The Journal of Parapsychology, Vol. 65, September 2001 (pp. 207-218)

UPDATING THE GANZFELD DATABASE: A VICTIM OF ITS OWN SUCCESS?

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ABSTRACT: The existence of psi—anomalous processes of information transfer such as telepathy or clairvoyance—continues to be controversial. Earlier meta-analyses of studies using the ganzfeld procedure appeared to provide replicable evidence for psi (D. J. Bem & C. Honorton, 1994), but a follow-up meta-analysis of 30 more recent ganzfeld studies did not (J. Milton & R. Wiseman, 1999). When 10 new studies published after the Milton–Wiseman cutoff date are added to their database, the overall ganzfeld effect again becomes significant, but the mean effect size is still smaller than those from the original studies. Ratings of all 40 studies by 3 independent raters reveal that the effect size achieved by a replication is significantly correlated with the degree to which it adhered to the standard ganzfeld protocol. Standard replications yield significant effect sizes comparable with those obtained in the past.

The term *psi* denotes anomalous processes of information transfer such as telepathy and other forms of extrasensory perception that are currently unexplained in terms of known physical or biological mechanisms. The question of whether psi actually exists continues to be controversial. In 1994, Bem and Honorton summarized meta-analyses of approximately 50 studies from 10 separate laboratories that appeared to provide replicable evidence for psi using an experimental protocol known as the *ganzfeld procedure*.

In most studies using the ganzfeld procedure, two participants—a "sender" and a "receiver"—are sequestered in separate, acoustically isolated rooms. For approximately 30 min, the sender concentrates on a randomly selected stimulus target, for example, an art print, a photograph, or a brief videotaped sequence. During the same period, the receiver is immersed in a mild form of perceptual isolation called the *ganzfeld* (total field) while providing a continuous verbal report of his or her ongoing thoughts, feelings, and images. At the completion of the

An earlier version of this article was presented at the 43rd Annual Convention of the Parapsychological Association (Palmer & Broughton, 2000). We wish to thank Richard Eibach, Nicholas Epley, and Thomas Keegan from the Department of Psychology, Cornell University, for serving as raters, and Paul Blue, administrative assistant at the Rhine Research Center, for coding and randomizing the rating materials.

ganzfeld period, the receiver is shown several stimuli (usually four) and, without knowing which stimulus was the target, is asked to rate the degree to which each matches the thoughts, feelings, and images experienced during the ganzfeld period. If the receiver assigns the highest rating to the target stimulus, it is scored as a hit. Thus, if the experiment uses judging sets containing four stimuli (the target and three decoys or control stimuli), the hit rate expected by chance is 25%.[1]

In their article, Bem and Honorton (1994) reported a hit rate of 35% ($p < 10^{-9}$) for 28 ganzfeld studies conducted between 1974 and 1981 and a hit rate of 32% ($p = .0008$) for 10 computer-controlled ("autoganzfeld") studies conducted between 1983 and 1989 that had been specifically designed to eliminate methodological flaws identified in some of the earlier studies.

More recently, Milton and Wiseman (1999) published a follow-up meta-analysis of 30 additional ganzfeld studies that had been conducted from 1987 through 1997. They concluded that these studies did not yield an overall significant effect, thereby calling into question the replicability of the ganzfeld procedure (see Storm & Ertel, 2001, for a critique of that meta-analysis). Milton subsequently organized and initiated an Internet debate of the ganzfeld research, a debate that was edited for publication by Schmeidler and Edge (1999). In her own contribution to that debate, Milton (1999) noted that when replications published after the Milton–Wiseman cutoff date are added to the database, the accumulated studies do, in fact, achieve statistical significance. Even so, however, the mean effect size of these more recent studies is still significantly smaller than those reported by Bem and Honorton for the two earlier databases.

