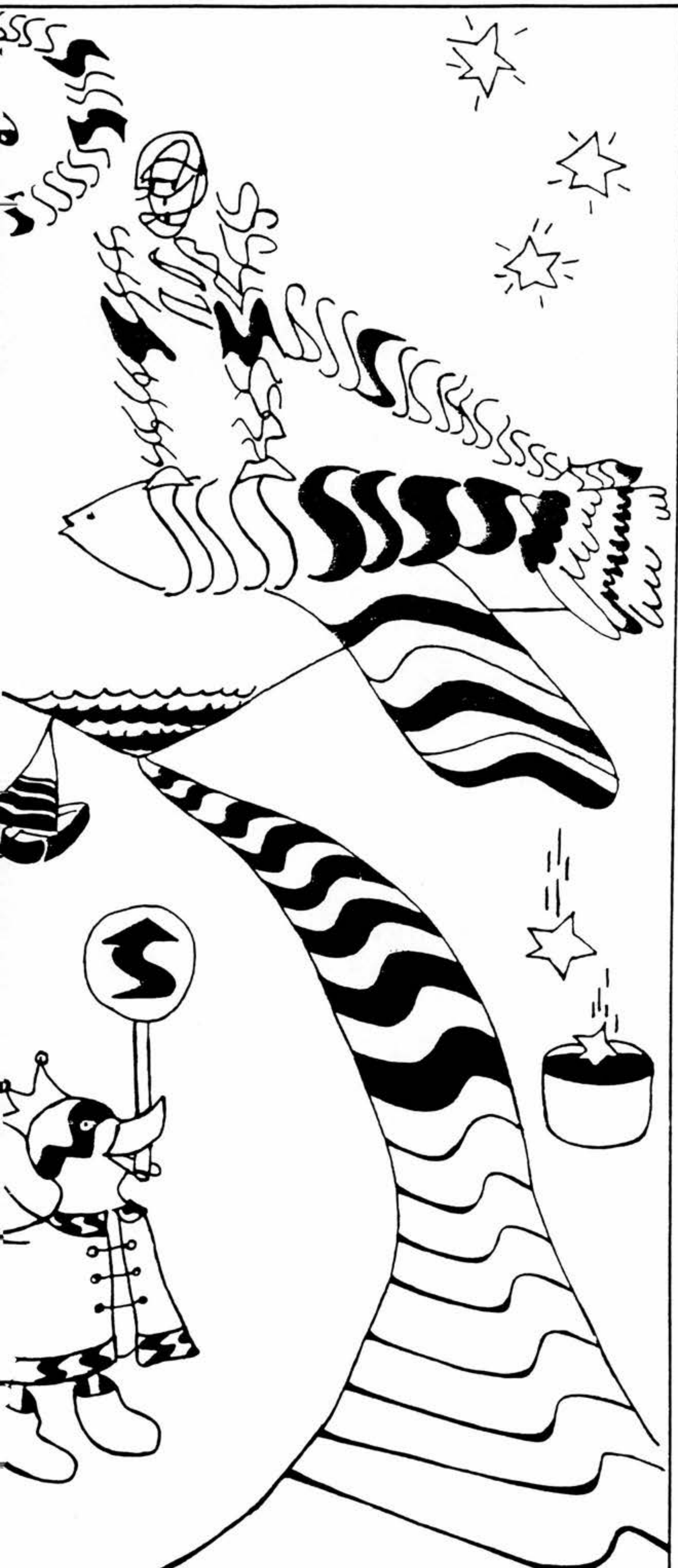
0% 10 20 30 40 50 60 70 80 90 100%

28. Some people sometimes feel as if they are looking at the world through a fog so that people and objects appear far away or unclear. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

Appendix 4

Creativity Tests and Addresses



THINKING CREATIVELY WITH WORDS

By E. Paul Torrance

VERBAL BOOKLET A

NAME ____________________

AGE __________ SEX __________

SCHOOL ____________________

GRADE ____________________

CITY ____________________

DATE ____________________

A4.1

SCHOLASTIC TESTING SERVICE, INC.
480 Meyer Rd., P.O. Box 1056
Bensenville, IL 60106-8056

Activities 1-3: ASK-AND-GUESS

The first three activities will be based on the drawing below. These activities will give you a chance to see how good you are at asking questions to find out things that you don't know and in making guesses about possible causes and consequences of happenings. Look at the picture. What is happening? What can you tell for sure? What do you need to know to understand what is happening, what caused it to happen and what will be the result?

Activity 1. ASKING. On this page, write out all of the questions you can think of about the picture on the page opposite this one. Ask all of the questions you would need to ask to know for sure what is happening. Do not ask questions which can be answered just by looking at the drawing. You can continue to look back at the drawing as much as you want to.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________
11. ______________________________
12. ______________________________
13. ______________________________
14. ______________________________
15. ______________________________
16. ______________________________
17. ______________________________
18. ______________________________
19. ______________________________
20. ______________________________
21. ______________________________
22. ______________________________

A4.3

23. ______________________________

GO ON TO NEXT PAGE

Activity 2. GUESSING CAUSES: In the spaces below, list as many *possible* causes as you can of the action shown in the picture on page 2. You may use things that might have happened just before the things that are happening in the picture, or something that happened a long time ago that made these things happen. Make as many guesses as you can. Don't be afraid to guess.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________
11. ______________________________
12. ______________________________
13. ______________________________
14. ______________________________
15. ______________________________
16. ______________________________
17. ______________________________
18. ______________________________
19. ______________________________
20. ______________________________
21. ______________________________
22. ______________________________ A4.4
23. ______________________________

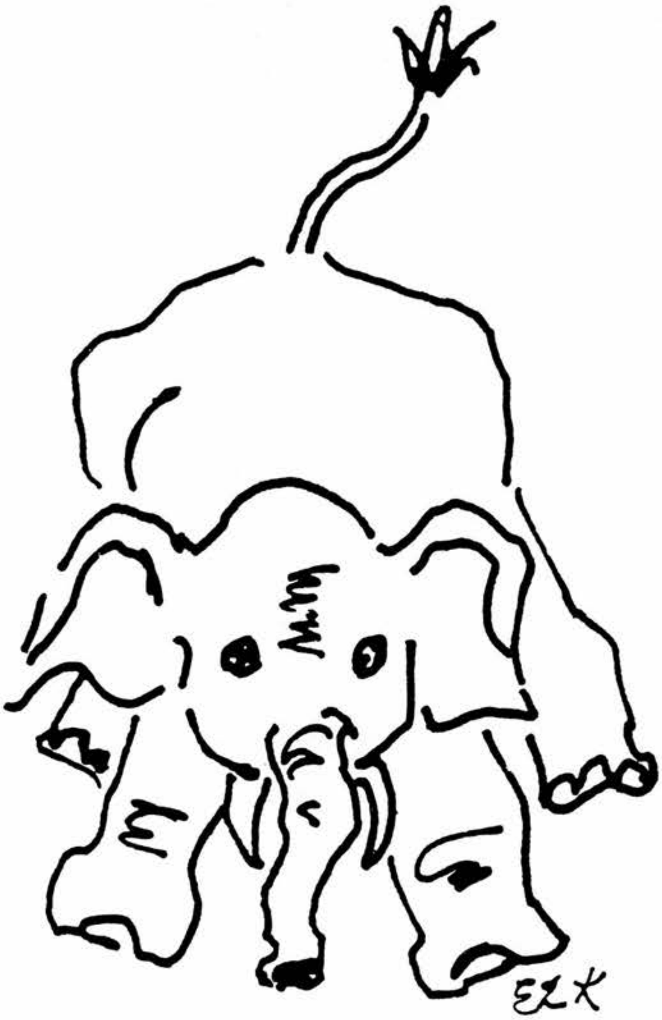
GO ON TO NEXT PAGE

Activity 3. GUESSING CONSEQUENCES: In the spaces below, list as many possibilities as you can of what might happen as a result of what is taking place in the picture on page 2. You may use things that might happen right afterwards or things that might happen as a result long afterwards in the future. Make as many guesses as you can. Don't be afraid to guess.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________
11. ______________________________
12. ______________________________
13. ______________________________
14. ______________________________
15. ______________________________
16. ______________________________
17. ______________________________
18. ______________________________
19. ______________________________
20. ______________________________
21. ______________________________
22. ______________________________
23. ______________________________ A4.5
24. ______________________________
25. ______________________________

Activity 4: PRODUCT IMPROVEMENT

In the middle of this page is a sketch of a stuffed toy elephant of the kind you can buy in most dime stores for about one to two dollars. It is about six inches tall and weighs about a half pound. In the spaces on this page and the next one, list the cleverest, most interesting and unusual ways you can think of for changing this toy elephant so that children will have more fun playing with it. Do not worry about how much the change would cost. Think only about what would make it more fun to play with as a toy.



1. ______________________________

2. ______________________________

3. ______________________________

4. ______________________________

5. ______________________________

A4.6

Activity 5: UNUSUAL USES (Cardboard Boxes)

Most people throw their empty cardboard boxes away, but they have thousands of interesting and unusual uses. In the spaces below and on the next page, list as many of these interesting and unusual uses as you can think of. Do not limit yourself to any one size of box. You may use as many boxes as you like. Do not limit yourself to the uses you have seen or heard about; think about as many possible new uses as you can.

1. ______
2. ______
3. ______
4. ______
5. ______
6. ______
7. ______
8. ______
9. ______
10. ______
11. ______
12. ______
13. ______
14. ______
15. ______
16. ______
17. ______
18. ______
19. ______
20. ______
21. ______
22. ______
23. ______

A4.7

Activity 6: UNUSUAL QUESTIONS

In this activity, you are to think of as many questions as you can about cardboard boxes. These questions should lead to a variety of different answers and might arouse interest and curiosity in others concerning boxes. Try to think of questions about aspects of cardboard boxes which people do not usually think about.

1. __________
2. __________
3. __________
4. __________
5. __________
6. __________
7. __________
8. __________
9. __________
10. __________
11. __________
12. __________
13. __________
14. __________
15. __________
16. __________
17. __________
18. __________
19. __________
20. __________
21. __________
22. __________

A4.8

23. __________

Activity 7: JUST SUPPOSE

You will now be given an improbable situation—one that will probably never happen. You will have to *just suppose* that it has happened. This will give you a chance to use your imagination to think out all of the other exciting things that would happen IF this improbable situation were to come true.

In your imagination, *just suppose* that the situation described were to happen. THEN think of all of the other things that would happen because of it. In other words, what would be the consequences? Make as many guesses as you can.

The improbable situation—JUST SUPPOSE *clouds had strings attached to them which hang down to earth.* What would happen? List your ideas and guesses on the next page.

A4.9

THINKING CREATIVELY WITH PICTURES

By E. Paul Torrance

FIGURAL BOOKLET A

NAME____________________

AGE__________ SEX__________

SCHOOL____________________

GRADE____________________

CITY____________________

DATE________ A4.10 ________

SCHOLASTIC TESTING SERVICE, INC.
480 Meyer Road, P.O. Box 1056
Bensenville, IL 60106-8056

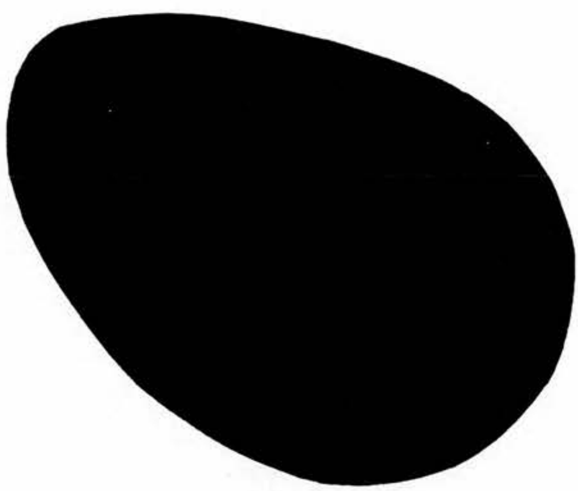
Activity 1. PICTURE CONSTRUCTION

On the opposite page is a curved shape. Think of a picture or an object which you can draw with this shape as a part.

Try to think of a picture that no one else will think of. Keep adding new ideas to your first idea to make it tell as interesting and as exciting a story as you can.

When you have completed your picture, think up a name or title for it and write it at the bottom of the page in the space provided. Make your title as clever and unusual as possible. Use it to help tell your story.

