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CONSIDERING THE SENDER AS A PK AGENT IN GANZFELD ESP STUDIES

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ABSTRACT: Previous ganzfeld research that has considered the role of the sender has been inconsistent in its findings and may be criticised for not taking sufficient account of the sender-receiver relationship. This study used a novel method for assessing any sender influence. A random event generator (REG) placed in the vicinity of the receiver acted as a proxy receiver during the sending period, "selecting" descriptive statements from among a pool of 768. Twenty statements were selected to produce an "REG mentation" that was compared with the performance of the "live" receiver. Forty ganzfeld trials were conducted with novice sender-receiver pairs using a standard protocol apart from the introduction of the REG. Receivers registered a 35% hit rate. The REG mentation was used by an independent judge to rank order the clips in each target set and gave rise to a suggestive hit rate of 32.5%. None of a battery of individual differences measures significantly predicted receiver performance but there was a significant relationship between sender synaesthesia rating and REG performance. The effect size for the REG trials compares favourably with that for other micro PK protocols, and further research is encouraged.

One theoretical question that remains to be answered satisfactorily is whether the sender plays any active role in successful GESP experiments. Given the relative success of clairvoyance designs (see, e.g., reviews by J. B. Rhine, Pratt, Stuart, Smith, & Greenwood, 1940/1966; Utts, 1996), it seems clear that a sender may not be *necessary*, but may make a positive contribution to ostensible psi. In favour of such a role, we could note that many of the most impressive spontaneous cases seem to involve an "agent" of some sort (cf. Beloff, 1993; L. E. Rhine, 1965). In the laboratory, a number of studies using a variety of methods have reported better performance when a sender or agent was involved compared with clairvoyance alone (e.g., Klein, 1972; Ullman, Krippner, & Vaughan, 1989), suggesting that the agent may be able to somehow gently direct the participants' mentation or choice of target. Further circumstantial evidence in favour of a role for the sender in ganzfeld ESP research can be claimed from Honorton's (1995) meta-analysis, which found that those studies that included senders generated better performance than those without,

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although the effect seemed to be confined to those experimenters who had used both conditions at some time. These results are compromised, however, by receivers often knowing whether or not a sender would be present, so that any differences in performance may be a simple psychological effect. Studies that have controlled for this have had mixed results (see Palmer, 1978, for a longer discussion of the psychological sender effect).

Three previous studies involving ganzfeld stimulation have compared sender and no-sender conditions within the same study (Morris, Dalton, Delanoy, & Watt, 1995; Raburn & Manning, 1977; Williams, Roe, Upchurch, & Lawrence, 1994), but these have been inconclusive. Raburn and Manning (1977) did find better performance when a sender was present (particularly, but not exclusively where receivers knew that a sender was present). However, Morris et al. (1995) reported no difference in scoring between sender and no-sender conditions in which the receiver and experimenter were blind, nor surprisingly did they find better performance in a sender condition in which the receiver and experimenter were not blind (and which therefore might be expected to benefit from a psychological sender effect). Williams et al. (1994) reported overall psi missing, making interpretation difficult, although they did not register any hits at all in 12 no-sender trials, which was suggestively different from performance in the two conditions in which a sender was present.

The role of the sender has been considered more directly by Kreidler and Kreidler (1973), who found that trials on which the sender was actively sending the target yielded significantly higher ESP scores than those on which the sender simply thought about the target. Schmeidler (1961) reported better scoring in a clairvoyance task when the senders were instructed to wish for a positive outcome than when they wished for the trial to be a failure. However, Kanthamani and Palmer (1993) described an experiment in which senders were presented with the target image only briefly (ten 1-ms exposures during the sending period) and between exposures were engaged in a PK task so that they might adopt a "subliminal sending strategy." Independent judges' ratings of receivers' mentations gave only two direct hits in 22 trials, which was nonsignificantly below a mean chance expectation of 5.5. The apparent moderating effects of variables such as the agent-subject relationship are also relevant here. Schmeidler (1961) found that she was able to predict ESP performance at better than chance levels by using a rating of agent-subject compatibility. Similarly, Honorton et al. (1990) had noted an improvement in the hit rate of participants who brought in their own senders as opposed to those who had lab personnel assigned to be their sender, and Dalton (1994) found that different sender-receiver sex pairings gave rise to different effect sizes, together suggesting that the nature of the relationship may be an important factor. Unfortunately, such effects of sender-receiver relationship have not been considered in the ganzfeld work that has focused on the role of sender; for security reasons, Raburn and Manning (1977) and Morris et al. (1995) used only lab