The *z* scores of the studies in the Milton–Wiseman database are significantly heterogeneous, and one of the observations made during the online debate was that several studies contributing negative *z* scores to the analysis had used procedures that deviated markedly from the standard ganzfeld protocol. Such a development is neither bad nor unexpected. Many psi researchers believe that the reliability of the basic procedure is sufficiently well established to warrant using it as a tool for the further exploration of psi. Thus, rather than continuing to conduct exact replications, they have been modifying the procedure and extending it into unknown territory. Not unexpectedly, such deviations from exact replication are at increased risk for failure. For example, rather than using visual stimuli, Willin (1996a, 1996b) modified the ganzfeld procedure to test whether senders could communicate musical targets to receivers. They could not. When such studies are thrown into an undifferentiated meta-analysis, the overall

[1] Some studies using the standard ganzfeld procedure eliminate the sender to test for a psi process that does not involve anomalous communication between two people.

effect size is thereby reduced and, perversely, the ganzfeld procedure becomes a victim of its own success.

In the present study, we sought to test this explanation for the apparent decline in ganzfeld effect sizes. Three independent raters unfamiliar with the recent ganzfeld studies and uninformed as to the studies' outcomes rated the degree to which each of the recent studies deviated from the standard ganzfeld protocol. The database was then reexamined to test the hypothesis that effect sizes are positively correlated with the degree to which the experimental procedures adhere to the standard protocol.

Method

Studies Included in the Analysis

In addition to the 30 studies analyzed by Milton and Wiseman (1999), an additional 10 studies were located by examining the six major publication outlets for parapsychological research. Many of these studies had been completed but not yet published prior to the cutoff date set by Milton and Wiseman for their meta-analysis. Following Milton and Wiseman, we treated separate experimental series within a given report separately but not experimental conditions within a given series. Two studies in the Milton–Wiseman sample that were originally reported in the Parapsychological Association's *Proceedings of Presented Papers* were replaced by their published reports in archival journals. These substitutions did not affect the statistical outcomes reported by Milton and Wiseman for these studies. Table 1 lists all 40 studies, with the 10 new studies identified by asterisks.

Raters

Three advanced graduate students in psychology at Cornell University were recruited by the first author to serve as raters. All have had considerable experience designing and conducting laboratory experiments in social psychology. Their prior familiarity with the ganzfeld procedure was limited to having read Bem and Honorton's (1994) article or having heard Bem present the information from that same article in a colloquium or lecture. They were not acquainted with any of the 40 subsequent studies they were asked to rate.

Rating Materials

The method sections for the 40 studies to be rated were first edited to eliminate all article titles, authors, hypotheses, references to results of other experiments in the sample, and descriptions of psychological tests (except those given during the ganzfeld or used for participant selection). The edited method sections were then photocopied and assembled into judging packets.

TABLE 1
NUMBER OF TRIALS, *z* SCORE, EFFECT SIZE (ES), HIT RATE, AND STANDARDNESS RATING FOR EACH STUDY IN THE UPDATED GANZFELD DATABASE (ARRANGED IN ORDER OF DECREASING STANDARDNESS)

Study	Trials	*z* score	*ES*	Hit rate %	Standardness
Bierman et al. (1993) - Series I	50	0.03	0.00	26.0	7.00
Bierman et al. (1993) - Series II	50	–0.30	–0.04	24.0	7.00
Broughton & Alexander (1997) - First Timers Series 1[a]	50	–0.30	–0.04	24.0	7.00
Broughton & Alexander (1997) First Timers Series 2[a]	50	–1.33	–0.19	8.0	7.00
Broughton & Alexander (1997) - Emotionally Close Series[a]	51	1.81	0.25	37.3	7.00
Dalton (1994)	29	1.76	0.33	41.4	7.00
*Dalton (1997)	128	5.20	0.46	46.9	7.00
Morris et al. (1993) - Cunningham Study	32	1.78	0.31	40.6	7.00
*Alexander & Broughton (1999)	50	1.60	0.23	36.0	6.67
Broughton & Alexander (1997) [a] - Clairvoyance Series	50	–0.64	–0.09	22.0	6.67
Broughton & Alexander (1997) [a] - General Series	8	0.46	0.16	37.5	6.67
Kanthamani & Broughton (1994) - Series 3	40	–0.91	–0.14	20.0	6.67
Kanthamani & Broughton (1994) - Series 4	65	2.01	0.25	36.9	6.67
Parker et al. (1997) - Study 2[b]	30	1.25	0.23	36.7	6.67
Parker et al. (1997) - Study 3[b]	30	1.25	0.23	36.7	6.67
*Parker & Westerlund (1998) - Study 4	30	2.40	0.44	46.7	6.67
*Parker & Westerlund (1998) - Study 5	30	1.25	0.23	36.7	6.67
Kanthamani & Palmer (1993)	22	–2.17	–0.46	9.1	6.33
Morris et al. (1995)	97	1.67	0.17	33.0	6.33
Kanthamani & Broughton (1994) - Series 8	50	0.03	0.00	26.0	6.00
Morris et al. (1993) - McAlpine Study	32	–0.17	–0.03	25.0	6.00
Stanford & Frank (1991)	58	–1.24	–0.16	19.0[d]	5.67
Kanthamani & Broughton (1994) - Series 7	46	0.03	0.00	26.1	5.33
McDonough et al. (1994)	20	1.02	0.23	30.0	5.33
Parker et al. (1997) - Study 1[b]	30	–0.83	–0.15	20.0	5.33
Williams et al. (1994)	42	–2.30	–0.35	11.9	5.33
*Wezelman et al. (1997)	32	2.15	0.38	43.8	4.67

