The Journal of Parapsychology, Vol. 64, September 2000 (pp. 279-300)

A PARADIGM SHIFT AWAY FROM THE ESP–PK DICHOTOMY: THE THEORY OF PSYCHOPRAXIA

BY LANCE STORM AND MICHAEL A. THALBOURNE

ABSTRACT: The traditional view in parapsychology is that ESP and PK are separate and distinct categories of psi. However, M. A. Thalbourne's (1982, in press) theory of psychopraxia is put forward as an alternative interpretation of the paranormal that assumes there is no necessity for making that distinction. Central to this theory are 4 components: the self; the so-called pro attitude, or preference for a particular outcome; the set of necessary conditions which, together with the pro attitude, are sufficient for the outcome; and the outcome, or goal state itself. Psychopraxia may operate endosomatically or, as considered in the present case, exosomatically as psi. An examination of 12 major meta-analyses covering 9 paranormal domains is presented as evidence that the mean effect sizes (here taken as "norms") cannot be differentiated by their magnitude alone in terms of ESP and PK categories. The evidence from these meta-analyses supports instead the single paranormal process postulated in the theory of psychopraxia. It is further argued that the absence of *perceived* complexity (a psychological state) in regard to the mechanical setup of the experiment is a necessary condition conducive to psychopraxia. Theoretical, experimental, and meta-analytic findings support the psychopractic hypothesis that the ESP–PK dichotomy is untenable.

THE THEORY OF PSYCHOPRAXIA

J. B. Rhine (1934) coined the terms *extra-sensory perception* (ESP) and *psychokinesis* (PK) as ostensibly useful categories for describing two seemingly different paranormal phenomena. Even though by the 1940s Rhine (1948/1954, p. 112) already regarded ESP and PK as "one single fundamental two-way process," both terms are still used as two basic categories of paranormal phenomena. Around that time, Thouless and Wiesner (1947) proposed a unitary process underlying ESP and PK. They coined a new term, *psi*, to describe the paranormal effect but, paradoxically, they went on to use the Greek symbols Ψ_γ (psi-gamma) and Ψ_κ (psi-kappa) as labels for ESP and PK, respectively, in order to indicate that ESP and PK were "different aspects of one process" (Thouless & Wiesner, 1947, p. 179). Rhine

[1] Preparation of this article was supported by a grant from the Bial Foundation. We acknowledge the statistical advice of Bob Willson and John Storm. We also thank John Palmer for theoretical advice and other helpful comments.

accepted the term *psi*, and it has been used ever since in parapsychology to designate "paranormal causation" or "paranormal processes" (Thalbourne, 1982, p. 56).

Thouless and Wiesner (1947), therefore, never quite escaped the dualistic argument that ESP and PK were qualitatively different phenomena. In fact, ESP and PK have always had historical associations that relate directly to one or another of the metaphysical ontologies (most commonly dualism). Table 1 schematizes the categories of ESP and PK from the point of view of the three major philosophical ontologies. We note, for example, that what appears as PK under one ontology appears as ESP under another ontology. Given that there appears to be no way out of the philosophical impasse, Thalbourne (in press, chapter 1) suggested that parapsychological terminology be ontology neutral and not be ideologically influenced by dualism, materialism, or idealism. On that basis, the theory of psychopraxia maintains ontological neutrality.

Furthermore, Thalbourne (in press, chapters 2–3) reviewed some of the literature that discusses the possible unitary nature of the processes underlying ESP and PK. In particular, the theory of psychopraxia, in deference to Thouless and Wiesner, posits the idea that one and the same ontologically neutral process does underlie ESP and PK, thus rendering the ESP–PK dichotomy redundant (see also Storm & Thalbourne, 2000). ESP and PK are thus regarded as nominal variants of one and the same psychopractic effect. The theory of psychopraxia, therefore, regards the distinction of ESP from PK as unnecessary and ultimately indefensible.

The theory emphasizes four elements involved in the task at hand, whether (again in deference to Thouless and Wiesner) it occurs endosomatically (within the body) or exosomatically (outside the body, thus equating with the traditional psi effect):

1. The self, which is not defined further than that it is inclusive of the "I"—the common denominator of all experience and the agent of all action (this description allows for additional agency of the unconscious component of the self).
2. The "pro attitude": "A person may be said to have a pro attitude towards state **S** when they would prefer **S** rather than **–S** [not **S]** *if* those two alternatives were to be brought to their attention" (Thalbourne, in press). Under this heading fall goals, intentions, needs, and dispositions, be they conscious or unconscious. So-called "psi-missing" is thus conceived of as being the result of a pro attitude toward below-chance results. The self is said to "adopt" a pro attitude.
3. The set of necessary conditions mediating between the self with its pro attitude and the goal state.
4. The outcome (i.e., goal state or goal achieved) that is to be brought about, whether in the so-called mental sphere or in the physical sphere, is not considered relevant.

TABLE 1
INTERPRETATION OF NORMAL AND PARANORMAL PHENOMENA IN TERMS OF THE THREE MAJOR METAPHYSICAL ONTOLOGIES: DUALISM, MATERIALISM, AND IDEALISM

Ontology	Perspective on normal phenomena	Perspective on paranormal phenomena
Dualism[a]	All events are considered possible so long as they do not defy the known physical laws or known mental processes. There may be other physical laws yet to be discovered. The absolute limits of the mind are yet to be determined. Normal human events are classified as physical events (e.g., motor function, etc., which originate in the brain) or mental events (e.g., cognition, volition, etc., which originate in the mind).	The processes underlying paranormal events would be described in terms of ESP if mind-to-mind or mind-to-object information transfer is involved (telepathy, clairvoyance, and precognition), or PK when mind influences matter. ESP and PK are distinct categories.
Materialism[b]	All events are considered possible so long as they do not defy the known physical laws. There may be other physical laws yet to be discovered. Normal human events (i.e., cognitive and motor functions) are mediated by the brain.	The processes underlying paranormal events would be described in terms of PK, where ESP is actually a brain state otherwise called a mental state (telepathy may work like a brain-to-brain field transmission; clairvoyance may work like radar or sonar). ESP reduces to PK.
Idealism	All events are considered possible so long as they can be experienced as sense data. The absolute limits of the mind are yet to be determined. The source of all normal human events (i.e., cognitive and motor functions) is attributed to mind.	The processes underlying paranormal events would be described in terms of ESP, where PK is actually a paranormal transformation of sense data otherwise called the perceived physical object (telepathy is mind-to-mind sense-data; clairvoyance works by means of mind-to-external sense data or information). PK reduces to ESP.