personnel as senders, and Williams et al. (1994) reported interpersonal dynamics problems that may not have made those sessions typical of the friend-as-sender condition.

The moderating effect of variables such as the sender-receiver relationship and sender-receiver compatibility suggests that the interaction between sender and receiver is highly complex and probably unpredictable in practice. There is a strong possibility that the kind of manipulation typically used may be simply too crude to generate clean and controlled comparison conditions, because it implicitly assumes that trials designated as having a sender are all equivalent, despite great variation in the nature of the sender-receiver relationship. The method proposed in the present study is intended to control for this by adopting a much simpler procedure that holds constant the sender's relationship with the receiver essentially by adopting a protocol *that does not require a human being to act as receiver*.

Work to date that has considered the role of the sender can also be criticised for only making use of relatively crude assessments of the receiver's performance. Typically, this consists of a comparison of the proportions of direct hits for sessions in which senders are present with those for which they are absent. More sensitive measures are called for that do not rely on receivers being able to attend to salient aspects of their own mentation (while ignoring the irrelevant) and adopt appropriate judging strategies for any sender influence to be detectable. Rather, a more direct measure of sender influence may be possible and has already been used with some success by one of us (Roe, 1996) in a study which gave rise to an effect size ($r = .257$) that compares favourably with typical micro PK effect sizes (cf. Radin & Nelson, 1987; Steinkamp, Boller, & Bösch, 2002). Here, a random event generator (REG) was treated as an analogue for a psychic reader in a pseudo reading. The REG was set to select statements from a predetermined pool of descriptors, which the client of the reading subsequently evaluated for accuracy. Any influence the client might have had in "causing" particular topics to come to mind of the pseudo reader could be sensitively measured by considering whether and how the REG output differed from chance expectation. That study design is applied to this research question by treating an REG as an experimental analogue of the receiver in a typical ganzfeld ESP study to produce a pseudo-mentation by selecting statements from a large set of descriptors. Such a study promises to be cleaner, because it overcomes variations in the sender-receiver relationship and affords more sensitive measurement of any sender effect as mentations generated as a string of selected statements can be judged both holistically (blind judging of mentations, rank ordering all clips in the pool) and atomistically (number of statements originally coined for the target clip that were selected as part of the mentation vs. that expected by chance).

It should be noted that the present study, as with Roe (1996), uses a tacit psi task in that participants are unaware of the REG measure until they are debriefed after data collection. Such tacit psi tasks have had some

success previously. Perhaps the best known study is by Stanford, Zenhausern, Taylor, and Dwyer (1975), who first gave 40 male participants a conscious REG task (that gave results at chance) and then a dull mechanical task with the REG running again, unbeknown to the participants. Those who scored seven direct hits in a block of 10 silent trials were "released" and given a more pleasant task—by chance 2.9 participants should have escaped, but in fact 8 did ($p = .00069$). Schmeidler (1977, 1982) reviewed earlier studies that compared informed and uninformed PK trials and reported inconsistent outcomes, with some finding superior performance when informed (e.g., Kuyper et al., 1972) and others finding superior performance when uninformed (e.g., Terry & Schmidt, 1978). These studies are confounded by possible experimenter effects, and it remains to be seen whether tacit PK tasks represent a useful means of detecting psi.