Bierman (1995) - Series III	40	1.94	0.31	40.0	4.33
Bierman (1995) - Series IV	36	1.33	0.22	36.1	4.33
*Symmons & Morris (1997)	51	2.97	0.42	45.1	4.00
*Wezelman & Bierman (1997) - Series IV	32	–1.45	–0.26	15.6	4.00
Kanthamani & Khilji (1990) - Series 6b[c]	40	0.52	0.08	30.0[d]	.67
Kanthamani & Broughton (1992) - Series 6a[c]	20	–0.46	–0.10	25.0[d]	3.33
*Parker & Westerlund (1998) - Serial Study	30	–0.49	–0.09	23.0[d]	3.33
*Wezelman & Bierman (1997) - Series V	40	–0.91	–0.14	20.0	3.00
*Wezelman & Bierman (1997) - Series VI	40	–0.15	–0.02	25.0	3.00
Kanthamani et al. (1988) - Series 5a[c]	4	0.22	0.11	50.0	2.67
Kanthamani et al. (1988) - Series 5b[c]	10	–2.06	–0.65	10.0[d]	2.67
Willin (1996a)	100	–0.33	–0.03	24.0	1.33
Willin (1996b)	16	–0.24	–0.06	25.0	1.33

Note: Asterisks denote studies added to Milton and Wiseman (1999).
[a]Cited as Broughton and Alexander (1996) in Milton and Wiseman (1999).
[b]Cited as Johansson and Parker (1995) in Milton and Wiseman (1999).
[c]Series summarized and numbered in Kanthamani and Broughton (1994).
[d]Hit rate not reported. Estimated from *z* score.

Because there were four instances in which the methods were identical for two separate series, there were only 36 separate method sections for the 40 studies. Also, because some method sections referred back to the method sections of previous series in the same article, some series were bundled together, creating 20 separate packets containing the 36 method sections. An assistant not otherwise involved in the study assigned code numbers to each method section and then randomly ordered the sequence of 20 packets differently for each rater. The coding procedure enabled us to examine the reliability and distribution of ratings while remaining blind to which ratings were assigned to which studies.

A rating sheet was stapled to the front of each method section. It consisted of a 7-point scale with 1 = *standard* and 7 = *nonstandard*. For purposes of exposition, we subtracted each rating from 8 so that higher ratings would correspond to greater adherence to the standard ganzfeld protocol. Blank spaces underneath the scale permitted the raters to specify the methodological deviations that influenced their ratings.