[a]Assumes interactionism.
[b]Assumes identity theory.

Psychopraxia is defined as:

> A . . . principle underlying all interactions between the self, or ego, and the realm consisting of mental and physical events, whereby *under certain conditions* (not yet fully specified, but probably psychophysiological) the adoption of a pro attitude . . . results in its fulfillment in reality. Paranormal phenomena may thus be seen as special instances of psychopraxia, being those manifestations of goal-achievement which are exosomatic rather than endosomatic, i.e., which are not mediated by the normal sensory–motor apparatus. (Thalbourne, 1982, p. 63)

Psychopraxia is thus the self (*psyche*) bringing about goals (*praxia*—from the Greek *prattein,* "to accomplish") endosomatically in the mind–body complex, or exosomatically in the wider world. "Mind and matter may, in the final analysis, be ontologically different substances (as the Dualists believe), but the more important fact is that *from the point of view of the active agent, mind and matter are manipulated in fundamentally the same way*" (Thalbourne, in press). Psychopraxia theory thus offers an alternative unitary viewpoint on paranormal effects so that it is unnecessary to use the categories ESP and PK.

In this article we argue, in accordance with psychopraxia theory, that a demarcation between the two categories of ESP and PK probably cannot be sustained. We argue that the magnitudes of the effect size "norms" of the major psi domains, as reported in the meta-analyses, in general, give no support for the idea that ESP and PK are different processes. Furthermore, we show that the extremely low effect-size norm of one major paranormal domain (viz., RNG) can be explained as the effect of the participant's *perceived* complexity of the RNG apparatus. The lack of such a perception would thus be seen as a necessary condition that would help bring about a psychopractic effect. We give theoretical, meta-analytic, and experimental evidence to support these arguments.

THE ESP–PK DICHOTOMY

One of the major arguments emphasized by Thalbourne (in press) in his theory of psychopraxia is that certain paranormal effects could traditionally be classed as either ESP, or PK, or both at the same time, according to one's interpretation or preference. This degree of latitude, at the very least, undermines the ESP–PK dichotomy. On the basis that there might be some degree of overlap between ESP and PK it becomes possible to propose an ESP–PK continuum, as Schmeidler (1987, p. 38) did. She suggested that at one extreme there may be pure PK (no measurable ESP). Movement along the continuum would see an increase in ESP fused with PK, until only ESP with no measurable PK would be evinced at the other end of the continuum. Schmeidler (1994) later claimed that supporting evidence for a difference between ESP and PK would come from experimentation that might reveal a distinction in scoring between the two, but if

"procedural conditions for success are found to be similar in PK and ESP, and if their physiological and psychological correlates are also found to be similar, then the two are functionally indistinguishable" (p. 199).

One problem with testing Schmeidler's theory would be in determining just how the procedural conditions of the ESP task and the PK task are to be considered the same when the tasks would have to be procedurally different from each other just by design. A further problem, as Schmeidler (1994, pp. 198–199) recognized, is whether the tasks can be exclusively described as ESP or PK in the first place, and she admits there are "gray areas" in this regard. (See Knowles, 1967, 1968;, Osis, 1953; Schmidt, 1969, 1973; and Storm & Thalbourne, 1998–1999, for examples in all six studies of these gray areas, where it is possible to interpret the paranormal effects as either ESP, or PK, or both in combination.) In fact, some theorists suggest that ESP and PK are so similar to each other that they might very well be the same thing, or that one may be a form of the other (S. E. Braude, 1979; Nash, 1983; Rhine, 1974; L. E. Rhine [cited in Rao, 1983]; Schmidt & Pantas, 1972; Stanford, 1977a, 1977b; Storm & Thalbourne, 1998-1999, 2000).

Irwin (1999) argued against Nash's (1983) hypothesis that paranormal effects are a unitary phenomenon. However, Irwin's contrary evidence is largely based on research on personality and attitudinal correlates of ESP performance compared with the same sorts of correlates of PK performance, but he applied this method to only a few studies. In fact, one referee of this article suggested that, if there is a difference, it may be that certain personality–attitudinal types may have a preference for certain tasks (ESP-ish or PK-ish), so that, for example, a "feeling" type may prefer a "feeling" paranormal task, whereas a "doing" type may prefer a "doing" paranormal task. Misperception of the task requirement may have a disorienting effect on the participant.

Although it seems that the psychophysiological state–trait of the participant has an influence on paranormal performance, there is no consensus yet as to which way the paranormal effect will go (psi hitting or psi missing) or that ESP and PK function best under mutually exclusive conditions. For example, some studies seem to suggest that PK works best when the participant is tense or aroused (Braud, 1985; Steilberg, 1975), whereas other studies report a negative correlation between PK performance and anxiety (which is related to tension and arousal;[2] Broughton & Perlstrom, 1986, 1992). Still other studies suggest that ESP can function under similar conditions of arousal or lack of arousal (see Stanford, 1977a; Van der Sijde & Snel, 1992). Therefore, Schmeidler's (1987)

[2] Clark, Beck, and Beck (1994) found, through discriminant-function analysis, that anxiety was discriminated by subjective anxiety and tension as measured on standard anxiety disorder scales. Hoehn, Rudolf, Pourmotabbed, and McLeod (1997) found that increased muscle tension and heightened arousal are consistent symptoms among anxiety-prone individuals.

schema and similar ones only beg the question: "What grounds are there for dichotomizing what may be a single paranormal process?"

Stanford (1974a, 1974b) came close to answering this question with his psi-mediated instrumental response (PMIR) model, although at that stage he did not see ESP and PK as the same process. Stanford (1978) then developed his *conformance behavior* model, which "subsumes both ESP and PK" events under one model (p. 198). Any paranormal process was thereby typified as a "conformance" (i.e., a disposition-serving outcome) respondent to the "need or other disposition" of an individual (Stanford, 1978, p. 207). Conformance behavior theory regards both ESP and PK as "goal-oriented rather than information-based" (Stanford, 1978, pp. 203, 208).

At a later date, Stanford (1990, pp. 58–59) was "less than fully convinced about the goal-oriented character of psi processes" but maintained it for the most part in his resurrected PMIR model. Stanford (1990) also abandoned the conformance behavior model, but even though the PMIR model now maintains that the same underlying elements are necessary for ESP and PK effects (e.g., a "disposed" system) he still discusses both as discernibly different processes (cf. Stanford, 1990, on ESP, with Stanford, 1974b, on PK).[3] For example, Stanford (1974b, pp. 326–328) holds that "implicit extrasensory guidance" is "part and parcel" of many PK events and that "active-agent telepathy" may really be a special form of PK (p. 344). He thus appears to identify qualitative differences between ESP and PK that psychopraxia theory would hold are dependent on a dualistic ontology.