STUDY AIMS

Three predictions were hypothesised, using sum of target ranks as the primary outcome measure and a fourth was planned to evaluate the atomistic data. All predictions are directional and so were prespecified as one-tailed:

1. Receivers will identify the target clip to a greater degree than expected by chance.
2. REG mentations will allow an independent judge to identify the target clip to a greater degree than expected by chance.
3. REG mentation judgements will identify the target clip to a greater degree than achieved by actual receivers.
4. More statements originally coined to describe the target clip will be selected than one might expect by chance.

We also planned to conduct exploratory analyses considering covariation of REG and receiver performance with receiver and sender personality and attitude measures. These correlations were prespecified as two-tailed.

METHOD

Design

The present study is the first of a series that is intended to systematically explore the utility of using an REG as a proxy receiver within a ganzfeld GESP protocol and to map the properties of this experimental context. This consists of a comparison of ganzfeld success rate between "live" receivers and the REG analogue, as for each traditional ganzfeld trial an REG operates alongside the receiver to generate an alternative mentation. The dependent variable for planned analyses is the sum of

target ranks awarded by the receiver and an independent judge; the dependent variable for exploratory analyses is the z score of target ratings.

Participants

An opportunity sampling method was used to draw 40 pairs of participants. These were mainly staff and students at University College Northampton and friends of the experimenters. Participants were not selected on the basis of prior belief, experiences, or personality and attitudinal dimensions that have previously been reported as related to psi performance (although a number of such variables were measured). It was a requirement that participants were ganzfeld novices and would therefore be unfamiliar with the clips that were included in the target pool. Each participant provided his or her own sender, who typically was a friend or relative. Lab personnel did not serve as participants.

Apparatus and Materials

This study used an automated ganzfeld computer system developed by Dr. Paul Stevens and written in Microsoft Visual Basic v5 that presented video material via the API for Media Player v7. Video clips are stored digitally as MPEG files, labelled 1a, 1b, 1c, and so on. Three separate monitors for the experimenter, sender, and receiver are controlled by the experimenter PC via separate video cards, which prevents video leakage. Security measures within the program lock the experimenter out of system completely during a session, so that it is not possible to switch to another application or access the computer except by aborting the session. Audio signals are split into left and right channels for sender and experimenter/receiver so that it should not be possible for audio leakage to occur.

The target set consists of the digital target pool developed at the University of Edinburgh, Edinburgh, Scotland, consisting of 96 digital video clips in 24 sets of 4. Ganzfeld randomisation is achieved using the Visual Basic pseudo-random algorithm, seeded using the timer at the start of the program (RANDOMIZE TIMER). Once the "Start" button has been pressed, the computer first selects a target set, then selects 1 of the 4 clips within that set. The order of presentation of the 4 clips at judging is similarly randomised.

The descriptor pool that the REG draws from consists of eight statements for each of the 96 clips to give a total pool of 768. Statements were coined by Chris A. Roe (CR) and Nicola J. Holt (NH) so as to be accurate but not overly specific (e.g., "a sense of flying or floating" rather than "a flock of birds flying overhead") so that they could in principle help identify targets from other sets and also so that they were more characteristic of the kinds of descriptions given during ganzfeld stimulation. It was not considered important to ensure that statements were distinct from one another, but rather we were concerned that the statements accurately reflect essential features of the clips. Hence statements vary inasmuch as



Figure 1. Schematic diagram to illustrate the layout of experimental rooms.

the clips themselves vary. Statements were selected during the sending period by taking one sample a second from an Orion RNG v1.1 attached to a Pericom 386 PC running under DOS. At the end of the sending period, the 20 statements that had been selected most often formed the mentation. In the event of any ties at the cutoff point of 20, then the first selected was automatically taken. Figure 1 is a schematic diagram that illustrates the layout of experimental rooms. We should note that none of

the rooms have windows. Both the experimenter's room and the sender's room have a door with a glass panel that has been completely covered with opaque material.