A4.11

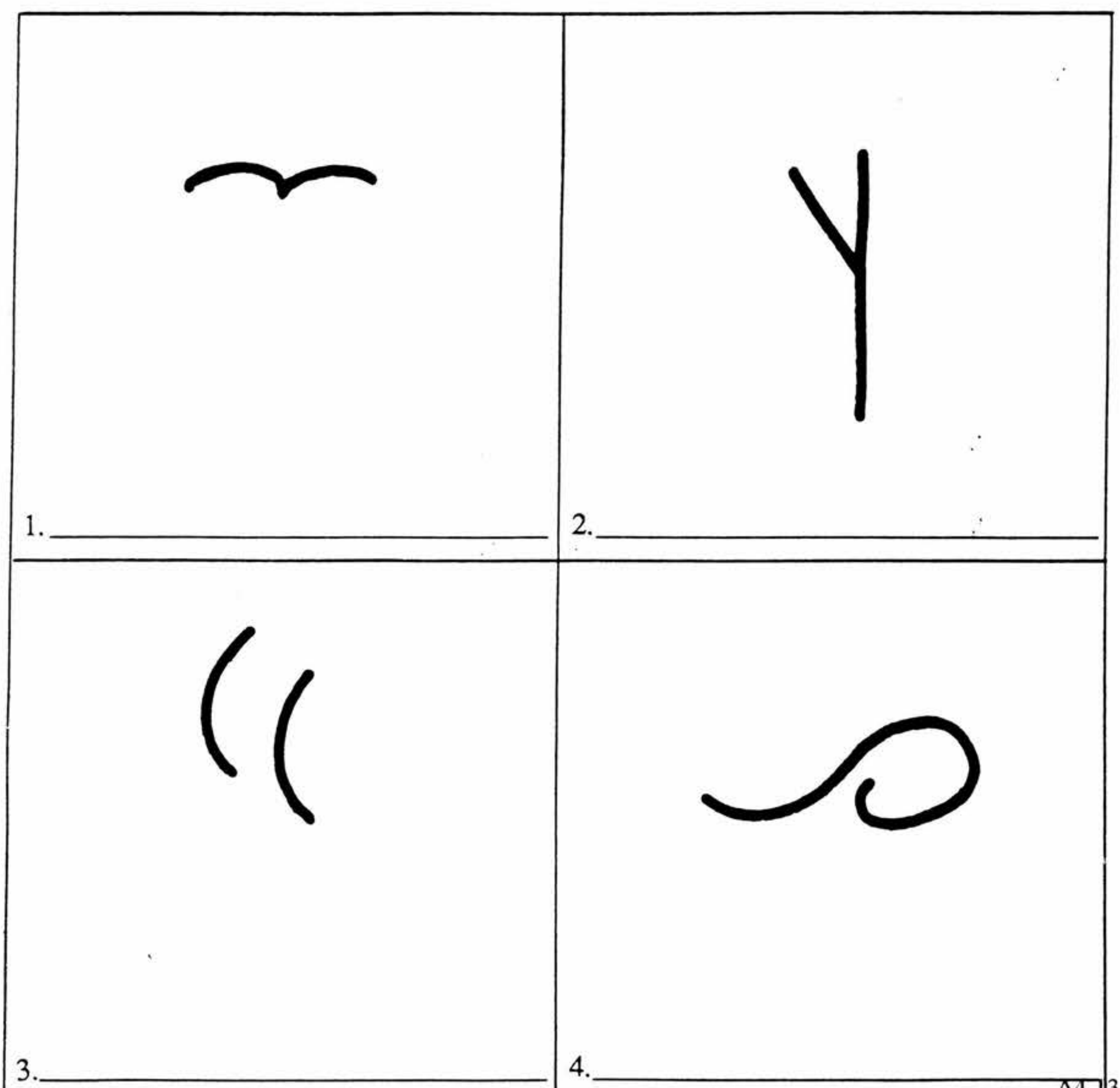


YOUR TITLE: ____

A4.12

Activity 2. PICTURE COMPLETION

By adding lines to the incomplete figures on this and the next page, you can sketch some interesting objects or pictures. Again, try to think of some picture or object that no one else will think of. Try to make it tell as complete and as interesting a story as you can by adding to and building up your first idea. Make up an interesting title for each of your drawings and write it at the bottom of each block next to the number of the figure.



5.____________________

6.____________________

7.____________________

8.____________________

9.____________________

A4.14

10.____________________

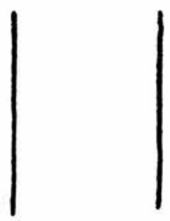
Activity 3. LINES

In ten minutes see how many objects or pictures you can make from the pairs of straight lines below and on the next two pages. The pairs of straight lines should be the main part of whatever you make. With pencil or crayon add lines to the pairs of lines to complete your picture. You can place marks between the lines, on the lines, and outside the lines—wherever you want to in order to make your picture. Try to think of things that no one else will think of. Make as many different pictures or objects as you can and put as many ideas as you can in each one. Make them tell as complete and as interesting a story as you can. Add names or titles in the spaces provided.

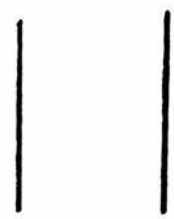
1. ____________________ 2. ____________________ 3. ____________________

4. ____________________ 5. ____________________ 6. ____________________

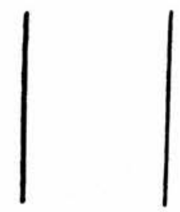
A4.15



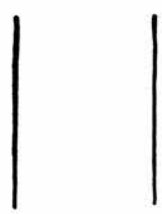
7. ____________________



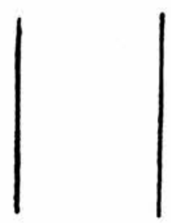
8. ____________________



9. ____________________

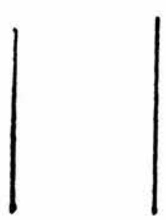


10. ____________________

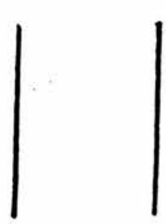


11. ____________________

12. ____________________

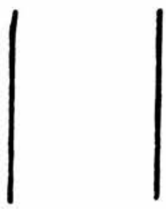


13. ____________________

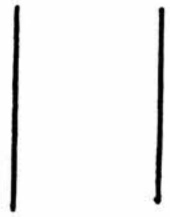


14. ____________________

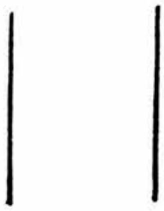
15. ____________________



16. ____________________



17. ____________________



18. ____________________

A4.16

GO ON TO NEXT PAGE

NKING CREATIVELY WITH SOUNDS AND WORDS

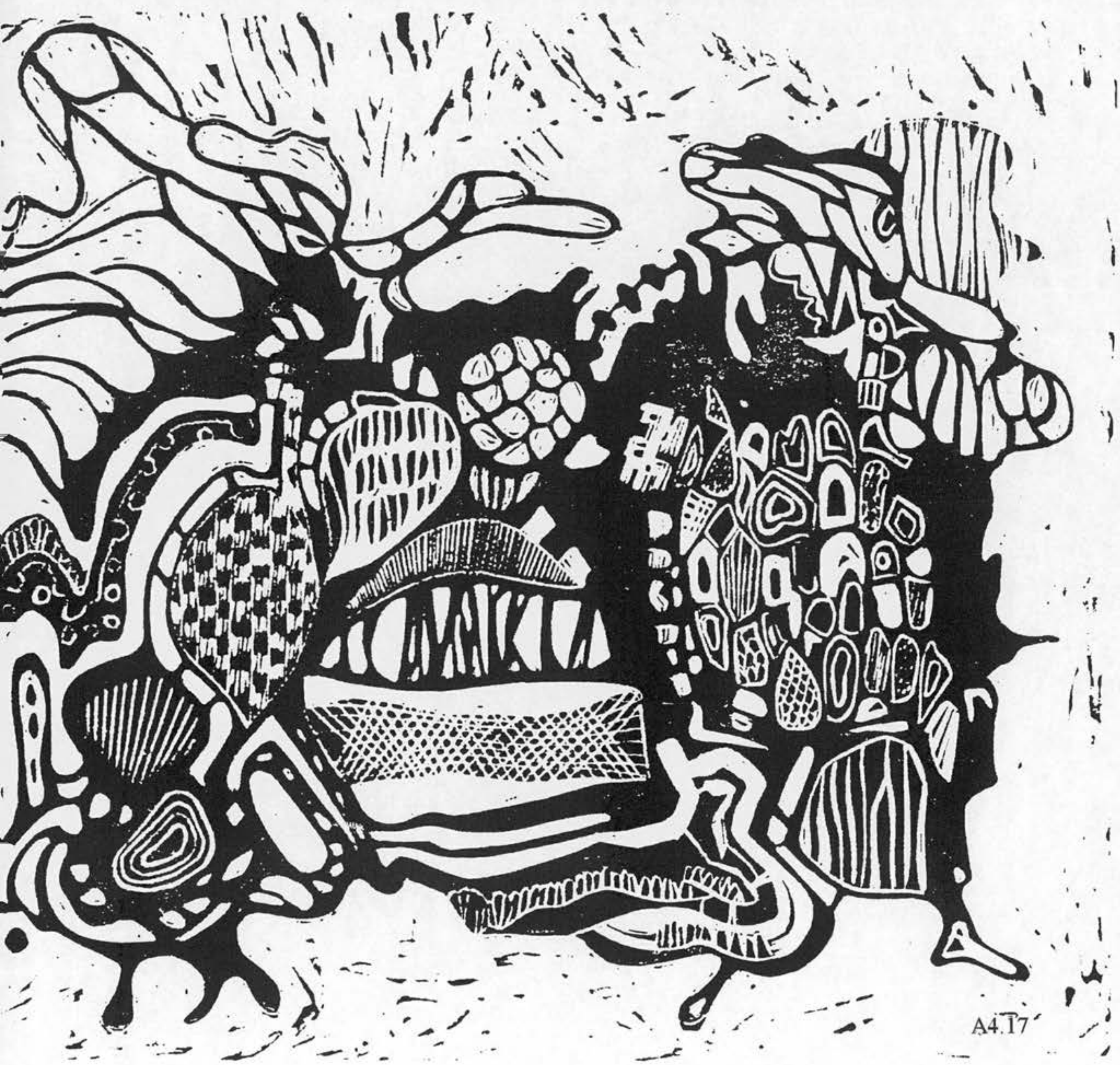
SOUNDS AND IMAGES
ONOMATOPOEIA AND IMAGES

by E. PAUL TORRANCE, JOE KHATENA, and BERT F. CUNNINGTON

Form IIA

Age ________ Sex ________ Grade ________

City ________________ Date ________



blished by:
HOLASTIC TESTING SERVICE, INC.
) Meyer Road
nsenville, Illinois 60106-1617

SOUNDS AND IMAGES

Form IIA

Sound 1	Sound 2	Sound 3	Sound 4
			A4.18

ONOMATOPOEIA AND IMAGES

Form IIA

		A	B	C	D
1	Meander				
2	Rumble				
3	Crackle				
4	Buzz				
5	Boom				
6	Moan				
7	Ooze				
8	Growl				
9	Thud				
10	Jangle				

A4.19

POSSIBLE JOBS

Form A

Arthur Gershon and J. P. Guilford

NAME _______________			SEX M ___	Scores:	I	______
(Print) Last	First	Middle	F ___		II	______
GROUP _______________		DATE ___________			Total	______

As the Inter-Planet Express prepared to land on Mars, the tourists were discussing a new custom developed by the Martians. Since the first settlers had arrived from earth, the Martians had taken to wearing emblems to show what each person's job is.

As the tourists looked through the videoscope, they saw one Martian wearing the emblem shown below.

"Electrical engineer," said one of the tourists. "Light bulb manufacturer," said another. "Maybe a bright student," a third tourist suggested.

In this test you will see more of the emblems that the Martians wore. Imagine that you are one of the tourists. Think of as many possible jobs as you can which might be indicated by the emblems. If you are not sure whether one of your ideas is reasonable, write it down anyway and try to think of another idea.

There are two pages in this test with three emblems on each page. You will have 5 minutes to work on each page, and will be told when 2 minutes remain for each page.

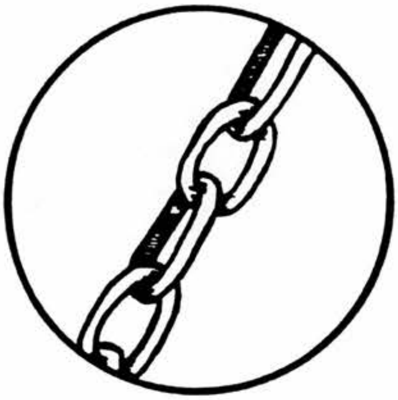
If you have questions, ask them now.