May, Utts, and Spottiswoode (1995a) later proposed decision augmenttation theory (DAT) as a "phenomenological, . . . logical and formal extension of Stanford's elegant PMIR model" (p. 456). Guided by the PMIR model, they proposed that "humans integrate information obtained by anomalous cognition [e.g., precognition] into the usual decision process" (May, Utts, & Spottiswoode, 1995b, p. 195). The RNG participant, for example, using anomalous cognition opportunistically scans the environment for information in order to determine the appropriate moment to "press the button." (Note, however, that the "scanning component" has now been discarded from the PMIR model—see Stanford, 1990, pp. 57–59.)

May et al. (1995a) effectively reduced a conventional micro-PK[4] effect, in the RNG case, to an ESP effect (viz., "Mentally-mediated informational process" [p. 454]), otherwise referred to as 'anomalous cognition'). However, DAT does not fully achieve—or, in fact, attempt—a

[3] Stanford (1990, p. 57) regards Stanford (1974b) as the definitive reference for PMIR in terms of psychokinetic effects (see especially Stanford, 1974b, pp. 348–351).

[4] There are traditional-minded researchers who would regard the RNG effect as a form of PK. The RNG effect has been referred to as *micro-PK* since 1969, although Schmidt (1969) preferred *precognition* (i.e., ESP).

unification of paranormal effects (e.g., May et al., 1995b, p. 200, acknowledged that DAT does not explain levitation). DAT, then, while showing a bias toward an ESP-like causality behind most paranormal effects, is not yet able to eliminate successfully the need for the PK category (e.g., see Braud, 1990; Braud & Schlitz, 1989; Stevens, 1998–1999).

In the next section we present evidence from the meta-analyses that suggests a unification of ESP and PK.

THE META-ANALYSES

Since 1985 a number of important meta-analyses have been conducted in parapsychology, 12 of which covered nine paranormal[5] domains: biological systems (Braud & Schlitz, 1991); ganzfeld (see Appendix A) and autoganzfeld (see Appendix B) (Bem & Honorton, 1994; Honorton, 1985; Honorton et al., 1990; Milton, 1999; Milton & Wiseman, 1999; Storm & Ertel, in press); forced choice (Honorton & Ferrari, 1989); free response, incorporating remote viewing (Milton, 1998); dice throwing (Radin & Ferrari, 1991); RNG (Radin & Nelson, 1989); and clairvoyance and precognition[6] (Steinkamp, Milton, & Morris, 1998; see Table 2).

When the effect size norms (calculated using the $z/N^{1/2}$ formula) for all domains are compared one can see a broad dispersion of the norms ranging from .0003 to .42 (see Figure 1).[7] The norms for the biological systems (direct mental influence on living systems [DMILS]; Braud & Schlitz, 1991),[8] free-response, ganzfeld, and autoganzfeld domains, which are relatively large, are at one extreme (at the top of Figure 1, above the mean effect-size norm of .10), whereas the relatively small norm for the RNG domain is at the other extreme (at the bottom of the figure and well below the mean). The RNG norm (the smallest of the

[5] In this study only meta-analyses that fall into the traditional ESP–PK categories were used. We did not use correlational meta-analyses on mediating or moderating variables (such as personality and belief) because we were interested only in "pure" measures of psi performance (ESP and PK), not strength of correlations.

[6] Steinkamp et al.'s (1998) meta-analysis was performed on forced-choice studies from 1935 to 1997 that were identifiable as being of the clairvoyance or precognition type. Thus, it is more up to date than Honorton and Ferrari's (1989) meta-analysis (for which the period of analysis was 1935–1987). However, Steinkamp et al's. meta-analysis refers to two specific domains that may be contrasted with the more general precognition domain of Honorton and Ferrari. We recognize that there may be a very slight degree of overlap in relation to the precognition-type forced-choice studies, but we point out that all three effect size norms are virtually the same, as might be expected (see Table 1). Note also that Steinkamp et al. found no significant difference in performance between clairvoyance and precognition studies.

[7] Figure 1 is a graphic representation using a logarithmic ordinate axis for ease of inspection only of the meta-analytic effect-size norms. We imply no law or functional relation between the x and y variables of the form $y = f(x)$.

[8] Research by Braud and Schlitz has shown that biological systems (blood cells, some animal species, etc.) can be influenced by psi.

TABLE 2
META-ANALYSES OF NINE PSI DOMAINS: DMILS, FORCED-CHOICE, FREE-RESPONSE, DICE-THROWING, RNG, CLAIRVOYANCE, PRECOGNITION, GANZFELD, AND AUTOGANZFELD

Domain meta-analyzed and author(s)	No. studies (k) and period of analysis	Mean z ($\Sigma z/k$)	Mean ES $[\Sigma(z/\sqrt{n})/k]$	Stouffer Z $(\Sigma z/\sqrt{k})$	p
DMILS (Braud & Schlitz, 1991)	8 (1979, 1991)	1.34	.420	7.72	2.58×10^{-14}
Forced-choice (Honorton & Ferrari, 1989)	248 (1935-1987)	0.38	.012 [a]	6.02	1.10×10^{-9}
Free-Response (GESP/remote viewing) (Milton, 1998)	75 (1964-1993)	0.68	.170 [a]	5.85	2.46×10^{-9}
Dice-throwing Radin & Ferrari, 1991)	59 (1935-1987)	0.42	.003 [b]	3.19	7.16×10^{-4}
RNG (Radin & Nelson, 1989)	490 (1959-1987	0.42	3.00×10^{-4} [b]	9.74	$\approx 10^{-23}$
Clairvoyance (Steinkamp et al., 1998)	22 (1935-1997)	0.60	.009	2.81	2.50×10^{-3}
Precognition (Steinkamp et al., 1998)	22 (1935-1997)	1.02	.010	4.78	8.80×10^{-7}
Ganzfeld (see Appendix A)	71 (1974-1999)	0.71	.154	5.98	1.12×10^{-9}
Autoganzfeld (Storm & Ertel, in press)	17 (1983-1997)	0.58	.117	2.35	9.39×10^{-3}

Note: The most conservative values were used in the table. DMILS = direct mental influence on living systems; ES = effect size; GESP = general extra-sensory experience.
[a] Calculated from a homogeneous data set.
[b] Quality-weighted value calculated from a homogeneous data set.

nine norms) is 328 times smaller than the mean effect-size norm, whereas the DMILS norm (the largest of the nine norms) is only 4 times larger than the mean effect-size norm.