All trials were completed using specialist facilities in the Psychology Building at University College Northampton. The sender room is sound attenuated and is separated from a public corridor by two lockable doors. The sender's and receiver's rooms are separated by approximately 38 m.

A battery of measures was administered that consisted of the following:

Participant Information Form: An 11-item questionnaire devised for the study that asked for general demographic information, as well as about previous psychic experiences, self-perceived creativity, and the incidence of hypnagogic imagery and synaesthesia.

NEO-FFI (Five-Factor Inventory), Form S (Costa & McCrae, 1992): A 60-item questionnaire measuring the five domains of neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Alpha coefficients for these domains are reported for the long form (NEO Personality Inventory-Revised) as ranging from .86 to .92 and test-retest reliabilities in the range .66 to .92. No reliability data are reported for the short form, but convergent validity estimates with the long form for the domains range from .70 to .92.

Thalbourne's Paranormal Belief Scale (Thalbourne & Delin, 1993, adapted as by Roe, 1998): An 18-item measure of belief in a range of paranormal and psychic phenomena, including telepathy, precognition, clairvoyance, mediumship, life after death, and psychokinesis. Overall Cronbach's alpha for this scale is reported at .92, and test-retest reliability after 11 months is reasonable at .66.

Sender's Postsession Questionnaire: A 14-item specially constructed questionnaire exploring the sender's experience, particularly the level of engagement with and response to the target clip.

Procedure

This study adopted a variant on the standard ganzfeld protocol. Prior to the trial, participants (senders and receivers) completed a battery of measures. The second and third authors acted as experimenters in the running of trials, with CS conducting 10 trials and NH 30 trials. Experimenters were not blind to the study hypotheses regarding the REG. Both experimenters endeavoured to make participants feel as comfortable and relaxed as possible prior to the trial, discussing the procedure and answering any questions arising while sharing refreshments. At this stage participants were not told about the purpose of the REG that would be running during the session. Participants were given a guided tour of the facility as the roles of sender and receiver were explained.

With the assistance of the sender, the experimenter prepared the receiver for the ganzfeld and wished the receiver success. The receiver was seated in a reclining chair and encouraged to relax. Receivers were invited to remove

their shoes and cover themselves with a blanket if desired. They wore headphones with a microphone attached, through which they could communicate with the experimenter and be heard by the sender. Halved ping-pong balls were placed over their eyes and held secure with micropore tape. A red light was shone on the receivers' face, positioned immediately in front of them at a distance that was comfortable for them (typically 1 m). The receiver was then locked in the room and the sender guided back to the room.

Once the experimenter had returned to the experimenter's room and established contact with the receiver, the trial commenced. The receivers began by listening to and following a series of progressive relaxation instructions,¹ after which there was a mentation period of 30 min during which they listened to pink noise being played through the headphones and reported on any impressions or sensations that they experienced. The experimenter listened to the receivers' mentation via headphones from the experimenter's room and took notes. The senders could also hear any comments made by the receivers during the mentation period as they watched a selected video clip that was played 15 times with 1-min intervals between plays. Drawing materials were provided for the senders should they wish to sketch elements of the target clip during these "quiet" periods. During the sending period, an REG located in the receiver's room silently generated an alternative mentation by selecting elements from the pool of statements.

Subsequent to the sending-receiving period, the receivers were asked a series of questions regarding their experiences in the ganzfeld. Simultaneously, the senders completed a questionnaire concerning their interaction with the target and sending strategies used. The experimenter then read the receivers' mentation back to them and asked if there was anything further that they would like to add. At the judging stage the receivers were asked to remove their eyeshields but were encouraged to remain in a relaxed state as they watched four video clips, giving each one a percentage similarity rating. They were able to view these clips as many times as they wished and to alter their ratings if necessary. The sender was able to listen to the clip soundtracks and the interaction between the receiver and experimenter during the judging stage but did not view the dummy clips. Once the receivers were satisfied with their ratings, these were confirmed and saved as a permanent record. Only after the data were saved was the target clip revealed and replayed. The sender, experimenter, and receiver then convened for a discussion and debriefing session in the receiver's room. Participants were only made aware of the purpose of the REG element of the study during debriefing, at which stage they were free to withdraw their data from any or all of the study. None chose to do so.