Rating Instructions

The Internet debate implied that parapsychologists actively involved in ganzfeld research would be unlikely to agree on a single definition of *the* standard ganzfeld procedure. Rather than provide our own ad hoc

definition, we had the raters read the general description from the section labeled "The Ganzfeld Procedure" in Bem and Honorton's (1994, pp. 5–6) report as well as most of the detailed method section describing the computer-controlled autoganzfeld procedure used in Honorton's Psychophysical Research Laboratories (PRL) published in the *Journal of Parapsychology* (Honorton et al., 1990, pp. 102–110). They were further instructed that the Bem–Honorton description

> specifies the main ingredients of the standard ganzfeld method, and these elements must be included in any ganzfeld procedure if it is to be considered purely standard. You will note that for a few procedural elements the section says that they are used "most often," "typically," or something to that effect. In these instances, the opposite procedure can still be considered standard. For example, the page states that "most often" the procedure includes a sender (telepathy). However, the minority of studies that did not use a sender (clairvoyance) can still be considered standard. Deviant elements can either be substitutes for standard elements or additions to them.

With regard to the PRL autoganzfeld procedure, the raters were told that the experiments

> need not conform to all the details of this protocol to be considered standard, but procedures cited in this section should not be considered non-standard if they are incorporated in the studies you will be rating. (Note: One feature of the PRL experiment not mentioned in its methodological description is that the experimenter, while still blind to the target, *sometimes* helped the subject do the judging.)
>
> You should take note of authors' declarations that their procedures were standard or non-standard, but you are not bound by such declarations.
>
> You should treat as standard the use of *artistic or "creative" subject samples* (since one of the most successful components of the PRL experiment used such a sample) or subjects having had *previous psi experiences* or having practiced a mental discipline such as meditation (since such subjects were shown to be the best scorers in the PRL experiment).
>
> There are a few kinds of deviations you should *not* count at all. Do not pay attention to *psychological tests* that might have been given to the subjects, unless they are given while the subject is actually in the ganzfeld or influence the selection of subjects. Even in these cases it is up to you to decide how much, if any, such factors make the method non-standard. Also, do not consider *sample size* or the method of *statistical analysis*. Finally, do not count deviations the only effect of which is to influence the likelihood of *artifacts*, such as sensory leakage of the target information.

> Such deviations are important in the broader scheme of things, but not for this exercise.
>
> You should base your judgment of standardness not only on the number of deviant elements but also on their importance. Judgments of importance should reflect how likely you think it is that the deviant element might have influenced the results, based on common sense and your understanding of how such judgments are made for other kinds of psychology experiments. In so doing, you should pay attention to the rationale or theory parapsychologists have developed to explain why the ganzfeld should facilitate high ESP scores (although lack of such relevance does not preclude a deviant element from being important). You will find that the *Psychological Bulletin* article discusses this rationale.[2]

Raters were not permitted to consult with one another while making their ratings although they were permitted to seek clarification of the instructions from the first author. None did, however.

Results and Discussion

Basic Update

Table 1 presents the *z* scores and effect sizes for all 40 studies in the sample. Milton and Wiseman's (1999) own figures were used for the 30 studies in their analysis, and their statistical procedures were duplicated to the extent possible for the 10 new studies. In cases in which the number of direct hits was reported, an exact binomial probability was computed and converted to a one-tailed *z* score. In three studies (Symmons & Morris, 1997; Wezelman & Bierman, 1997, Series V and VI), hits were reported for both receiver judges and outside judges. In these cases, *z* scores were computed for both counts and averaged. This was the procedure Milton and Wiseman (1999) apparently used in the most comparable case from their survey (McDonough, Don, & Warren, 1994). In the Serial Series of Parker and Westerlund (1998), the total number of hits for the 30 participants, averaged over the four trials per session, was calculated to be 6.75, and the binomial probability of this value was obtained using a .75 interpolation between 6 and 7. Effect sizes were calculated using the formula employed by Milton and Wiseman (1999), $z/N^{1/2}$ (hereinafter labeled *ES*).

The 10 new ganzfeld replication studies yield an overall hit rate of 36.7%, $ES = .17$, Stouffer $Z = 3.97$, $p = 3.5 \times 10^{-5}$, one-tailed. All 40 replication studies combined yield an overall hit rate of 30.1%, $ES = .051$, Stouffer

[2] Complete instructions to the raters can be obtained from the authors.