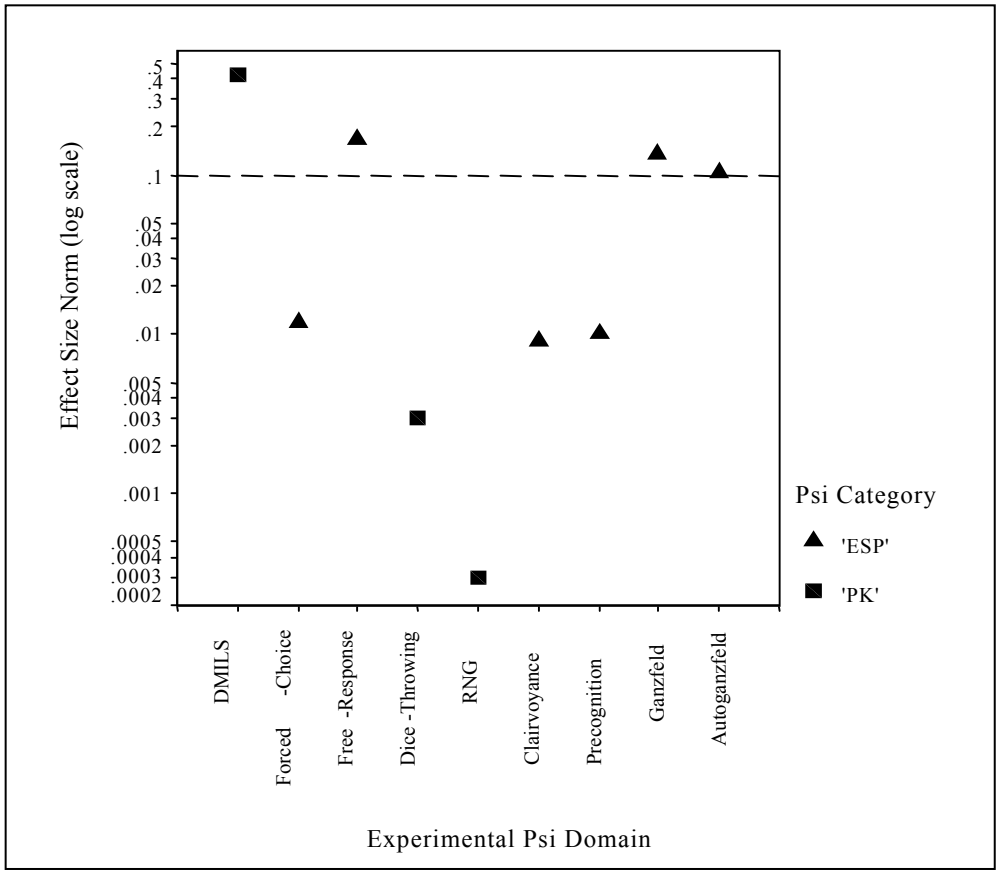

Figure 1. Scatter-plot graph showing the effect-size norms of the nine major psi domains and the mean effect-size norm reference line (mean ES_{norm} = .10). DMILS = direct mental influence on living systems (Braud & Schlitz, 1991).

One finds again, by comparing the magnitudes of the effect-size norms shown in Figure 1, that there is no inherent means of demarcating ESP from PK. Some researchers (e.g., Honorton et al., 1990, p. 127; Milton, 1998, p. 279; Utts, 1995, pp. 310–311) have argued that effect-size comparisons between similar domains (e.g., ganzfeld and autoganzfeld, or remote viewing and ganzfeld) are a valid means of determining the efficacy and consistency of experimental methodologies. By implication, then, should effect sizes across domains be similar, one and the same paranormal process seems likely to have been elicited across experimental domains. We further add that such a process has, in some cases, been elicited to greater efficiency, at least relatively speaking, apparently due to the current status of the design characteristics of the experiment. Thus the even to opinion in parapsychological circles is that the ganzfeld and autoganzfeld experiments represent two of the most successful types of paranormal experiment available to the parapsychologist (in terms of both significance testing and effect sizes) because of their "highly standardized technique[s] aimed specifically at enhancing ESP performance" (Broughton,

1991, p. 297; see also Bem & Honorton, 1994). The same reasoning may apply to the exceptional performances by "influencers" in DMILS experiments—this domain has produced the highest norm of all domains and thus holds promise for the field of "mental healing" (Braud & Schlitz, 1991, p. 42).

Given that the rigidity of the ESP–PK dichotomy has already been challenged, it would logically follow that if there should be a general similarity in the magnitudes of the effect-size norms one might then argue that the paranormal processes in both cases are actually one and the same. Schmeidler (1994, p. 229), for one, reported that the meta-analyses have not yet given any clear evidence that "qualitative differences" exist between ESP and PK.

Of course, one must be able to explain any extreme effect-size norms that might challenge one's psychopractic hypothesis. For example, consideration should be given to causal factors unique to the relevant domains that do not in themselves unnecessarily foist the ESP–PK dichotomy on one in a way that could be viewed as lacking parsimony. The extremely low effect-size norm yielded in the RNG meta-analysis is a case in point. We argue that there is nothing to be gained in thinking about the weakness of the norm for the RNG domain as indicating a distinct PK process when it may be more constructive to start with the claim that work needs to be done in identifying possible psi-inhibitory factors (if any) in RNG experimental procedures that might be responsible for the low effect size.

Referees of this article pointed out that DAT would explain the low RNG effect-size norm. The effect size in a typical RNG experiment is low because the RNG trial, although it needs much less effort, provides much less information compared to a trial in most other paranormal experiments, owing to the fact that there are usually only a few hundred information bits available in an RNG trial compared to the many thousands in, say, any given target in a ganzfeld trial,. Again, according to DAT, the precognitive task of scanning the environment for the right moment to act is also comparatively difficult given that only one decision point is permissible and, according to one referee, "the z score for each button press must be constrained by the limits of the standard normal distribution." In other paranormal experiments there are vastly more possibilities of making a correct decision. Related to this issue, another referee, also appealing to DAT, argued "that the PK meta-analyses do badly because PK does not work." From a traditional perspective this latter argument is acceptable only if DMILS is to be regarded as something other than a PK-type domain, and the evidence is not forthcoming.[9]

[9] Many researchers would regard DMILS as belonging to the PK category. DMILS has been referred to as a "force-like" (i.e., PK) influence. Although Braud and Schlitz (1991) referred to "non-local" influences of the mind on biological systems (p. 42), they also argued for the possibility of electromagnetic radiation; (p. 41), and earlier they referred to psi effects on biological systems as *bio-PK* (Braud & Schlitz, 1989, p. 289).