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

A4.20

POSSIBLE JOBS

Look at each emblem and briefly describe as many as six possible jobs you think it might indicate.



STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

POSSIBLE JOBS

Look at each emblem and briefly describe as many as six possible jobs you think it might indicate.

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

Creativity Questionnaire

Date: ______

P. #: ______

We would appreciate receiving your answers to the following questions. These questions will help us to better understand the relationship between psi and creativity.

1. What type of creative / artistic activity(ies) do you do?

____

____

____

2. Please rate yourself for level of creative / artistic ability.

Not at all = 1 2 3 4 5 6 7 8 9 10 = Very Much

3. What is your preferred method of problem solving?

   A. Thinking through it logically.
   B. Letting inspiration provide the answer.
   C. Seeking others opinions before making a decision.
   D. Trying out different options before settling on one.
   E. Other: ______________________________________

   ____

   ____

4. Please describe your feelings towards performing, or displaying your work.

____

____

____

5. How competitive are you?

Not at all = 1 2 3 4 5 6 7 8 9 10 = Very Much

6. In looking at your future five to ten years from now, what do you see yourself doing professionally?

____

____

____

____

____

KHATENA—TORRANCE CREATIVE PERCEPTION INVENTORY
by
Joe Khatena and E. Paul Torrance

nething About Myself

st of statements is given to you below. All you have to do is read them carefully and decide if they describe or not. If a statement describes you, show this by circling an "A" in the space on your answer sheet. If a ement does not describe you, mark a "B" in the space on your answer sheet.

. I like adding to an idea.

. I have many talents.

. I like making guesses but will make new ones if they are wrong.

. I am imaginative.

. Others think I am different.

. I have made a new dance or song.

. I have done art or craft work of one kind or another.

. My products were shown to others or won prizes.

. I like pulling a thing apart and putting it together to make something new.

I have tried to find out if my guesses are right.

. When I have a problem I try to think of new ideas.

. I have been the chief actor or star in a play.

. I am surely as talented as others.

. I like taking risks.

. I get so interested in what I do that I do not notice other things going on.

. I have brought about important changes in rules or ways things are done.

. I know what others say is not always right.

. To help others understand an idea, I relate it to what can be seen, touched, or heard.

. I let my thinking and feeling work together when I am trying to make something.

. I can always find a way to do things.

. I can make new things.

. I know what makes a problem and can define it.

. I dance, sing, or play music in new ways.

. I have planned lighting for a play or musical.

. I can combine things or ideas to make something new.

26. I can work for a long time without getting tired.
27. To be able to laugh or see the funny side of things helps me cope with everyday problems.
28. I enjoy beautiful things.
29. I like to try new ways of cooking and to describe them.
30. I see answers to problems suddenly.
31. I have written a story or poem on my own.
32. I can work towards far off goals.
33. My friends must be true.
34. The unknown thrills me.
35. I find fault in others to help them improve.
36. I am never tired of asking questions.
37. I am very interested in and consider the ideas of others.
38. I think for myself though I may not always be right.
39. I prefer to work on my own.
40. I wait for enough information before judging.
41. I know when no one knows the answer to something.
42. I am playful and like a child when I try to make things.
43. I do not like doing things in the ways others require.
44. I begin doing things and continue because of my own interest.
45. I like trying to do what others call difficult.
46. My desire to do better makes me work harder.
47. I have made a new formula or way to do things.
48. I can organize.
49. I have made scenery for a play or musical.
50. I am willing to change my judgment when new information turns up.

(Continued on next page)

KHATENA—MORSE MULTITALENT PERCEPTION INVENTORY

by

Joe Khatena and David Morse

ist of statements is given to you below. All you have to do is read them carefully and decide if they describe
ı or not. If a statement describes you, show this by circling an "A" in the space on your answer sheet. If a
tement does not describe you, mark a "B" in the space on your answer sheet.

1. My mental pictures or images are colorful and exciting.
2. I am quick to learn a new beat or rhythm.
3. I often make many mental pictures or images.
4. I produce many art works.
5. When dancing I can change my style easily.
6. I know how to make things look good in my drawings or paintings.
7. I can put ideas together in new ways.
8. My drawings or paintings show one part flowing to the next just like a good beat in music.
9. I know good from bad musical sounds.
0. I can perform almost any role in a play.
1. I can keep time to a tune easily.
2. I like adding details to my ideas.
3. When someone begins a melody or tune I can complete it.
4. I prefer difficult tasks.
5. The pictures I make in my mind or mental images are of many different kinds and vivid.
6. I can invent a simple tune.
7. I allow my imagination to help me to see new lands, people I have never seen, and happenings that are out of this world.
8. I can hum or sing a tune that is like another tune.
9. My drawings or paintings reflect my personality and feelings.
0. In my art I combine things in different ways to express an idea or feeling.
1. I like to draw or paint unusual scenes.
2. I can judge things for myself.
3. I can organize other people and lead them to do things.
4. I have a good singing voice.
5. I enjoy seeking answers to questions or solutions to problems.

126. I make my own tunes.
127. I can report what I see correctly.
128. I am able to hum or sing any tune easily.
129. I like adding details to the basic ideas of my drawings or paintings.
130. I like to take part in group activities.
131. I want to perform or achieve better than others.
132. I am always trying to find new kinds of art materials to use.
133. My drawings or paintings show simple ideas grow in meaning as the pictures develop.
134. I know when to accent different beats for effect.
135. I have unusual ideas for pictures or scenes.
136. I draw or paint with confidence.
137. I sing, dance, or play an instrument nearly every day.
138. I like to play with ideas.
139. I have had a work chosen for display.
140. I often take risks.
141. I don't believe everything that people tell me.
142. I can write or make up the words to a song.
143. When something is not right I like to change it.
144. I like to be in charge of a team.
145. I can make up a plan of a toy house.
146. I like to be the one to start something new.
147. When I speak others listen to me.
148. I can write or make up a story.
149. I know what I want to be in the future.
150. I can make jewelry.

(Continued on next page

Address for:

Torrance Tests of Creative Thinking and the SAM and KMMPI:

Scholastic Testing Service, Inc.
480 Meyer Road
P.O. Box 1056
Bensenville, IL 60106
USA

Address for:

Guilfords Structure of Intellect Tests: Owned by Sheridan Psychological Services, Inc.

Mind Garden
P.O. Box 60669
Palo Alto, CA 94306
USA

Appendix 5

Tellegen Absorption Scale
(TAS)

Styles of Experience

Please circle true or false to the following statements concerning your possible thoughts and experiences on the accompanying answer sheet. Answer each one as honestly as possible.

1. I keep close track of where all of my money goes.

2. Sometimes I feel and experience things as I did when I was a child.

3. I can be greatly moved by eloquent or poetic language.

4. While watching a movie, a TV show, or a play, I may become so involved that I forget about myself and my surroundings and experience the story as if it were real and as if I were taking part in it.

5. I could be happy living all alone in a cabin in the woods or mountains.

6. If I stare at a picture and then look away from it, I can sometimes "see" an image of the picture, almost as if I were still looking at it.

7. Sometimes I feel as if my mind could envelop the whole world.

8. I like to watch cloud shapes change in the sky.

9. I often enjoy playing with theories or abstract ideas.

10. If I wish I can imagine (or daydream) some things so vividly that they hold my attention as a good movie or story does.

11. I think I really know what some people mean when they talk about mystical experiences.

12. I sometimes "step outside" my usual self and experience an entirely different state of being.

13. I am very level-headed and always like to keep my feet on the ground.

14. Textures - such as wool, sand, wood - sometimes remind me of colors or music.

15. Sometimes I experience things as if they were doubly real.

16. When I listen to music, I can get so caught up in it that I don't notice anything else.

17. My parents ideas of what is right and what is wrong have always proved to be best.

18. If I wish I can imagine that my body is so heavy that I could not move it if I wanted to.

19. I can often somehow sense the presence of another person before I actually see or hear her/him.

20. The crackle and flames of a wood fire stimulate my imagination.

21. I'd be extremely embarassed to tell people I'd spent my summer at a nudist camp.

22. It is sometimes possible for me to be completely immersed in nature or in art and to feel as if my whole state of consciousness has somehow been temporarily altered.

23. Different colors have distinctive and special meanings for me.

24. I am able to wander off into my own thoughts while doing a routine task and actually forget that I am doing the task, and then find a few minutes later that I have completed it.

25. I will often stop in the middle of one activity to start something completely new.

26. I can sometimes recollect certain past experiences in my life with such clarity and vividness that is like living them again or almost so.

27. Things that might seen meaningless to others often make sense to me.

28. While acting in a play I think I could really feel the emotions of the character and "become" her/him for the time being, forgetting both myself and the audience.

29. When I have to stand in line, I never try to get ahead of other people even when I'm in a hurry.

30. My thoughts often don't occur as words but as visual images.

31. I often take delight in small things (like the five-pointed star shape that appears when you cut an apple across the core or the colors in soap bubbles).

32. When listening to organ music or other powerful music, I sometimes feel as if I am being lifted into the air.

33. I have always preferred working with people to working with things.

34. Sometimes I can change noise into music by the way that I listen to it.

35. Some of my most vivid memories are called up by scents and smells.

36. Some music reminds me of pictures or changing color patterns.

37. No decent person would ever think of hurting either a close friend or a relative.

38. I often know what someone is going to say before he or she says it.

39. I often have "physical memories"; for example, after I've been swimming I may still feel as if I'm in the water.

40. The sound of a voice can be so fascinating to me that I can just go on listening to it.

41. I am considered a rather freewheeling and spontaneous person by people who know me.

42. At times I somehow feel the presence of someone who is not physically there.

43. Sometimes thoughts and images come to me without the slightest effort on my part.

44. I find that different odors have different colors.

45. People seem naturally to turn to me when decisions have to be made.

46. I can be deeply moved by a sunset.

Appendix 6

Edinburgh Autoganzfeld Experimental
Questionnaire
Part 1 & 2

Session Record
Sender Instructions

<u>Edinburgh Autoganzfeld Experimental Questions</u>

PART 1

Receiver: ______________________ M/F   Part.#: _______

Sender: ______________________ M/F   Date: _______

Experimenter: ______________________ M/F

Series: ______________________   Trial #: _______

<u>BEFORE</u> viewing target pool and <u>AFTER</u> reviewing mentation, please have Receiver answer these questions:

<u>General Imagery Characteristics:</u>

1. Were there any images that seemed to be surprising to the Receiver?

2. Did any images seem more vivid, clear, sharp, unusual, or stand out more than any others?

3. Did it seem that there was a lot (an abundance) of imagery to the Receiver?

4. Does it seem to the Receiver that a theme throughout the imagery, or that a particular, or persistent, kind of imagery came up frequently? (Cohesiveness/Lability).

5. What images did not seem to have meaning, or be particularly recognizable to the Receiver?

6. Does the Receiver think there was a sender present? Yes / No

7. On a scale of 1 to 10, with 1 being the everyday waking state, and 10 being a very deeply relaxed altered state, how deep into an altered state does the Receiver feel they got? ______

Edinburgh Autoganzfeld Experimental Questions

PART **2** – Experimenter Ratings

Receiver:	____________________	M/F	Part.#:	______
Sender:	____________________	M/F	Date:	______
Experimenter:	____________________	M/F		
Series:	____________________		Trial #:	______

<u>Experimenter</u>: Please rate the following questions based on this session's mentation:

1. Amount of Mentation (circle): Low Normal High

2. External / Cognitive References: (e.g., references to noise, light, chair, experimenter, temperature, being in experiment, direct references to act of participation, trying to image target, cognitive strategies, references to sender).

0 1 2 3 4 5 6

3. Amount of Judgeable / Descriptive Content:

0 1 2 3 4 5 6

4. Mundane = 0 1 2 3 4 5 6 = Bizarre

5. Lability: (e.g., relative number of changes, transformations).

0 1 2 3 4 5 6

6. Experimenter's Expectation of Success:

0 1 2 3 4 5 6

AUTOGANZFELD SESSION RECORD

Receiver: ______________________________ M/F Part. #: ________

Sender: ______________________________ M/F Date : ________

Experimenter: ___________________________ M/F

Series: ______________________________ Trial #: ________

State Report / Time Passage:______________Minutes

Target Rating Summary:

Title	Participants Rating	Experimenters Rating
1.__________________________	______	______
2.__________________________	______	______
3.__________________________	______	______
4.__________________________	______	______

End of Session Summary:

Target Picture:____

Rank Given to Target: 1:______ 2:______ 3:______ 4:______

Experimenter Signature:____

Co-Experimenter:____

Comments:____

____

____

____

____

____

____

INSTRUCTIONS FOR SENDERS

Throughout the sending and judging phases, it is important that you silently communicate your thoughts to the receiver, and do not verbalise out loud.