$Z = 2.59$, $p = .0048$, one-tailed. This latter set of figures thus represents the current status of ganzfeld studies published after those summarized in Bem and Honorton (1994). By this measure, then, the ganzfeld effect remains replicable, but the mean effect size for these 40 studies falls below the 95% confidence intervals for both the 39 preautoganzfeld studies (.080 to .328) and the 10 previous autoganzfeld studies (.059 to .269).[3] Accordingly, we now turn to our hypothesis that the effect sizes of the ganzfeld replications are moderated by the degree to which their experimental procedures adhere to the standard ganzfeld protocol.

Standard Versus Nonstandard Replications

The "standardness" ratings of the three raters achieved a Cronbach's alpha of .78. The mean of the three sets of ratings on the 7-point scale was 5.33, where higher ratings correspond to greater adherence to the standard ganzfeld protocol. As hypothesized, the degree to which a replication adheres to the standard ganzfeld protocol is positively and significantly correlated with *ES*, $r_s(38) = .31$, $p = .024$, one-tailed.

This same outcome can be observed by defining as standard the 29 replications whose ratings fell above the midpoint of the scale (4) and defining as nonstandard the 9 replications that fell below the midpoint (2 replications fell at the midpoint): The standard replications obtain an overall hit rate of 31.2%, $ES = .096$, Stouffer $Z = 3.49$, $p = .0002$, one-tailed. In contrast, the nonstandard replications obtain an overall hit rate of only 24.0%, $ES = -.10$, Stouffer $Z = -1.30$, *ns*. The difference between the standard and nonstandard replications is itself significant, $U = 190.5$, $p = .020$, one-tailed. Most importantly, the mean effect size of the standard replications falls within the 95% confidence intervals of both the 39 preautoganzfeld studies and the 10 autoganzfeld studies summarized by Bem and Honorton (1994). In other words, ganzfeld studies that adhere to the standard ganzfeld protocol continue to replicate with effect sizes comparable with those obtained in previous studies.

It is true, of course, that the preautoganzfeld studies were themselves methodologically diverse and may have included some studies that would have been rated as nonstandard by our raters. If such studies were to be excluded from the preautoganzfeld database, it is conceivable that the new replications would not fall inside the preautoganzfeld confidence limits. This possibility can only be assessed by a separate standardness analysis of the preautoganzfeld database.

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[3] For purposes of effect-size comparisons, we have included in the preautoganzfeld database 11 additional studies that Honorton (1985) had set aside because the investigators had not reported direct hit rates. This brings the total number of studies in the preautoganzfeld database to 39 (mean $ES = .20$). Details of how we calculated the effect sizes for these additional studies can be obtained from the authors.

As noted earlier, our raters were instructed that "for a few procedural elements the [method] section says that they are used 'most often,' 'typically,' or something to that effect. In these instances, the opposite procedure can still be considered standard." By implication, this would also include procedural variations that the previous meta-analyses had suggested were psi-conducive, such as the use of dynamic rather than static targets or the pairing of friends to serve as sender and receiver. (Both of these experimental variables were mentioned in the method sections read by our raters.) Thus, a replication study that used only dynamic targets to enhance the probability of successful replication would still be considered standard under these instructions.

Analogously, we instructed our raters to treat as standard the preselection of participants who were artistic or creative, who reported previous psi experiences, or who practiced a mental discipline such as meditation. Even though these participant variables were not discussed in the particular methodological excerpts read by our raters, they were explicitly identified elsewhere in Bem and Honorton (1994, p. 13) as potentially psi-conducive on the basis of the previous meta-analyses. And, in fact, several of the 40 replications listed in Table 1 preselected their participants on some or all of these criteria specifically to enhance the probability of successful replication. Accordingly, it was our judgment that it would be nonsensical to have our raters treat the use of such preselection criteria as a departure from the standard procedure.

Perhaps there is some merit in continuing to conduct exact replications of the ganzfeld procedure, but genuine progress in understanding psi rests on investigators' being willing to risk replication failures by modifying the procedure in any way that seems best suited for exploring new domains or answering new questions. (Milton, 1999, suggested the possibility of having researchers state in advance of conducting a study—and therefore not knowing the results—whether they wished the study to be part of a future proof-oriented meta-analysis.) In any case, future meta-analyses should distinguish "standard" replications from nonstandard extensions of the ganzfeld procedure lest it become a victim of its own success.

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