Generally, we make no dispute over these explanations, and in very real terms any of them acting alone or in concert could account for the low RNG effect-size norm. However, these explanations not only refer directly to a special class of experimental difficulty specifically related to the nature of the RNG experiment (particularly the apparatus), but they also lead to the inevitable psychological problem that all RNG experiments, regardless of variations around an RNG theme,[10] are, we suggest, likely to be perceived (consciously or otherwise) by the test participant as difficult and complex (i.e., comprising more than one inhibiting feature).

We maintain, therefore, that the issue of perceived (and, in the RNG case, actual) apparatus complexity and task difficulty must also be considered when attempting to account for low effect sizes in RNG experiments. This consideration is in keeping with the broader understanding in parapsychology that psychological and attitudinal variables have been shown to contribute to the variability of results. We therefore propose that perceived complexity is psi inhibitory. Consequently, the lack of this perception would be a necessary condition to facilitate the psychopractic process. From the perspective of DAT, if a participant using anomalous cognition is opportunistically scanning the environment for information in order to determine the right moment to act, then he or she is free to cognize (unconsciously or otherwise) all information relevant to the apparatus and the task at hand. Any resulting value judgment (whether manifested consciously or not) will generally be a veridical assessment that the "RNG problem" is difficult to surmount, resulting in outcomes (viz., poor performances) that may directly reflect the participant's poor "object relation" with the RNG. This adverse assessment of the situation would not be conducive to psychopraxia.

To refine our argument, we are of the opinion that RNGs may be perceived by the participant to be difficult and complex pieces of equipment and, as a corollary of these facts, the participant may unconsciously arrive at the conclusion that paranormal cognition or action (to use conventional terms) on the apparatus will be difficult. Concomitant with this state of mind may be the other well-recognized psi-inhibitory effects of reduced motivation,[11] low concentration, and so on (all of which may be induced by conscious or unconscious doubt). These effects may result in the temporary overshadowing of a participant's belief in his or her psychic ability to influence the system. This state of mind could also have adverse effects on the participant's attitude toward a successful outcome. If enough participants in the sample perceive the apparatus in the same

[10] Performance comparisons between mechanical setups within the RNG domain may produce significant differences in scoring between them (e.g., Schmidt, 1973), or nonsignificant differences (e.g., Schmidt & Pantas, 1972) but, relevant to other domains, effect sizes generally tend to be much lower.

[11] Stanford (1977b) and Kennedy (1995) have both made references to the effects of motivation in psi experiments.

negative way, the end result may be a lower overall effect size than might ordinarily be expected by the experimenter.

Our hypothesized explanation for the poor performance of the RNG domain in Radin and Nelson's (1989) meta-analysis[12] warrants further clarification, because we are making two assumptions:

1. Inspection of the effect-size norms of the different domains (see Figure 1) for comparative purposes is a valid procedure because:
   - The same types of participants from very similar populations have been tested in all the domains being compared, because the meta-analyses, by their nature, represent multiple accumulations of many samples conducted over many decades and across many populations.
   - The effect-size norms may be compared and contrasted with each other in real terms because they indicate (i.e., were brought about by) a single underlying paranormal cause.
2. Differences between the effect-size norms may be caused more by the variability in participants' conscious and unconscious reactions to the apparatus, the task, or both, than by the actual (i.e., physically real) imposition of the mechanical setup and task requirements.

The norm for one other PK domain must also be considered in terms of the conditions necessary for psychopraxia to take effect. One can see in Figure 1 that the norm for the dice-throwing domain lies below the norms of all six ESP-type domains, and it is 33 times smaller than the mean effect-size norm. This difference, however, is very much smaller in magnitude than the difference for the RNG norm. In relative terms, then, a certain necessary condition present in the dice-throwing task may not be present in the RNG task. Specifically, the possibility of influencing the fall of a die may not be perceived to be as difficult as influencing an RNG.

The reason for this perception differential may have to do with the long history of testing with dice, coupled with the fact that the simple die is so familiar to everyone. Regarding the high effect-size norm for the DMILS domain, gerbils and fish are common household pets and should not represent any serious threat to the average participant. The RNG, however, is a relative newcomer in the field of parapsychology, and we suggest that it is a long way from being perceived as a simple device. Our "techno-fear" hypothesis targets difficult, complex, human-made apparatus, not natural (i.e., biological) systems. Thus, if an effect-size norm is high for one paranormal domain but low for another, then one

[12] The RNG database in fact consists of many single-participant case studies rather than multiparticipant experiments. (This may also apply to other domains, such as dice-throwing.) It is important for experimenters to specify whether they are dealing with single- or multiparticipant experiments and how many trials are contributed by each participant.

parsimonious reason for this difference, given the same underlying paranormal cause, is that the former norm is the result of conditions that were generally good in some way for a sufficient number of participants, whereas the latter norm is the result of conditions that were generally adverse in some way for a sufficient number of participants.

We note, however, that perceived complexity (a psychological condition) of the experimental setup and task was not acknowledged by Kennedy (1995, p. 47) as having any effect on paranormal performance (see also Kennedy, 1978; Stanford, 1977b). Kennedy confirmed the general finding that the statistical evidence supports the claim that actual complexity (the physical condition) is not a psi-inhibitory variable, but this evidence does not undermine our hypothesis that participants' perceptions of the setup and task at any level of consciousness might be adverse to a psi effect. For example, Vassy (1986) found that informational complexity resulted in decreased success in "precognition" tasks. Once again, we argue that perception of all forms of complexity, but not actual complexity in and of itself, can lead to reduced performance on psi tasks. We hypothesize that a participant's mental outlook can be affected by the issue of complexity regardless of whether this cognitive state is reached normally or in an anomalous way. Of course, perceived complexity–difficulty is not limited to any one experimental domain but, as we have said, we feel it may be more likely in the RNG domain than in the other domains.