Below are some instructions for you to try as sender, if you wish. You will have plenty of time to do everything that you want to do in making this session a success, so relax and enjoy yourself!

When the video clip is shown to you, try to immerse yourself in it. Try to experience it as realistically and as completely as possible. You can use all of your senses in addition to the visual - try to imagine yourself in the clip itself, experiencing the colors, temperature, textures, and sounds of the clip. You may want to imagine the physical sensations associated with the clip, such as heat, cold, pain. You may also try to envelope yourself in the atmosphere (if any) that the picture tries to create, and to feel the emotions that it depicts.

You may chose to concentrate only on a central theme of the clip, or try a variety of things, such as geometric shapes, colors, movement, emotion, or anything that you think will help your receiver to better receive the material. In between showings of the clip, you may draw on the paper provided, if you wish, as well as trying to mentally re-enforce the correct things that your receiver may be saying about the target.

During the judging sequence, we would like for you to silently encourage your receiver to select the correct target. After the judging sequence, a message will appear on your TV monitor telling you to return to the receivers room. At that time, you may reveal the target to your receiver and discuss the session outcome.

Good luck and enjoy yourself!

Appendix 7

Heriot-Watt Audio/Visual Report

To Measure The Attenuation Of
Airborne Sound Between Test
Rooms Within The Department
of Psychology, Edinburgh Univ
7 George Square, Edinburgh.

13 th. July 1992

David J. MacKenzie BSc., MSc., MIOA.

riot-Watt University

Department of Building Engineering and Surveying,

Riccarton, Edinburgh, EH14 4AS.

Tel. 031 449 5111 ext. 4620
Fax. 031 451 3161

Head of Department: Mr. P. G. Cheesman
Deputy Head of Department: Mr. R. S. Webb
Dean of Faculty of Engineering and William Watson Chair of Building: Professor J. A. Swaffield.
Industrial Professors: Prof. W. Cantley, Prof. J. Torrance.

Date: 13 th. July 1992

To: Professor Morris,
Department of Psychology,
Edinburgh University,
7 George Square,
Edinburgh.

Brief for Consultancy: **To Measure The Attenuation of Airborne Sound Between Test Rooms Within The Department of Psychology, Edinburgh University, 7 George Square, Edinburgh.**

R E P O R T

1.0 INTRODUCTION

1.1 We were requested by Professor Morris of The Department of Psychology of Edinburgh University, 7 George Square, Edinburgh to undertake a series of measurements to determine the attenuation of airborne sound between test rooms within The Department of Psychology.

1.2 The tests were carried out on Monday 6 th. July 1992 by David J. MacKenzie BSc., MSc., MIOA from Heriot-Watt University.

2.0 LAYOUT OF TEST ROOMS

2.1 Figure 1 shows the general layout of the test area within 7 George Square, Edinburgh. Area S17 has been subdivided into smaller rooms and this is clearly shown in Figure 2. The Ante Room, Monitoring and Receiver areas are also shown. Room S27, which is situated along corridor SC8, is the Sender Room and was used as one of the source rooms during the airborne sound tests.

2.2 Measurement of the attenuation of airborne sound was undertaken between the following pairs of rooms:

Test Number	Source Room	Receiving Room
1	Ante Room	Receiver
2	Monitoring	Receiver
3	Sender	Ante Room
4	Sender	Receiver.

The measurement of the background noise was also measured within the Ante Room and the Receiver room.

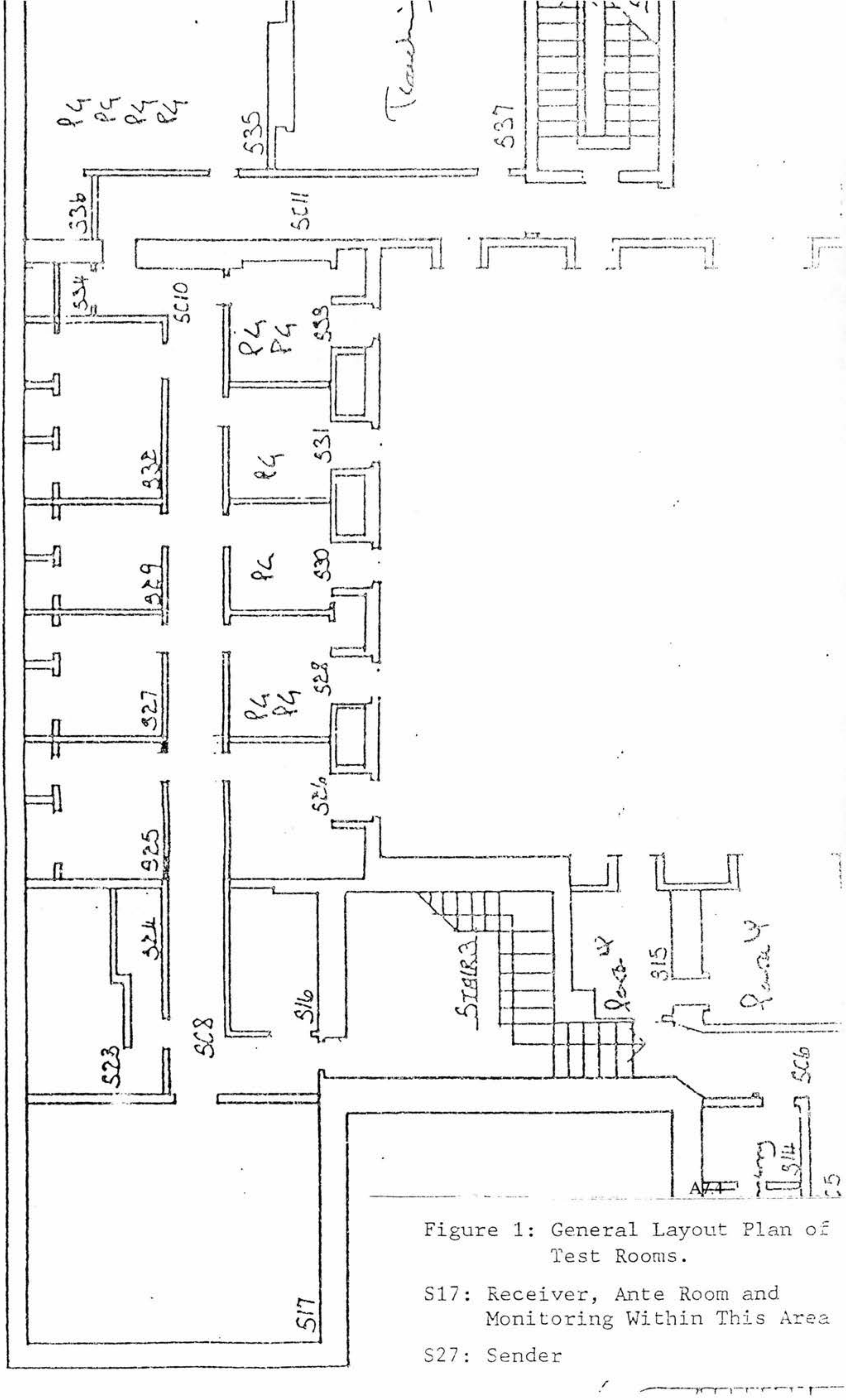
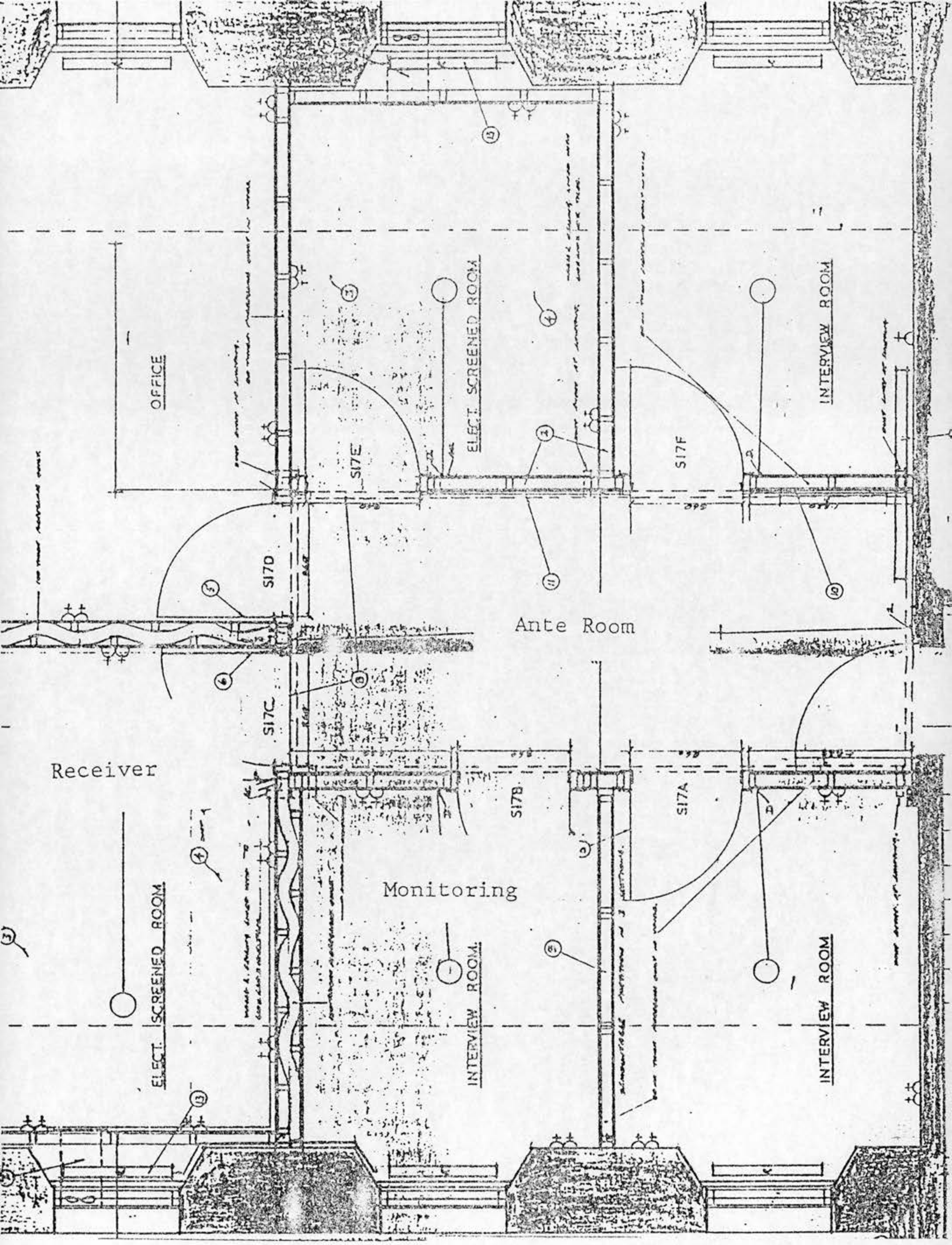


Figure 1: General Layout Plan of Test Rooms.

S17: Receiver, Ante Room and Monitoring Within This Area

S27: Sender



A7.5

Figure 2: Detailed Layout Plan of Area S17.

Receiver, Ante Room and Monitoring Are Shown.

3.0 CONDITION OF ROOMS

3.1 Ante Room

This area is the outer reception area leading from access corridor SC8 to the suite of rooms where the receiver room is situated, S17. The door which leads from the ante room to the corridor has a small gap between the door itself and the threshold plate.

3.2 Receiver

This is one of the rooms used for test purposes and is partially furnished. The room is ventilated and has a set of two access doors which close against seals fitted to the door frame. The tightness of the seals was evident in closing the outer door.

3.3 Monitoring

This room which lies adjacent to the receiver is also accessed from the Ante Room and is where experimental work will be controlled through the use of computers etc.

3.4 Sender

This room, S27, is separate from the others and is further along access corridor SC8, as shown in Figure 1.

4.0 EQUIPMENT USED

4.1 The equipment used conformed to the requirements of BS 2750 1980 "Methods of Measurement of Sound Insulation in Buildings and of Building Elements" and in particular the following parts:

a. BS 2750: Part 4: 1980 "Field Measurements of Airborne Sound Insulation Between Rooms", and

4.2 The following items of equipment were used to carry out the Airborne and Impact Sound Insulation Tests:

Nortronics Sound Measuring System
Bruel and Kjaer Loudspeaker System
Bruel and Kjaer Condenser Microphones

Bruel and Kjaer Preamplifiers
Bruel and Kjaer Connecting Cables
Bruel and Kjaer Acoustic Calibrator
Microphone cables, etc.

plus other ancillary equipment for measurements etc.