¹ These recorded instructions were produced by both experimenters so that the participant would hear a voice they were familiar with.

After completion of all trials in the series, an independent judge who was otherwise uninvolved with the study² rated the four clips in each set according to the degree to which they reflected the content of the REG mentation in the same manner as done by the receiver. Finally, CR went through the REG mentations to note the number of occasions on which a statement originally intended for the target clip had been selected as part of the mentation for that trial in order to generate an atomistic assessment of REG success. At this time CR was aware of the trial outcomes. A judge³ who was otherwise not involved in the study and who was blind to the study outcome completed an independent analysis that confirmed CR's analysis.

RESULTS

Overall Ganzfeld/REG Performance

The ranks allocated to target clips by the receiver and by the independent judge using the REG-generated mentations are summarised in Table 1. We can see from this that receivers in the ganzfeld achieved a 35% hit rate. Fourteen direct hits were obtained over 40 trials, which is more than the mean chance expectation of 10, with a significant sum of ranks (SOR = 87, $z = 1.77$, $p = .038$, one-tailed), in support of Hypothesis 1.

TABLE 1
TARGET RANK FREQUENCIES FOR THE
RECEIVER- AND REG-BASED MENTATIONS

Variable	1	2	3	4	SOR	z	p (1-tail)
Receiver	14 (35%)	11 (27.5%)	9 (22.5%)	6 (15%)	87	1.77	.038
REG	13 (32.5%)	12 (30%)	8 (20%)	7 (17.5%)	89	1.48	.069

For the judgement of REG-generated mentation, performance is also somewhat better than chance, with 13 rather than 10 direct hits, giving a 32.5% hit rate. However, the sum of ranks falls just below significance (SOR = 89, $z = 1.48$, $p = .069$, one-tailed). Hypothesis 2, that the REG mentations would allow an independent judge to identify the target clip to a greater degree than chance, was thus not supported. Given that true receiver performance was superior to that of the independent judge, Hypothesis 3, which predicted that the REG mentations would enable

² We are grateful to Jacqui Wilson for serving as an independent judge. We should note here that she had little, if any, contact with CS or NH during the course of the study. The REG mentation sheets were made up by CR, who at that time was aware of the overall study outcome but did not have details of the outcomes of individual trials beyond being informed of the target set.

³ We are grateful to Mark Ycoman for serving as an independent analyst.

identification of the target clip more successfully than the actual receivers, was also not supported.

Covariation of REG Performance With Receiver Performance

The similarity in distribution of ranks for both receiver and REG mentations might suggest some coincidence of performance, with both receiver- and REG-based ranks being successful or unsuccessful on the same trials, which could be indicative of a general sender effect.⁴ However, no significant correlation was found between them ($\rho = .136$, $p = .202$, one-tailed). Thus the receiver's relative success at the task is not predictive of the degree to which the REG-generated mentation will correspond to the target.

Atomistic Analysis of REG Performance

For the atomistic analysis, we were interested to see if those statements originally coined as descriptors for a particular clip were more likely to be selected on trials when that clip was the target than we might expect by chance. Over 40 trials, we would expect on average to have 7.6 trials with at least one statement originally intended for that clip.⁵ In fact only 6 trials included a target clip statement, which is nonsignificantly fewer than chance expectation.

Covariation of Performance With Receiver Personality Variables

When considering covariation of psi task performance with personality and attitudinal factors, we used the z score of the target clip's similarity rating as the outcome variable. This was deemed preferable to using the simple rank, because it is more sensitive and allows for greater variance across participants, which is essential when considering covariation.