CONCLUSION

We have conjectured that a demarcation between the two traditional categories, ESP and PK, may not be sustainable. We considered some of the philosophical, theoretical, and experimental difficulties that have arisen in arguing for an ESP–PK dichotomy. The meta-analyses considered above have shown that strength of effect size seems not to be differentiated by experimental categorization.

Regarding the low effect-size norm of the RNG domain, we proposed that the complexity issue be reconsidered. The "complexity issue is itself complex," claimed Stanford (1978, p. 205), and we acknowledge that point. We note, too, Stanford's (1977b) observation that the evidence is not strong for interpreting (actual) complexity as a deleterious effect on paranormal performance. That finding referred generally to the PK domains. Stanford (1990) later claimed that evidence for success on "very complex tasks" was "reasonably good . . . and continues to accumulate" (p. 59). We argue, however, that, within the RNG paradigm specifically, circumstances were characteristically different from other domains (as argued in DAT). The overall system is perceived to be complex (a psychological state) because actual complexity (a physical state) provides the grounds for that perception and, although there may or may not be significant variations in performance between one RNG task and another,

in general RNG paranormal performance will tend to be inferior compared to other domains.

We then proposed that one necessary condition for a psychopractic effect in the RNG situation would be a lack of perceived complexity. Consequently, if there is any validity in the psychopractic hypothesis, insofar as certain conditions may inhibit a psychopractic effect, then future parapsychological participants have a necessary educational process of familiarization with RNGs ahead of them. Should the RNG apparatus reach the same degree of acceptance by the participant as the gerbil, the fish, or even the humble die, we may see effect sizes increase for the relatively new domain of the RNG experiment. We recognize that advances in RNG research will also depend on resolutions of a technical nature in the way RNGs function (i.e., bit size) but, overall, we hypothesize that the effect of techno-fear may be related in a counterproductive way to psychopractic performance. Technically speaking, if nothing can be done for the RNG as it is, we maintain the brighter hope that there is every possibility of conquering techno-fear.

The only really convincing evidence for anomalies of a possibly paranormal nature comes not just from repeatability of effects but from the strength of effects as well. Weak effect sizes do not promise a consistent, reliable, and practical parapsychology. For parapsychology, increases in the strength of effect sizes across domains may be the only way to satisfy skeptics who make the claim that "the signal to noise ratio for ESP is simply too low to be interesting" (Stevens, 1967, p. 1).

From the psychopractic point of view, further empirical work involveing a greater focus on the relevant pro attitude, and on the conditions necessary for bringing about psychopractic effects, may represent a possible alternative future for parapsychological research. Psychopraxia theory postulates a single cause for paranormal effects. We suggest that we circumvent the time-consuming dualistic debate over whether a paranormal effect is a case of ESP or PK. It is possible that the increased understanding that may result from this new approach will offer investigators greater control over the experimental situation, thus facilitating increases in effect sizes for the various psi domains.

REFERENCES

References preceded by an asterisk indicate studies included in Storm and Ertel's (in press) meta-analysis.

BEM, D. J., & HONORTON, C. (1994). Does psi exist? Replicable evidence for an anomalous process of information transfer. *Psychological Bulle-tin*, **115**, 4–18.

*BIERMAN, D. J. (1987). A test on possible implications of the OT's for ganzfeld research. *European Journal of Parapsychology*, **7**, 1–10.

*BIERMAN, D. J., BERENDSEN, J., KOENEN, C., KUIPERS, C., LOUMAN, J., & MAISSON, F. (1983). The effects of ganzfeld stimulation and feedback in a clairvoyance task [Abstract]. In R. A. White & R .S. Broughton (Eds.), *Research in parapsychology 1983* (p. 14). Metuchen, NJ: Scarecrow Press.

*BRAUD, L. W., ACKLES, L., & KYLES, W. (1983). Free-response GESP performance during ganzfeld stimulation [Abstract]. In R. A. White & R. S. Broughton (Eds.), *Research in parapsychology 1983* (pp. 78–80). Metuchen, NJ: Scarecrow Press.

BRAUD, W. (1985). ESP, PK and sympathetic nervous system activity. *Parapsychology Review*, **16**, 8–11.

BRAUD, W. G. (1990). Distant mental influence of rate of hemolysis of human red blood cells. *Journal of the American Society for Psychical Research*, **84**, 1–24.

BRAUD, W. G., & SCHLITZ, M. A. (1989). Possible role of intuitive data sorting in electrodermal biological psychokinesis (bio-PK). *Journal of the American Society for Psychical Research*, **83**, 289–302.

BRAUD, W. G., & SCHLITZ, M. A. (1991). Consciousness interactions with remote biological systems: Anomalous intentionality effects. *Subtle Energies*, **2**, 1–46.

BRAUDE, S. E. (1979). *ESP and psychokinesis: A philosophical examination.* Philadelphia: Temple University Press.

BROUGHTON, R. S. (1991). *Parapsychology: The controversial science.* New York: Ballantine.

BROUGHTON, R. S., & PERLSTROM, J. R. (1986). PK experiments with a competitive computer game. *Journal of Parapsychology*, **50**, 193–211.

BROUGHTON, R. S., & PERLSTROM, J. R. (1992). PK in a competitive computer game: A replication. *Journal of Parapsychology*, **56**, 291–305.

CLARK, D. A., BECK, A. T., & BECK, J. S. (1994). Symptom differences in major depression, dysthymia, panic disorder, and generalized anxiety disorder. *American Journal of Psychiatry*, **151**, 205–209.

COHEN, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

*HARALDSSON, E., & GISSURARSON, L. R. (1985). Perceptual defensive-ness, ganzfeld and the percipient-order effect. *European Journal of Parapsychology*, **6**, 1–17.

HOEHN, S., RUDOLF, R. L., POURMOTABBED, T., & MCLEOD, R. (1997). Does muscle tension reflect arousal? Relationship between electromyo-graphic and electroencephalographic recordings. *Psychiatry Research*, **71**, 49-55.

HONORTON, C. (1985). Meta-analysis of psi ganzfeld research: A response to Hyman. *Journal of Parapsychology*, **49**, 51–91.

HONORTON, C., BERGER, R. E., VARVOGLIS, M. P., QUANT, M., DERR, P., SCHECHTER, E. I., & FERRARI, D. C. (1990). Psi communication in the ganzfeld: Experiments with an automated testing system and a comparison with a meta-analysis of earlier studies. *Journal of Parapsychology*, **54**, 99–139.

HONORTON, C., & FERRARI, D. C. (1989). "Future telling": A meta-analysis of forced-choice precognition experiments, 1935–1987. *Journal of Parapsychology*, **53**, 281–308.