5.0 MEASUREMENT PROCEDURE

5.1 The attenuation of airborne sound between two pairs of rooms was carried out using the Nortronics Sound Measuring System. By placing a microphone in the source room and another matched microphone in the receiving room, measurement of the source levels and the receiving levels were carried out simultaneously.

Measurements were carried out in one third octaves commencing at 50 hertz up to and including 10000 hertz. To determine the sound attenuation between a pair of rooms, the microphones were randomly placed at three different locations within the test rooms and the average of the readings was automatically calculated by the Nortronics Sound Measuring System. The Nortronics was automatically set to measure the signal in both the test rooms ranging from 32 seconds at low frequencies to 4 seconds at high frequencies.

The tests commenced at 5.30 pm and were completed at 8.00 pm. All doors were kept closed during the tests.

6.0 RESULTS

6.1 This work has been carried out to show the attenuation of airborne sound from one area to another, and in particular between the test rooms that have been specially adapted for experimental work. The measured values have been tabulated and are shown in Tables 1 and 2.

The above tables have also been graphed, Figures 3 and 4, and show the reduction, in decibels, of the airborne sound between the source room (L_1) and the receiving room (L_2).

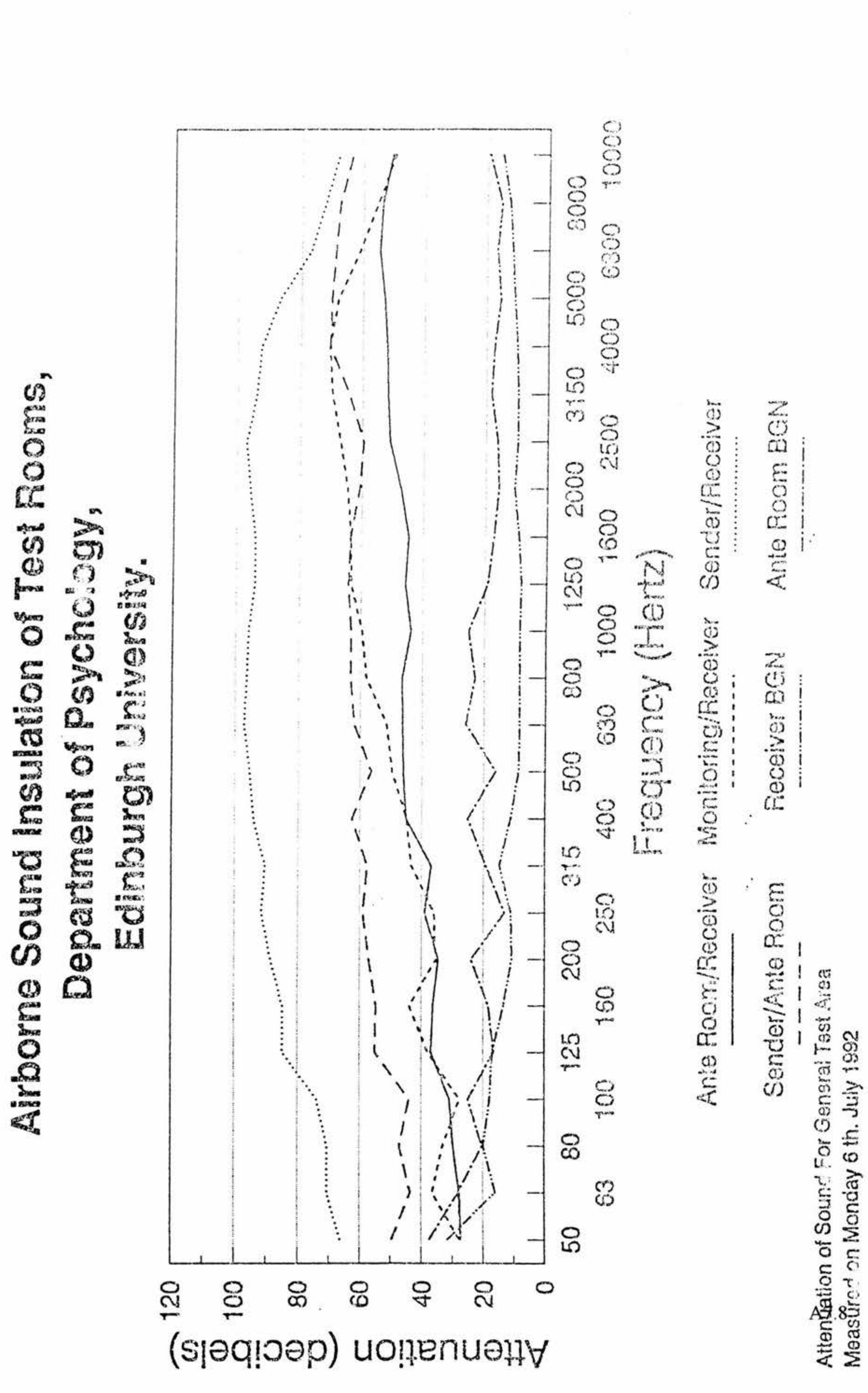


Figure 3: Results of Tests - Department of Psychology

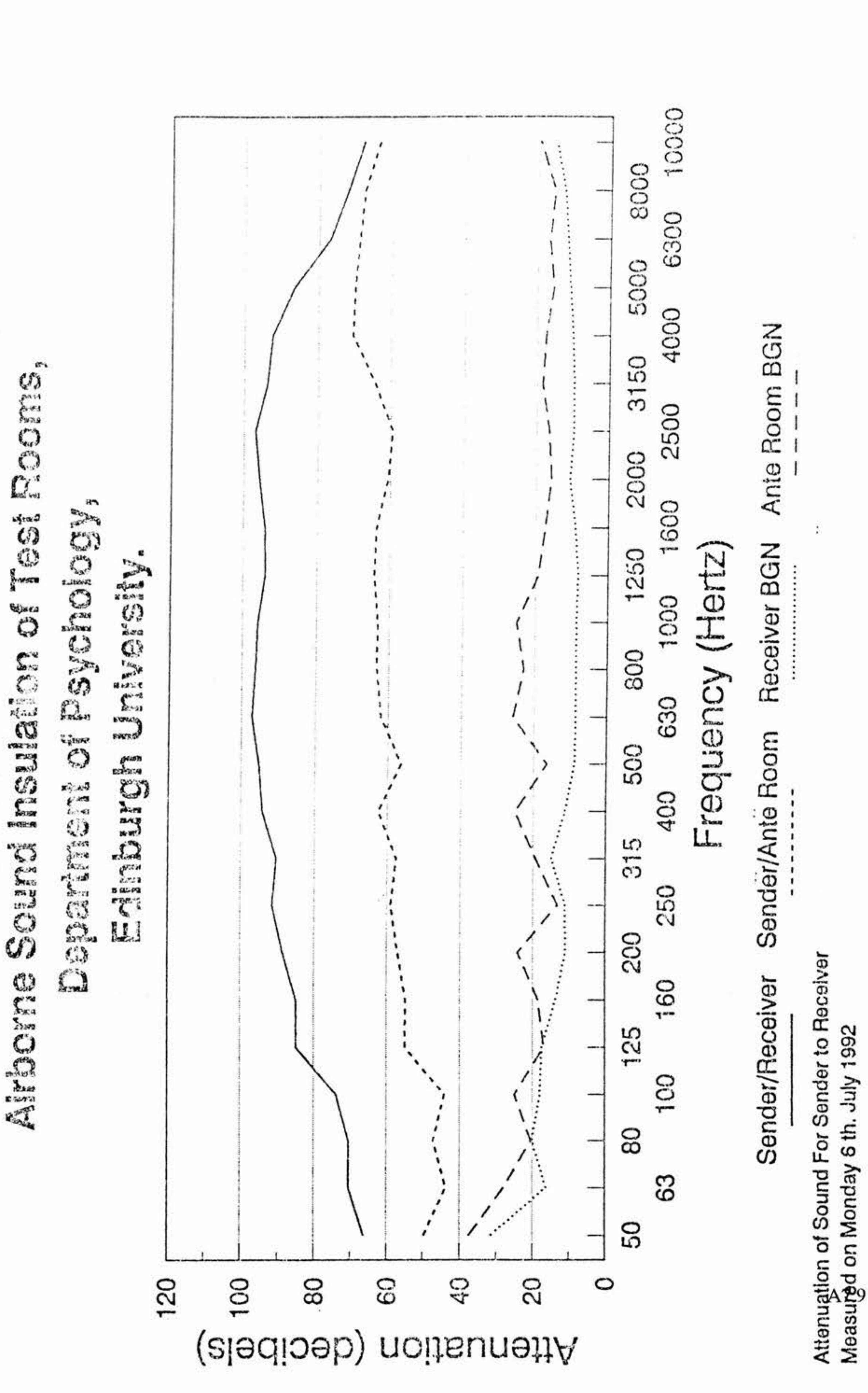


Figure 4: Results of Tests For Sender/Receiver Rooms
Department of Psychology

Figure 3 shows the results for the attenuation between the four sets of rooms plus the background noise level in the Receiver and Ante Room areas.

Figure 4 shows the results in connection with the Sender to Receiver and Sender to Ante Room tests only.

7.0 COMMENT

7.1 Figure 3

This figure shows all of the tests that have been carried out including the background noise measurements within the Receiver Room and the Ante Room.

Test 1: Ante Room/Receiver

The Receiver Room, which is the main test room, is separated from the Ante Room by two doors which close against compression seals. It would be difficult to improve the sound insulation via this path by any great amount unless the doors were changed for heavier ones, however, acoustic sound insulating doors are quite expensive.

Should the airborne sound insulation need to be improved, placing a heavy sheet material on the inner face of each door may improve the airborne sound insulation to a certain extent. Materials such as heavy plywood, wallboard or plasterboard would be suitable: however a check would have to be undertaken to determine whether the existing door hinges/framework would take this additional load.

Test 2: Monitoring/Receiver

Up to 400 hertz the airborne sound insulation curve follows that for the Ante Room/Receiver test, but beyond 400 hertz the insulation value improves.

Test 3: Sender/Ante Room

As the difference between the source room and the receiving room increases, then so does the airborne sound insulation through the phenomenon of the inverse square law whereby sound attenuates with distance. For a point source sound attenuates at a rate of 6 decibels per doubling of distance.

A7.10

This normally holds true externally (out of doors), however within a building other factors come into play such as flanking transmission whereby sound or vibration enters into the structural elements of a building and travel large distances and then reradiate into a room some distance away. Therefore, most buildings can withstand a certain amount of sound insulation beyond which it is difficult to improve the sound insulation by any appreciable amount.

Here the airborne sound insulation between the two rooms is good. It was noticed that there was quite a large gap below the door of the Ante Room leading to the access corridor SC8. It may be a good idea to have device that closed this gap. Do not put a threshold plate on the floor as this would be liable to trip personnel up.

Test 4: Sender/Receiver

This is the main test result: the attenuation of airborne sound created within the Sender room to that what is heard within the Receiver room. The sound level within the Sender area was greater than 100 decibels and the result that was obtained clearly indicates *a very high level of airborne sound attenuation between the Sender and the Receiver areas.*

The octave band results have been calculated from the measured one third octave band results and these have been plotted on a graph which shows the normal speech frequencies and sound pressure levels (S.P.L.). This is shown in Figure 5.

Normal speech ranges from approximately 100 hertz up to 8000 hertz and ranges in loudness (sound pressure level) from 40 to 75 decibels. The measured values are approximately 25 decibels greater than the normal speech values.

Background Noise Curves

Background Noise, also known as the ambient noise, is the everyday noise that is present within an environment. There are a number of small peaks in the background noise curve for the Ante Room and this is due to noisy fluorescent fittings, which would be switched on during normal working conditions as this area does not have any natural daylight.