Table 2 summarises the relationships between receiver personality and attitude scores and performance for both the receiver and the REG. We can see that the relationships between these variables are weak or nonexistent. There are 26 correlations in Table 2, which multiple analyses increase the likelihood of capitalising on chance to give spurious significant effects, such that we might expect one of these relationships to achieve significance just by chance. Despite this, none of the receiver variables significantly predict performance in either task,

⁴ We are grateful to an anonymous reviewer for noting that this could equally reflect a target effect, with some target pools perhaps being constructed such that they are easier to judge.

⁵ The probability of one or more target statements being selected on any particular trial can be calculated from $(1 - p)$, where p equals the probability of none being selected, which in this case equals $\dots (760/768 \times 759/767 \times 758/766 \dots 741/749)$, or .191. The probability that six or fewer statements would be selected is calculated using the binomial distribution.

and indeed none may even be considered suggestive ($.05 < p < .1$). Only one gives a correlation greater than .25,⁶ and the relationship in this case is in the "wrong" direction, with greater success by the receiver being associated with lower scores on openness to experience, contrary to expectation.

TABLE 2
SPEARMAN RHO CORRELATIONS BETWEEN RECEIVER PERSONALITY AND
ATTITUDE MEASURES AND PERFORMANCE
(AND TWO-TAILED PROBABILITIES)

Measure	Receiver ratings z scores	REG-based ratings z scores
Previous psychic or unusual experiences	-.162(.318)	.056(.732)
Do you think you can be psychic in the conditions of this study?	-.223(.171)	.148(.367)
Do you believe that we all have the ability to be psychic?	-.097(.553)	-.011(.946)
Receiver's score on belief in paranormal scale	.137(.400)	.025(.880)
Synaesthesia	-.120(.460)	.108(.507)
Frequency of hypnagogic experiences	-.203(.216)	.015(.928)
Receiver: how creative are you?	-.101(.536)	-.118(.468)
Receiver: how important is creative practice?	-.092(.571)	-.038(.814)
NEO personality dimensions		
Neuroticism	.011(.945)	-.035(.829)
Extraversion	.031(.847)	-.139(.391)
Openness to experience	-.259(.106)	-.171(.292)
Agreeableness	-.135(.407)	-.139(.392)
Conscientiousness	.102(.530)	-.113(.488)

Covariation of Performance With Sender Personality Variables

The relationships between sender personality and attitude scores and performance for both the receiver and the REG are summarised in Table 3. We can see that none of the correlations with receiver ratings exceed .25, and indeed the largest effect size, with belief in psychic ability, is in the opposite direction to that which might have been expected, with better

⁶ The figure of .25 was chosen as a somewhat arbitrary threshold point for identifying potentially interesting relationships, on the basis that effect sizes larger than this are likely to be suggestive (two-tailed) or would be close to significance (one-tailed). Of course, these findings are not treated as significant here, but given the exploratory nature of this study are regarded as worthy of further consideration in subsequent studies in this series. This figure is somewhat smaller than Cohen's (1988) judgement of .3 as a medium effect size for r and ρ .

performance being associated with lower levels of belief. Interestingly, for REG performance, three relationships are greater than .25. Two of these are only suggestive and also are in the opposite direction to prediction, with higher ratings on importance of creative practice and openness to experience predicting worse performance. The one significant effect is with synaesthesia, where those reporting more synaesthesia-like experiences performed better at the REG-based task.