*HOUTKOOPER, J. M., GISSURARSON, L. R., & HARALDSSON, E. (1988-1989). Why the ganzfeld is conducive to ESP: A study of observational theory and the percipient-order effect. *European Journal of Parapsychology*, **7**, 169-192.

IRWIN, H. J. (1999). *An introduction to parapsychology* (3rd ed.). Jefferson, NC: McFarland.

KENNEDY, J. E. (1978). The role of task complexity in PK: A review. *Journal of Parapsychology*, **42**, 89–122.

KENNEDY, J. E. (1995). Methods for investigating goal-oriented psi. *Journal of Parapsychology*, **59**, 47–62.

KNOWLES, E. A. G. (1967). Psi dexterity in a mixing experiment. *Journal of Parapsychology*, **31,** 214–230.

KNOWLES, E. A. G. (1968). Psi dexterity in a mixing experiment. In J. B. Rhine & R. Brier (Eds.), *Parapsychology today* (pp. 29–34). New York: Castle Books.

MAY, E. C., UTTS, J. M., & SPOTTISWOODE, J. P. (1995a). Decision augmentation theory: Applications to the random number generator database. *Journal of Scientific Exploration*, **9**, 453–488.

MAY, E. C., UTTS, J. M., & SPOTTISWOODE, J. P. (1995b). Decision augmentation theory: Toward a model of anomalous mental phenomena. *Journal of Parapsychology*, **59**, 195–220.

*MILTON, J. (1987). Judging strategies to improve scoring in the ganzfeld [Abstract]. In D. H. Weiner & R. D. Nelson (Eds.), *Research in parapsychology 1986* (pp. 100–103). Metuchen, NJ: Scarecrow Press.

*MILTON, J. (1988–1989). A possible "directive" role of the agent in the ganzfeld. *European Journal of Parapsychology*, **7***,* 193–214.

MILTON, J. (1998). A meta-analysis of waking states of consciousness, free-response ESP studies. In N. L. Zingrone, M. J. Schlitz, C. S. Alvarado, & J. Milton (Eds.), *Research in parapsychology 1993* (pp. 31-34). London: Scarecrow Press.

MILTON, J. (1999). Should ganzfeld work continue to be crucial in the search for a replicable psi effect? Part I. Discussion paper and introduction to an electronic-mail discussion. *Journal of Parapsychology*, **63**, 309–333.

MILTON, J., & WISEMAN, R. (1999). Does psi exist? Lack of replication of an anomalous process of information transfer. *Psychological Bulletin*, **125**, 387–391.

*MURRE, J. M. J., VAN DALEN, A. C., DIAS, L .R .B., & SCHOUTEN, S. A. (1988). A ganzfeld psi experiment with a control condition. *Journal of Parapsychology*, **52**, 103–125.

NASH, C. B. (1983). An extrasensory observational theory. *Journal of the Society for Psychical Research*, **52**, 287–288.

OSIS, K. (1953). A test of the relationship between ESP and PK. *Journal of Parapsychology*, **17**, 298–309.

RADIN, D. I., & FERRARI, D. C. (1991). Effects of consciousness on the fall of dice: A meta-analysis. *Journal of Scientific Exploration*, **5**, 61–83.

RADIN, D. I., & NELSON, R. D. (1989). Evidence for consciousness-related anomalies in random physical systems. *Foundations of Physics*, **19**, 1499–1514.

RAO, K R. (1983). L. E. Rhine on psi and its place. *Journal of Parapsychology*, **47**, 347–359.

RHINE, J. B. (1934). *Extra-sensory perception.* Boston: Bruce Humphries.

RHINE, J. B. (1954). *The reach of the mind.* Harmondsworth, Middlesex, England: Penguin. (Original work published 1948)

RHINE, J. B. (1974). Telepathy and other untestable hypotheses. *Journal of Parapsychology*, **38**, 137–153.

*SARGENT, C. L. (1982). A ganzfeld GESP experiment with visiting subjects. *Journal of the Society for Psychical Research*, **51**, 222–232.

*SARGENT, C. L., & HARLEY, T. A. (1982). Precognition testing with free-response techniques in the ganzfeld and the dream state. *Euro-pean Journal of Parapsychology*, **4**, 243–256.

SCHMEIDLER, G. R. (1987). Psychokinesis: Recent studies and a possible paradigm shift. In S. Krippner (Ed.), *Advances in parapsychological research 5* (pp. 9–38). Jefferson, NC: McFarland.

SCHMEIDLER, G. R. (1994). PK: Research reports and a comparison with ESP. In S. Krippner (Ed.), *Advances in parapsychological research 7* (pp. 198–237). Jefferson, NC: McFarland.

SCHMIDT, H. (1969). Precognition of a quantum process. *Journal of Parapsychology*, **33**, 99–108.

SCHMIDT, H. (1973). PK tests with a high-speed random number generator. *Journal of Parapsychology*, **37**, 105–118.

SCHMIDT, H., & PANTAS, L. (1972). Psi tests with internally different machines. *Journal of Parapsychology*, **36**, 222–232.

*SONDOW, N. (1986). Exploring hypnotizability, creativity, and psi: Conscious and unconscious components to psi success in the ganzfeld. In D. H. Weiner & R. D. Nelson (Eds.), *Research in parapsychology 1986* (pp. 42–47). Metuchen, NJ: Scarecrow Press.

STANFORD, R. G. (1974a). An experimentally testable model for spontaneous psi events: I. Extrasensory events. *Journal of the American Society for Psychical Research*, **68**, 34–57.

STANFORD, R. G. (1974b). An experimentally testable model for spontaneous psi events: II. Psychokinetic events. *Journal of the American Society for Psychical Research*, **68**, 321–356.

STANFORD, R. G. (1977a). Conceptual frameworks of contemporary psi research. In B. B. Wolman (Ed.), *Handbook of parapsychology* (pp. 823–858). New York: Van Nostrand Reinhold.

STANFORD, R. G. (1977b). Experimental psychokinesis: A review from diverse perspectives. In B. B. Wolman (Ed.), *Handbook of parapsychology* (pp. 324–381). New York: Van Nostrand Reinhold.

STANFORD, R. G. (1978). Toward reinterpreting psi events. *Journal of the American Society for Psychical Research*, **72**, 197–214.

STANFORD, R. G. (1990). An experimentally testable model for spontaneous psi events: A review of related evidence and concepts from parapsychology and other sciences. In S. Krippner (Ed.), *Advances in parapsychological research 6* (pp. 54–167). Jefferson, NC: McFarland.