7.2 Figure 4

For ease of identification the results for the tests involving the Sender room and the Receiver room have been

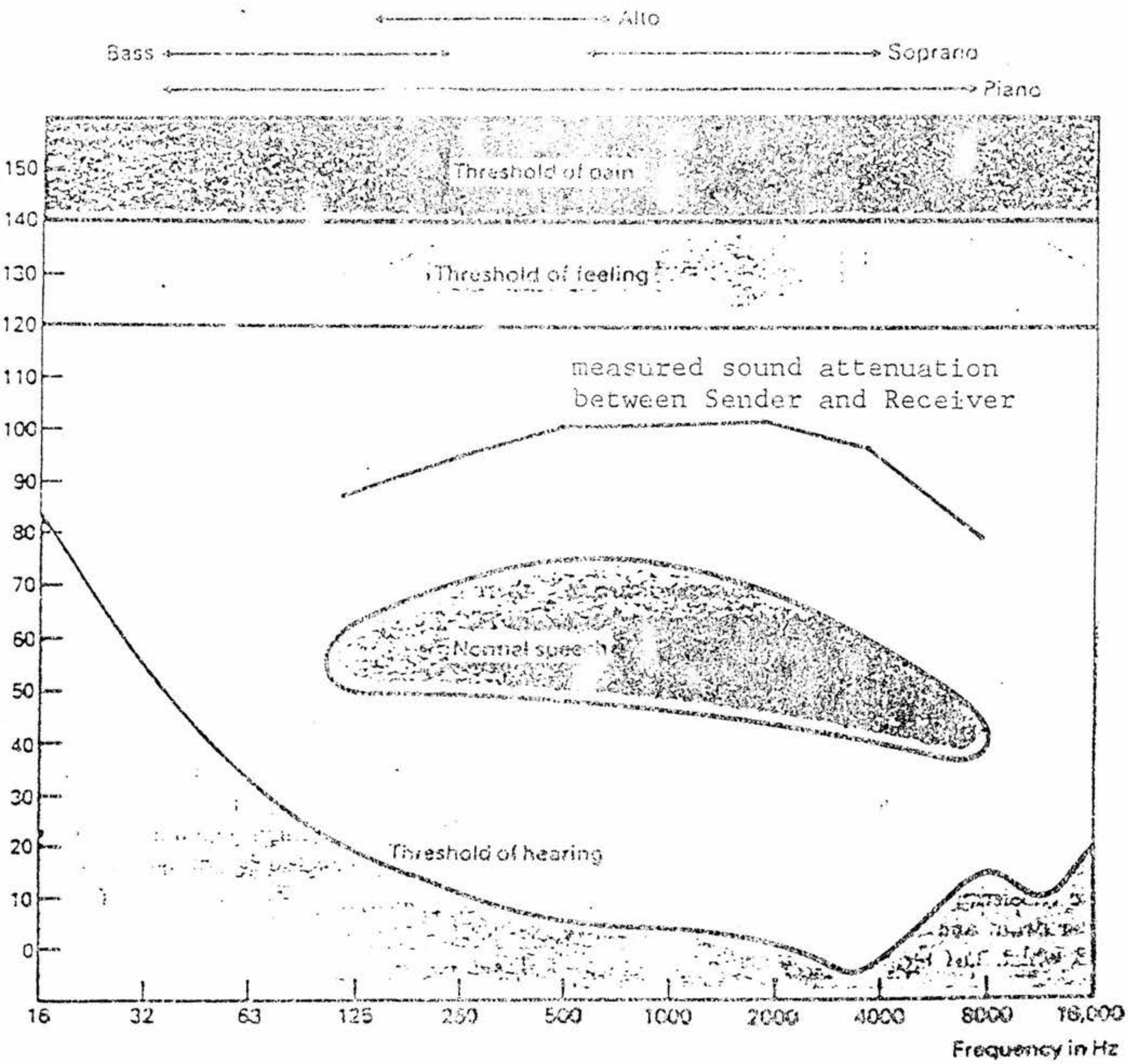


Figure 5: Comparison of Measured Airborne Sound Attenuation and Normal Speech Frequencies and Loudness Levels

abstracted and these are shown on a separate graph sheet, Figure 4. The high attenuation between the two aforementioned test rooms is clearly shown.

I trust that this Report meets your requirements, however should you require any further information do not hesitate to contact me at any time.

David J. MacKenzie BSc., MSc., MIOA.,
Department of Building Engineering and Surveying.

Freq. (Hz)	Ante Room/ Receiver (dB)	Monitoring/ Receiver (dB)	Sender/ Receiver (dB)	Sender/ Receive (dB)
50	27.3	28.0	66.5	49.6
63	27.8	36.5	70.6	43.7
80	29.8	33.2	70.6	47.1
100	31.0	27.9	74.0	44.1
125	37.0	38.0	84.9	55.1
160	36.4	43.9	84.9	54.8
200	34.7	35.4	88.6	57,0
250	39.1	36.0	91.5	59.0
315	37.0	43.4	90.4	57.6
400	45.2	45.0	94.2	62.6
500	46.1	49.7	95.3	56.4
630	46.4	51.6	97.2	62.1
800	46.5	58.1	96.4	63.3
1000	43.8	59.6	95.9	63.2
1250	45.8	63.4	94.1	64.3
1600	44.8	63.5	94.2	63.8
2000	47.4	64.8	95.8	60.8
2500	51.1	67.2	97.0	59.6
3150	51.8	70.0	93.9	64.4
4000	52.2	70.9	92.5	70.7
5000	53.1	68.2	86.7	70.2
6300	54.7	61.1	77.1	69.0
8000	53.8	55.3	72.3	67.7
10000	50.6	49.7	68.0	63.5

Table 1: Attenuation of Airborne Sounds Between Test Rooms, Department of Psychology, Edinburgh University.

Freq. (Hz)	Ante Room (dB)	Receiver (dB)
50	37.4	31.5
63	28.1	16.3
80	20.5	20.0
100	25.0	18.0
125	16.9	17.4
160	18.5	13.6
200	24.2	11.0
250	13.3	15.0
315	19.4	15.0
400	25.2	11.3
500	16.4	8.8
630	26.0	8.6
800	23.1	8.6
1000	25.2	8.7
1250	19.3	8.3
1600	17.5	9.2
2000	15.9	10.8
2500	16.5	9.9
3150	18.5	9.9
4000	17.6	10.2
5000	15.6	11.1
6300	16.8	11.8
8000	15.5	12.8
10000	19.5	15.2

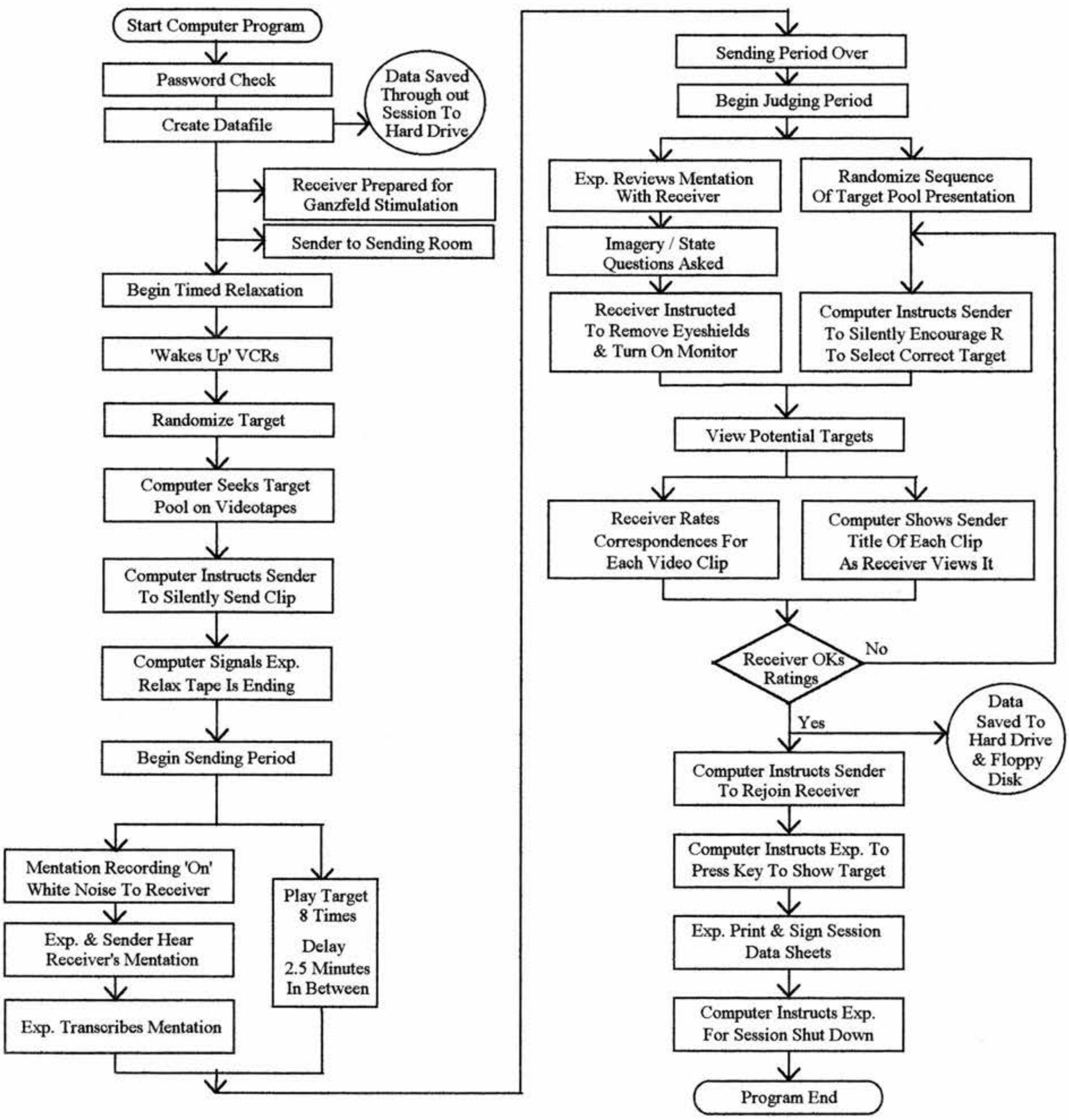
Table 2: Background Noise Levels of Test Rooms, Department of Psychology, Edinburgh University.

Appendix 8

Edinburgh Automated Ganzfeld Flow Chart

Appendix 8

Flow Chart Of Edinburgh Automated Ganzfeld Program



Appendix 9

Participant Information Form
(PIF)
Standard and Modified

DEPARTMENT *of* PSYCHOLOGY
Koestler Chair of Parapsychology
The University of Edinburgh
7 George Square
Edinburgh EH8 9JZ
Telephone 031 650 1000
or direct dial 031 650 3348

Dear Participant:

We are pleased that you have expressed an interest in taking part in our research.

As a first step, we would like to gather some general information about you which will help us evaluate which of our on-going or future research projects might be suitable for you as a participant.

All of the information you give us will be kept strictly confidential -- no one except our researchers will be able to find out what responses you have given to any of the questions unless we have asked for and received your written permission to release that information. In addition, please feel free to skip any question that you would prefer not to answer.

Thank you for your help with our work!

PARTICIPANT QUESTIONNAIRE

1. Name:____

2. Address:____

____

3. Phone: (work)____________________ (home)____________________

May we phone you at work? ☐ Yes ☐ No

4. Sex: ☐ Male ☐ Female

5. Date of birth:________________________

6. Place of birth:________________________

7. Nationality:________________________

If British, please specify which region:________________________
If not British, please specify your nationality and, if not born in Britain, how long you have been residing here.

Nationality:____________________ Length of residency:____________________

8. Usual occupation:____

9. Educational background and/or vocational training:____________________

10. How did you come to contact the Koestler Laboratory?
(please tick and provide relevant information as appropriate)

☐ Recruitment poster (if so, where did you see it?) ____________________

☐ Learned of our work through the media

☐ Laboratory staff member (who?):____________________

☐ Referred by a friend(who?):____________________

☐ Other (please specify):____________________

11. Some of our research would not require you to come to our lab in Edinburgh. However, for other work we would need to see you in person. Would you be able to participate in research conducted at our facilities in Edinburgh?

☐ Yes ☐ No

12. Would you be interested in and available for participation in a long-term research project (spanning several weeks or months)?

☐ Yes ☐ No

13. We will be conducting research aimed at examining many different aspects of psychic functioning. Please tick any of the following areas of our work in which you would be willing to participate (tick as many or as few as appropriate).

☐ Extrasensory perception (the gaining of knowledge about an external event and/or person)

☐ Psychokinesis (the influencing of an external event)

☐ Training and development of psychic abilities

☐ Sports psychology

☐ Psychology of deception

☐ Examination of a variety of mental skills (e.g., relaxation, concentration, imagery, etc.)