TABLE 3
SPEARMAN RHO CORRELATIONS BETWEEN SENDER PERSONALITY AND
ATTITUDE MEASURES AND PERFORMANCE
(AND TWO-TAILED PROBABILITIES)

Measure	Receiver ratings z scores	REG-based ratings z scores
Previous psychic or unusual experiences	.069(.671)	.098(.547)
Do you think you can be psychic in the conditions of this study?	.009(.958)	.063(.699)
Do you believe that we all have the ability to be psychic?	-.242(.133)	-.093(.570)
Sender's score on belief in paranormal scale	-.098(.549)	-.085(.601)
Synaesthesia	-.175(.279)	.340(.032)
Frequency of hypnagogic experiences	-.018(.914)	-.205(.205)
Sender: how creative are you?	.015(.929)	-.191(.238)
Sender: how important is creative practice?	.193(.232)	-.269(.093)
NEO personality dimensions		
Neuroticism	-.045(.784)	.002(.989)
Extraversion	.024(.883)	.132(.415)
Openness to experience	-.131(.420)	-.266(.097)
Agreeableness	.206(.202)	-.169(.298)
Conscientiousness	-.148(.364)	.212(.189)

Covariation of Performance With Sender Situational Variables

Finally, we were interested to see whether the senders' choice of strategy and their degree of engagement with the target could be used as predictors of task success. These analyses are presented in Table 4. Once again, no relationships with receiver performance are evident, but there are two suggestive relationships with REG performance. In particular, the senders' sense that their strategy was working was suggestively related to actual REG success, but there was no relationship with receiver performance. This latter is surprising given that these ratings were made *after senders had received constant audio feedback on the receiver's mentation* (but not at that stage their final judgements) and so might be expected to have a sense of whether their mentation accorded with the target.

TABLE 4
SPEARMAN RHO CORRELATIONS BETWEEN SENDER STRATEGY MEASURES
AND PERFORMANCE (AND TWO-TAILED PROBABILITIES)

Measure	Receiver ratings z scores	REG-based ratings z scores
How engaging did you find the video clip?	.053(.746)	-.253(.115)
How emotional did you find the video clip from not at all to very?	.127(.435)	-.273(.088)
How emotional did you find the clip from negative to positive?	.124(.445)	-.165(.308)
How enjoyable did you find the role of being a sender?	.121(.456)	-.192(.236)
Did you feel that your sending strategy was working?	.001(.997)	.286(.073)

DISCUSSION

In this study participants were able to select the target from among four alternatives to a degree that was significantly above chance expectation. The 35% hit rate reported here is identical to Bem and Honorton's (1994) mean estimate of the four-alternative hit rate and obviously falls well within their 95% confidence interval of 28%–43%, and thus could be regarded as a successful replication. The effect size of .28, calculated using $z/N^{1/2}$, is somewhat larger than that for the set of subsequent studies reviewed by Milton and Wiseman (1999), which gave a mean effect size of 0.013 ($SD = 0.23$). With respect to this distribution of effect sizes, our study gives rise to a z score of 1.16.

The "performance" of the REG in generating mentations that resulted in a 32.5% hit rate is quite striking, but we are clearly aware that the sum of ranks analysis was not significant, and so cannot be regarded as evidence of a sender effect unless replicated. However, the outcome is sufficiently promising, we would argue, to warrant such replication attempts. Converting the outcome z score into an effect size gives $r = .234$ (using $r = z/N^{1/2}$; after Clark-Carter, 1997, p. 551), which is similar to the effect size of .257 reported in previous research that utilised an REG as a proxy psychic reader (Roe, 1996), and from which this study was adapted. It also compares favourably with typical effect sizes for other REG-based studies, which Radin and Nelson (1987) estimated at 3×10^{-1} , and which more recently has been calculated as 6×10^{-5} (Steinkamp et al., 2002).⁷

⁷ This is taken from the weighted mean effect size, π , of .50003, which gives an r of 6×10^{-5} using the formula $r = (\pi - .5) / .5$ (after Steinkamp et al., 2002, p. 272). We are mindful, however, of the extreme heterogeneity of the results included in that analysis and the reported correlation with study size that may reflect a publication bias, and which leads us to be cautious in our interpretation (E. Boller, personal communication, February 2003).