STEILBERG, B. (1975). Conscious concentration and visualization in PK tests. *Journal of Parapsychology*, **39**, 12–20.

STEINKAMP, F., MILTON, J., & MORRIS, R. L. (1998). A meta-analysis of forced-choice experiments comparing clairvoyance and precognition. *Journal of Parapsychology*, **62**, 193–218.

STEVENS, P. (1998–1999). Remote psychokinesis. *European Journal of Parapsychology*, **14**, 68–79.

STEVENS, S. S. (1967). The market for miracles. *Contemporary Psychology*, ***12***, 1–3.

STORM, L., & ERTEL, S. (in press). Does psi exist? A re-appraisal of Milton and Wiseman's (1999) meta-analysis of ganzfeld research. *Psychological Bulletin*.

STORM, L., & THALBOURNE, M. A. (1998–1999). The transliminal connection between paranormal effects and personality in an experiment with the *I Ching*. *European Journal of Parapsychology*, **14**, 100–124.

STORM, L., & THALBOURNE, M. A. (in press). Research note: Effect size in "The transliminal connection between paranormal effects and personality in an experiment with the I Ching" by Storm & Thalbourne (1998–1999). *European Journal of Parapsychology*.

STORM, L., & THALBOURNE, M. A. (2000). *A replication of an experiment with the* I Ching *(Part I)*. Manuscript submitted for publication.

THALBOURNE, M. A. (1982). *A glossary of terms used in parapsychology*. London: William Heinemann.

THALBOURNE, M. A. (in press). *The common thread between ESP and PK*. New York: Parapsychology Foundation.

THOULESS, R. H.., & WIESNER, B. P. (1947). The psi process in normal and "paranormal" psychology. *Proceedings of the Society for Psychical Re-search*, **48**, 117–196.

UTTS, J. (1995). An assessment of the evidence for psychic functioning. *Journal of Parapsychology*, **59**, 289–320.

VAN DER SIJDE, P. C., & SNEL, F. W. (1992). Psi and relaxation: An at-tempt to replicate. *Journal of the Society for Psychical Research*, **58**, 244–249.

VASSY, Z. (1986). Experimental study of complexity dependence in pre-cognition. *Journal of Parapsychology*, **50**, 235–270.

Department of Psychology
Adelaide University
Australia 5005
lance.storm@psychology.adelaide.edu.au

APPENDIX A

THE GANZFELD DATABASES (1985–1999)

The Ganzfeld Database (Pre-Communiqué Studies)

Storm and Ertel (in press) found 11 studies not previously considered in any meta-analysis of ganzfeld research (see Table A1). The Storm and Ertel (S&E) database has an unweighted effect size of .222 (*SD* = .23) and a Stouffer *Z* of 3.46 ($p = 2.70 \times 10^{-4}$). The quality-weighted effect size is .137 (± .022 of a standard error) with a quality-weighted *Z* of 1.06 ($p = .144$). Storm and Ertel (in press) conducted a performance comparison using the *t* test for independent samples between Honorton's (1985) database and the S&E database. The two databases were not significantly different on mean effect sizes. They were combined, and the *ES* for this combined database of 11 + 28 = 39 studies is .227 (*SD* = .34), *Z* = 6.15 ($p = 3.93 \times 10^{-10}$).

TABLE A1
NUMBER OF TRIALS, *Z* SCORES, AND EFFECT SIZES ($ES = z/\sqrt{N}$) FOR THE STORM AND ERTEL (IN PRESS) DATABASE

Study	Trials (*n*)	Z	Effect size (ES)
Bierman (1987)	16	2.07*	0.52
Bierman et al. (1983)	32	1.02	0.18
W. Braude, Ackles, & Kyles (1983)	10	2.19*	0.69
Haraldsson & Gissurarson (1985)	70	0.28	0.03
Houtkooper, Gissurarson, & Haraldsson (1988–1989)	40	0.00	0.00
Milton (1986)	37	1.23	0.20
Milton (1988–1989)	35	1.58	0.27
Murre et al. (1988)	41	0.81	0.13
Sargent (1982)	20	0.79	0.18
Sargent & Harley (1982)	44	2.26*	0.34
Sondow (1986)	60	–0.75	–0.10
Totals	405	11.48	2.44

* $p < .05$.

The Ganzfeld Database (1974–1997)

This 39-study database can be compared with the 23 post-Communiqué ganzfeld studies in Milton and Wiseman's (1999) meta-analysis (thus excluding the seven autoganzfeld studies). A planned performance comparison

using the *t* test was significantly different, $t(60) = 3.11$, $p = .003$, but a post hoc Cohen's *h* test (Cohen, 1988, p. 179) showed that the magnitude of the difference itself was not large enough to reach a critical level, so the two databases were combined. The mean effect size of this database of 62 studies is .143 ($SD = .33$), Stouffer $Z = 5.09$ ($p = 1.79 \times 10^{-7}$).

The Ganzfeld Database (1997–1999)

Since Milton and Wiseman's (1999) meta-analysis was published, 11 more ganzfeld studies were found (Milton, 1999). Only 9 of those studies were deemed suitable for meta-analysis by Milton (1999, pp. 311–312). This database of 9 studies has an effect size of .121 ($SD = .34$) and a Z of 3.46 ($p = 2.70 \times 10^{-4}$). A planned *t* test did not yield a significant difference between Milton's 9-study database and the 62-study database. The 9 studies were combined with the 62 studies to form a 71-study database: ES = .154 ($SD = .33$), $Z = 5.98$ ($p = 1.12 \times 10^{-9}$).

APPENDIX B

THE AUTOGANZFELD DATABASES (1983–1999)

The Autoganzfeld Database (1983-1997)

Milton and Wiseman's (1999) database included 7 autoganzfeld studies, which have a mean ES of .05 (SD = .19), Z = .61 (p = .272). Although this database does not have a significant mean ES, the t test performed by Storm and Ertel (in press) showed no significant differences on effect sizes between this 7-study database and Bem and Honorton's (1994) 10-study database. Thus, a 17-study autoganzfeld database was feasible and yielded a mean effect size of .117 (SD = .17), Z = 2.35 (p = .009).

The Autoganzfeld Database (1997–1999)

Since the publication of Milton and Wiseman's (1999) meta-analysis, Milton (1999) found only one other autoganzfeld study, but an ES could not be calculated for it. To date, the auotganzfeld database still consists of 17 studies only (see Table 2).