14. Have you ever participated in any formal laboratory parapsychological studies?

☐ Yes ☐ No

If yes:
Where was this work conducted?:____________________

Please describe the research:____________________

15. Do you consider yourself to be:

☐ Left-handed ☐ Right-handed ☐ Ambidextrous

16. Are you an only child? ☐ Yes ☐ No

If no, where in the order of birth of the children in your family do you fit (e.g., 3rd of 5, or twins with one older sibling)? ____________________

If twins, are you: ☐ Fraternal ☐ Identical

17. Have you ever participated in any casual testing of parapsychological phenomena (e.g., card-guessing games with friends)? ☐ Yes ☐ No

A9.2

If yes, please describe:____________________

Note: Many of the following questions will be answered by ticking one of seven boxes to best describe your response to the question. The seven boxes should be used as a scale, with the two labelled end boxes each representing extreme answers on either end of the scale.

18. In general, how often do you experience notable coincidences? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Never — Occasionally — Frequently

19. If you do experience coincidences, do they appear to come in clusters, occur fairly regularly or occur irregularly?

☐ ☐ ☐ ☐ ☐ ☐ ☐

Irregularly — Regularly — Clusters

20. Are you aware of any special circumstances associated with your experience of coincidences? If so, please describe:

____

21. How often do you clearly recall the content of your dreams? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Never — Once a week — Almost everyday

22. To what degree do your dreams differ from your ordinary experience? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Not at all — Very much

23. How often are you aware that you have dreamed without being able to recall the dream's content? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Rarely — Once a week — Almost everyday

24. Have you ever had a dream in which you were aware you were dreaming?

☐ Yes ☐ No

25. If you have had a dream in which you were aware you were dreaming, how often does this occur? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Rarely — Once a week — Almost everyday

26. How often do you daydream? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Rarely — Daily — Hourly

27. Using the numbers 1-4, please number the following themes of daydreams according to their frequency of occurrence (where 1 is the most frequently occurring theme and 4 is the least frequently occurring theme).

____ Past events in your life
____ Possible futures
____ Fantasy
____ Other (please specify) ______________________________

28. Do you enjoy activities which require an involvement in fantasy? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Not at all — Neutral — Very much

A9.3

29, How easy is it for you to create a mental image of a familiar scene? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Impossible — Effortless

30. If you can create a mental image of a familiar scene, how clearly can you see the scene? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Not clear at all — As clear as using normal vision

31. How well can you receive a sense of hearing, smelling, and/or tasting some component of a mentally imagined scene? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Not at all — Very well

32. How often do you lose awareness of your surroundings when you get involved in an activity? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Never — Half the time — Always

33. How often do you lose your sense of time when you get involved in an activity? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Never — Half the time — Always

34. Do you believe that: (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Things just happen to people — People make things happen to themselves

35. How strongly do you believe in luck (with luck being defined as having things generally turn out well or badly due to chance or a fluke, as opposed to being especially earned)? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Don't believe — Believe very strongly

36. Do you consider yourself to be a lucky person (using the definition of luck given in question 35)? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Very unlucky — Very lucky

37. How frequently do you have accidents (please include minor mishaps)? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Never — Weekly — Daily

38. Do you enjoy situations which are riskier than other everyday situations? (see the list in question 39 for examples of such situations) (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Don't like at all — Neutral — Like very much

39. Please tick those activities you enjoy (tick as many as you wish):

☐ Gambling
☐ Games of chance with no monetary risk
☐ Speaking or performing in public
☐ Physical activities involving risk

A9.4

40. When you have an appointment or social engagement, are you usually: (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Early | On time | Late

41. On the following scale, where would you place yourself? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Reserved | Outgoing

42. On the following scale, where would you place yourself? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Not competitive | Highly competitive

43. Have you played video games? ☐ Yes ☐ No

If yes, do you generally enjoy them? ☐ Yes ☐ No

44. If you have not played video games, would you like to?

☐ Yes ☐ No ☐ Uncertain

45. Do you use a computer? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Never | At least weekly | Everyday

46. With regard to your computer expertise, where on the following scale would you place yourself? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Sophisticated user | Complete novice

47. Would you feel comfortable using a computer in a parapsychological study?

☐ Yes ☐ No ☐ Uncertain

48. How would you rate the way machines (cars, computers, cameras, kitchen appliances, watches, TVs, etc.) usually perform for you? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Always breaking down | Require average servicing | Rarely ever have problems

49. If machines tend to break down more often than one would expect, list the type of machines with which you have had particular problems:

____

50. Do you get regular physical exercise? ☐ Yes ☐ No

If yes, approximately how many hours of exercise do you get per week?: ____________

51. Tick the kind(s) of exercise you get:

☐ Running/jogging ☐ Aerobics/calisthenics

☐ Weight training ☐ Team sports

☐ Walking ☐ Swimming

☐ Other (please specify) ________________________

A9.5

52. Have you ever felt that while exercising you were operating on a different level from that which you normally experience (e.g., seeing things in slow motion, one's actions seem effortless, etc.)? (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐
Never — Occasionally — Frequently

53. Have you ever practised any form of mental discipline/exercise, e.g., meditation, biofeedback, hypnosis, relaxation exercises? ☐ Yes ☐ No

If yes, what kind:______________________________

If yes, did you practice consistently or sporadically?
☐ Consistently ☐ Sporadically

If yes, do you still practice: (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐
Never — Weekly — Daily

54. Have you ever studied any physical and/or spiritual regimen such as hatha yoga, tai chi, aikido, etc?

☐ ☐ ☐ ☐ ☐ ☐ ☐
Never — Weekly — Daily

If yes, what kind?:______________________________

If yes, do you still practice: (please tick one box)

☐ ☐ ☐ ☐ ☐ ☐ ☐
Never — Weekly — Daily

55. Have you ever taken part in a formal self-improvement program such as TM, psychotherapy, etc.? ☐ Yes ☐ No

If yes, please specify the program:______________________________

56. Do you have regular sleep habits? ☐ Yes ☐ No ☐ Uncertain

57. On the average, how many hours a night do you sleep?____________________

58. Do you usually feel you get enough sleep? ☐ Yes ☐ No

59. Occasionally our research might require our having some information about various medical problems. Please tick any of the following of which you have had experience in the indicated period:

	Currently	1-5 years ago	More than 5 years ago
Epilepsy			
grand mal	☐	☐	☐
petit mal	☐	☐	☐
Heart Trouble	☐	☐	☐
Mental Disorder	☐	☐	☐
Loss of Hearing	☐	☐	☐
Poor Eyesight	☐	☐	☐
Colour-blindness	☐	☐	☐
High Blood Pressure	☐	☐	☐

A9.6

Please use the following definitions for the purpose of answering the next 17 questions.

PSI: Direct interactions between mental processes and the physical world or other mental processes occurring outside currently understood channels. Thus this is a 'blanket' term used to refer to all paranormal processes and causation.
PSI is commonly divided into two categories:

1. EXTRASENSORY PERCEPTION (ESP): Reception of information without the use of known senses or logical inference.
ESP is for convenience further subdivided into three categories:
TELEPATHY: ESP of the thoughts, feelings or behaviour of another person or organism.
CLAIRVOYANCE: ESP of distant physical events or concealed objects.
PRECOGNITION: ESP of the future.
2. PSYCHOKINESIS (PK): Mental influence on the physical world.

60. What best describes your own psi ability? (please tick one box)

☐	☐	☐	☐	☐	☐	☐
I have psi ability			Uncertain			I have no psi ability

61. Is the existence of ESP: (please tick one box)

☐	☐	☐	☐	☐	☐	☐
Certain			Uncertain			Impossible

62. Have you ever had an experience which is best explained by telepathy? (please tick one box)

☐	☐	☐	☐	☐	☐	☐
Yes			Uncertain			No

63. Have you ever heard or read of an experience which is best explained by telepathy? (please tick one box)

☐	☐	☐	☐	☐	☐	☐
Yes			Uncertain			No

64. Have you ever had an experience which is best explained by clairvoyance? (please tick one box)

☐	☐	☐	☐	☐	☐	☐
Yes			Uncertain			No

65. Have you ever heard or read about an experience which is best explained by clairvoyance? (please tick one box)

☐	☐	☐	☐	☐	☐	☐
Yes			Uncertain			No

66. Have you ever had an experience which is best explained by precognition? (please tick one box)

☐	☐	☐	☐	☐	☐	☐
Yes			Uncertain			No

67. Have you ever heard or read about an experience which is best explained by precognition? (please tick one box)

☐	☐	☐	☐	☐	☐	☐
Yes			Uncertain			No

A9.7

68. If you have had an ESP experience(s), was the ESP information conveyed to you primarily (most commonly) by means of: (tick as many boxes as appropriate)

- ☐ A sense, feeling, intuition, or thought
- ☐ Seeing a vision of a figure or an object
- ☐ Internal mental imagery

If the experience consisted primarily of internal mental imagery, was the nature of the experience primarily: (tick as many boxes as appropriate)

- ☐ Visual
- ☐ Auditory
- ☐ Olfactory (a sense of smell/odour)
- ☐ Kinaesthetic (a physical sensation)
- ☐ Other (please specify):

69. Is the existence of psychokinesis: (please tick one box)

☐	☐	☐	☐	☐	☐	☐
Certain			Uncertain			Impossible

70.Have you ever had an experience which is best explained by psychokinesis? (please tick one box)

☐	☐	☐	☐	☐	☐	☐
Yes			Uncertain			No

71. Have you ever heard or read about an event which is best explained by psychokinesis? (please tick one box)

☐	☐	☐	☐	☐	☐	☐
Yes			Uncertain			No

72. Were you raised in an environment where there is a tradition of paranormal ability which is still believed in to some degree (e.g., second sight in the Highlands)?

☐ Yes ☐ No

If yes, please specify the environment and the tradition:______________________________

____

73. Has any member of your family had paranormal experiences? (please tick one box)

☐	☐	☐	☐	☐	☐	☐
Yes			Uncertain			No

74. Have you ever experienced a vision for which you could find no normal explanation? (please tick one box)

☐	☐	☐	☐	☐	☐	☐
Yes			Uncertain			No

75. Have you ever had an experience in which you felt as if your consciousness was separated from your physical body? (please tick one box)

☐	☐	☐	☐	☐	☐	☐
Yes			Uncertain			No

If yes, please briefly describe any notable surrounding circumstances: ____________________

A9.8

____

76. Do you believe that you might be able to demonstrate any psi ability in a controlled laboratory experiment? (please tick one box)

☐	☐	☐	☐	☐	☐	☐
Yes			Uncertain			No

77. If you would like to describe any experiences you have had that possibly involved psi, please do so below (continue on the back of the sheet if more room is needed).

A9.9

DEPARTMENT of PSYCHOLOGY
Koestler Chair of Parapsychology

The University of Edinburgh
7 George Square
Edinburgh EH8 9JZ

Fax 031 667 7938

Telex 727442 (UNIVED G)
Telephone 031 650 1000
or direct dial 031 650

Dear Participant:

Attn: Kathy Dalton

We are pleased that you have expressed an interest in taking part in our research.

As a first step, we would like to gather some general information about you which will help us evaluate which of our on-going or future research projects might be suitable for you as a participant.

All of the information you give us will be kept strictly confidential -- no one except our researchers will be able to find out what responses you have given to any of the questions unless we have asked for and received your written permission to release that information Thank you for your help with our work!

PARTICIPANT QUESTIONNAIRE

1. Name:____

2. Address:____

____

3. Phone:(work)____________________(home)____________________

   May we phone you at work? ☐ Yes ☐ No

4. Sex: ☐ Male ☐.Female

5. Date of birth:____________________ Place of birth:____________________

6. Nationality:____________________________

7. Usual occupation:__________________________

8. Educational background and/or vocational training:__________________________

9. Would you be interested in and available for participation in a long-term research project (spanning several sessions)?

   ☐ Yes ☐ No

10. We will be conducting research aimed at examining many different aspects of psychic functioning. Please tick any of the following areas of our work in which you would be willing to participate (tick as many or as few as appropriate).

☐ Extrasensory perception (the gaining of knowledge about an external event and/or person)

☐ Psychokinesis (the influencing of an external event)

☐ Training and development of psychic abilities

☐ Examination of a variety of mental skills (e.g., relaxation, concentration, imagery, etc.)

11. Have you ever participated in any formal laboratory parapsychological studies?

☐ Yes ☐ No

If yes:
Where was this work conducted?:____

Please describe the research:____

12. Do you consider yourself to be:

☐ Left-handed ☐ Right-handed ☐ Ambidextrous

13. Have you ever participated in any casual testing of parapsychological phenomena (e.g., card-guessing games with friends)? ☐ Yes ☐ No

If yes, please describe:____

Note: Many of the following questions will be answered by ticking one of the boxes to best describe your response to the question.