In comparing the performance of the sender with that of the REG, it may have been preferable to have both mentations assessed by the independent judge so as to make the outcomes more comparable. However, we felt that it was important to include the receiver's own judgements because this is how ganzfeld mentations are typically judged and represents, we would argue, a more direct measure of any sender effect than could be achieved through independent judgements. We were also concerned that where a judge is asked to rank order a set of clips on the basis of one set of mentations in the knowledge that he or she had already rank ordered those same clips for those trials on the basis of some other mentations, then that prior knowledge might affect present judgements sufficiently to compromise their independence. This problem is not unavoidable with careful planning, and we hope to address it in a replication attempt.

The atomistic analysis indicated that whatever degree of success could be attributed to the REG was not a result of the REG selecting statements that were originally coined for the target clip. However, the statements were purposely coined so as to be flexible, and this seems to have been advantageous. Although the target pool is intended to be diverse, inevitably there will be some common themes across some clips (though those allocated to any particular target set are as distinct as possible) so that in a number of cases a statement was selected that had originally been coined for another clip but that seemed remarkably apt for the target clip. For example, for Trial 3 the target clip was *Antarctic shore*, which contains scenes of a flurry of penguins on an ice flow. The mentation for this trial included one statement originally coined for the clip: "The sea – blue and icy – water – waves – streaming," but also included the following statements originally intended for other clips: "People close together – pushing and jostling each other," "Loud screaming – a bird screeching," "Wings white wings – angel wings – flapping – flying," and "Two animals, circling each other – running round in rings." Although not literal descriptions of the scene, these further statements do capture its essential features, so that when considered together they were described by the independent judge as "very impressive" and given a similarity rating of 90. For Trial 26 the target clip was *Police chase*. The mentation again included one intended statement: "Police cars screeching – racing – zooming past – sirens blaring," but also included "Traffic – busy roads – crossroads, grids of streets, crossings," "Sounds of screeching or squealing" (originally coined to describe animal sounds), and "Turning cartwheels" (originally describing human movements), which when taken together led to a similarity rating of 55. A number of similar examples are omitted because of limitations of space.

The discrepancy between the results of holistic judgements of REG mentations by an independent judge and the outcome of the atomistic analysis could indicate that any apparent success of the REG mentation is actually due to psi on the part of the judge. According to this explanation, the mentations are sufficiently vague or general to allow the judge

to justify the choice of any of the four clips, reducing the judgement to a rather convoluted forced-choice ESP task. Somewhat contrary to this, however, is the amount of variance in the similarity ratings awarded to the clips in each set,⁸ which suggests that some clips were distinctly more similar to the REG mentation than others. Nevertheless, it would be interesting to see what profile of ranks would be produced by another independent judge, or indeed to see whether this judge would have been equally successful if independently rating the receivers' own mentations. We plan to explore this in ongoing work.

An analysis of sender personality, attitude, and experiential variables revealed that of 31 correlational analyses with receiver ratings z scores, none were even suggestive. Of the 31 concerned with REG performance, 1 was significant and a further 4 were suggestive, and all of these were with sender measurements. If this pattern is typical, then it may add some weight to the original thesis that in normal circumstances any actual effect of the sender in GESP studies is unlikely to be detected by current measures because these are overwhelmed by the role of the receiver in detecting, interpreting, and reflecting any such effect in their judgements. None of the (admittedly weak) patterns found with the REG as sensor are evident with the receiver as sensor. Of course, there is a real danger of committing a number of Type I errors through overanalysis here, and clearly none of the significant effects would survive if subjected to correction for multiple analyses. Given that this study is exploratory, however, we would argue that it is appropriate to draw attention to potentially interesting patterns with the caveat that these need to be replicated before they need to be taken seriously. With this in mind, it is our intention to continue with this protocol to further consider the role of the sender by attempting to distinguish any psi on the part of the sender from that of the independent judge (or indeed the experimenter). We plan to do this by comparing sender and no-sender conditions, the latter of which would therefore have no sender and no receiver, and should in theory give null results.

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⁸ Calculating the standard deviation for ratings for each trial gives an average across the 40 trials of 23.21 ($SD = 10.34$).

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