14. How often do you clearly recall the content of your dreams? (please tick one box)

☐	☐	☐	☐	☐
Never	Once a week	2-3 times a week	4-5 times a week	Almost everyday

15. Have you ever had a dream in which you were aware, during the dream, that you were dreaming?

☐ Yes ☐ No

16. If Yes, how often does this occur? (please tick one box)

☐	☐	☐	☐	☐
Rarely	Once a week	2-3 times a week	4-5 times a week	Almost everyday

17. How often do you daydream? (please tick one box)

☐	☐	☐
Rarely	Daily	Hourly

18. Do you enjoy activities which require an involvement in fantasy? (please tick one box)

☐	☐	☐	☐	☐
Not at all	Slightly	Neutral	Most of the time	Very much

19. How easy is it for you to create a mental image of a familiar scene? (please tick one box)

A9.11

☐	☐	☐	☐	☐
Impossible	Difficult	Medium	Fairly easy	Effortless

20. If you can create a mental image of a familiar scene, how clearly can you see the scene? (please tick one box)

☐ Not clear at all ☐ ☐ Medium ☐ ☐ As clear as using normal vision

21. If you can create a mental image of a familiar scene, how well can you control the scene? (please tick one box)

☐ No control ☐ Little control ☐ Medium control ☐ A lot of control ☐ Total control

22. How well can you receive a sense of hearing, smelling, and/or tasting some component of a mentally imagined scene? (please tick one box)

☐ Not at all ☐ ☐ Medium ☐ ☐ Very well

23. How often do you lose awareness of your surroundings when you get involved in an activity? (please tick one box)

☐ Never ☐ ☐ Half the time ☐ ☐ Always

24. How often do you lose your sense of time when you get involved in an activity? (please tick one box)

☐ Never ☐ ☐ Half the time ☐ ☐ Always

25. On the following scale, where would you place yourself? (please tick one box)

☐ Reserved ☐ ☐ Neither ☐ ☐ Outgoing

26. On the following scale, where would you place yourself? (please tick one box)

☐ Not competitive ☐ ☐ ☐ ☐ Highly competitive

27. Would you feel comfortable using a computer in a parapsychological study?

☐ Yes ☐ No ☐ Uncertain

28. How would you rate the way machines (cars, computers, cameras, kitchen appliances, watches, TVs, etc.) usually perform for you? (please tick one box)

☐ Rarely ever have problems ☐ ☐ Require average servicing ☐ ☐ Always breaking down

29. If machines tend to break down more often than one would expect, list the type of machines with which you have had particular problems:

____

30. Do you engage in any artistic / creative activities?

☐ Yes ☐ No

A9.12

31. How would you rate yourself for level of creative / artistic ability?

☐ Low ☐ ☐ Medium ☐ ☐ High

32. How do you feel about performing, or displaying your work?

☐	☐	☐	☐	☐
Nervous		Neutral		Confident

33. Have you ever practised any form of mental discipline/exercise/self-improvement program, e.g., meditation, yoga, tai chi, aikido, TM, psychotherapy, biofeedback, hypnosis, relaxation exercises, etc.?

☐ Yes ☐ No

If yes, what kind:____

If yes, how often: (please tick one box)

☐	☐	☐	☐	☐
Daily		Weekly		Monthly

34. On the average, how many hours a night do you sleep?____________________________

35. Occasionally our research might require our having some information about various medical problems. Please tick any of the following of which you have had experience in the indicated period:

	Currently	1-5 years ago	More than 5 years ago	Never
Epilepsy				
grand mal	☐	☐	☐	☐
petit mal	☐	☐	☐	☐
Headaches	☐	☐	☐	☐
Heart Trouble	☐	☐	☐	☐
Mental Disorder	☐	☐	☐	☐
Loss of Hearing	☐	☐	☐	☐
Poor Eyesight	☐	☐	☐	☐
Colour-blindness	☐	☐	☐	☐
High Blood Pressure	☐	☐	☐	☐

Please use the following definitions for the purpose of answering the next 17 questions.

<u>PSI</u>: This is a 'blanket' term used to refer to paranormal processes and causation, and commonly divided into two categories:

1. EXTRASENSORY PERCEPTION (ESP): Reception of information without the use of known senses or logical inference.

ESP is for convenience further subdivided into three categories:

TELEPATHY: ESP of the thoughts, feelings or behaviour of another person or organism.

CLAIRVOYANCE: ESP of distant physical events or concealed objects.

PRECOGNITION: ESP of the future.

2. PSYCHOKINESIS (PK): Mental influence on the physical world.

A9.13

36. What best describes your own psi ability? (please tick one box)

☐	☐	☐	☐	☐
I have no psi ability		Uncertain		I have psi ability

37. Is the existence of ESP: (please tick one box)

☐ Impossible ☐ ☐ Uncertain ☐ ☐ Certain

38. Have you ever had an experience which you think may have involved psi?

☐ Yes ☐ No

39. Have you ever had an experience which is best explained by telepathy? (please tick one box)

☐ No ☐ Rarely ☐ Occasionally ☐ Frequently ☐ Yes

40. Have you ever heard or read of an experience which is best explained by telepathy? (please tick one box)

☐ No ☐ Rarely ☐ Occasionally ☐ Frequently ☐ Yes

41. Have you ever had an experience which is best explained by clairvoyance? (please tick one box)

☐ No ☐ Rarely ☐ Occasionally ☐ Frequently ☐ Yes

42. Have you ever heard or read about an experience which is best explained by clairvoyance? (please tick one box)

☐ No ☐ Rarely ☐ Occasionally ☐ Frequently ☐ Yes

43. Have you ever had an experience which is best explained by precognition? (please tick one box)

☐ No ☐ Rarely ☐ Occasionally ☐ Frequently ☐ Yes

44. Have you ever heard or read about an experience which is best explained by precognition? (please tick one box)

☐ No ☐ Rarely ☐ Occasionally ☐ Frequently ☐ Yes

45. If you have had an ESP experience(s), was the ESP information conveyed to you primarily (most commonly) by means of: (tick as many boxes as appropriate)

☐ A sense, feeling, intuition, or thought
☐ Seeing a vision of a figure or an object
☐ Dreams
☐ Internal mental imagery

If the experience consisted primarily of internal mental imagery, was the nature of the experience primarily: (tick as many boxes as appropriate)

☐ Visual
☐ Auditory
☐ Olfactory (a sense of smell/odour)
☐ Kinaesthetic (a physical sensation)
☐ Other (please specify):

A9.14

46. Is the existence of psychokinesis: (please tick one box)

☐ Impossible ☐ ☐ Uncertain ☐ ☐ Certain

47. Have you ever had an experience which is best explained by psychokinesis? (please tick one box)

☐ No ☐ ☐ Uncertain ☐ ☐ Yes

48. Have you ever heard or read about an event which is best explained by psychokinesis? (please tick one box)

☐ No ☐ ☐ Uncertain ☐ ☐ Yes

49. Were you raised in an environment where there is a tradition of paranormal ability which is still believed in to some degree (e.g., second sight in the Highlands)?

☐ Yes ☐ No

If yes, please specify the environment and the tradition:________________________

____

50. Has any member of your family had paranormal experiences? (please tick one box)

☐ No ☐ ☐ Uncertain ☐ ☐ Yes

51. Have you ever experienced a vision for which you could find no normal explanation? (please tick one box)

☐ No ☐ ☐ Uncertain ☐ ☐ Yes

52. Have you ever seen lights or energy fields around someones body?

☐ No ☐ ☐ Uncertain ☐ ☐ Yes

53. Have you ever had an experience in which you felt as if your consciousness was separated from your physical body? (please tick one box)

☐ No ☐ ☐ Uncertain ☐ ☐ Yes

If yes, please briefly describe any notable surrounding circumstances: ____________________

____

54. Do you believe that you might be able to demonstrate any psi ability in a controlled laboratory experiment? (please tick one box)

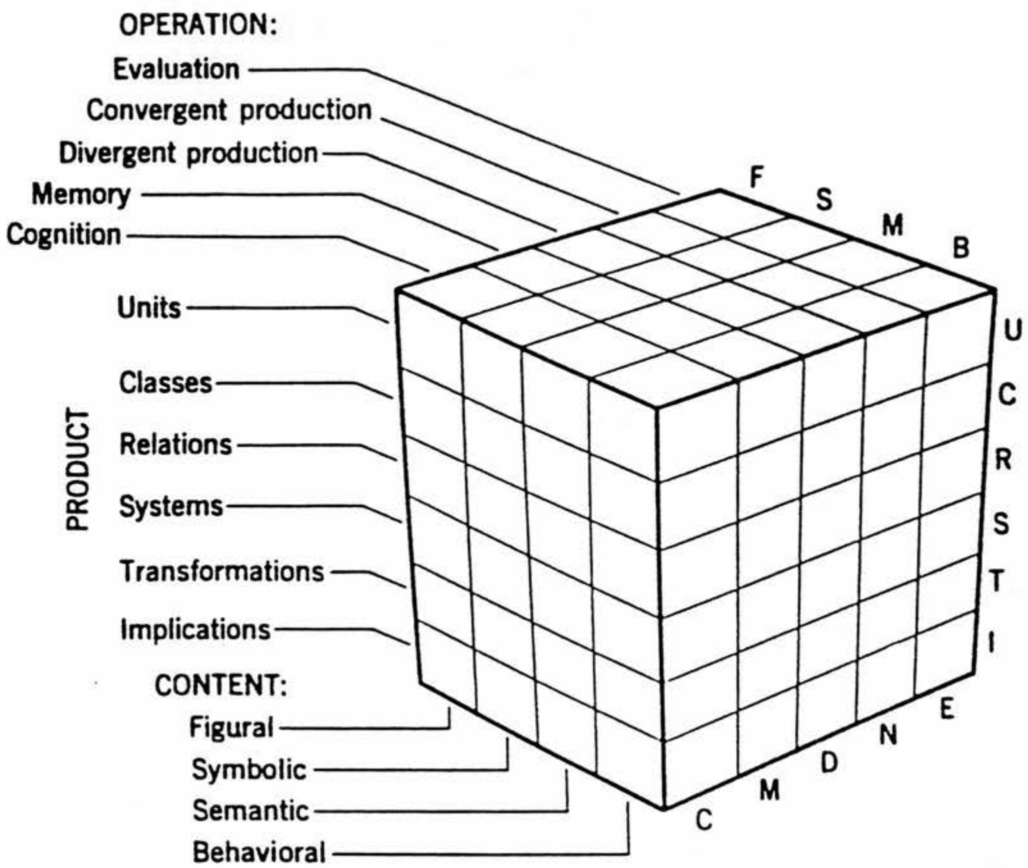
☐ No ☐ ☐ Uncertain ☐ ☐ Yes

55. If you would like to describe any experiences you have had that possibly involved psi, please do so below, and continue onto the back of the sheet if more room is needed.

A9.15

Appendix 10

Guilford's Structure-of-Intellect Cube



lford's "Structure of Intellect" model of intelligence. From *The Nature of Human Intelligence* by J. P. Guilford, 1967. lcGraw-Hill Book Co. Copyright 1967 by McGraw-Hill. Reprinted by permission.

Appendix 11

Statistical Definitions

Appendix 11

Statistical Definitions

Cohen's (*h*): In order to devise a scale of equal detectability, Cohen (1988) devised the effect size *h*, which performs an arcsin transformation on two proportions before calculating their difference. Cohen's *h* is quite general and can assess the difference between any two proportions drawn from independent samples or between a single proportion and any specified hypothetical value. The formula is:

$$h = a_1 - a_2$$

Where *a* is the arcsin equivalent of two proportions to be compared (*X*).

But, because values of *h* do not provide an intuitively descriptive scale, Rosenthal (1991), and Rosenthal and Rubin (1989) have suggested a new index, π, which applies specifically to one-sample, multiple choice data of the kind obtained in ganzfeld experiments. In particular, π expresses all hit rates as the proportion of hits that would have been obtained if there had been only two equally likely alternatives, similar to a coin toss. Therefore, π ranges from 0 to 1, with .5 expected under the null hypothesis. The formula is:

$$\pi = \frac{P(k-1)}{P(k-2)+1}$$

Effect Size: The magnitude of an experimental effect; i.e., the size of the relation between *X* and *Y*. **ES(*h*)** is the effect size represented by Cohen's *h*.

Stanford's *z*: Scores computed by subtracting the mean of the ratings for all four targets from the rating for the target and dividing the result by the standard deviation of the ratings used to compute the mean (Stanford and Sargent, 1983). The formula is:

$$z = \frac{\mathrm{X}i - \overline{\mathrm{X}}}{\sqrt{Sx/N}},(4)$$