
Technical Paper No. 1

Paranormal Effects Using Sighted and Vision-Impaired Participants in a Quasi-Ganzfeld Task

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ABSTRACT: An experiment on exosomatic psychopraxia was conducted in which 42 wholly or partially blind participants were matched for age and sex with 42 sighted participants. The experimental task was to describe, paranormally, a randomly selected drawing concealed in aluminium foil and a manila envelope. Every second participant was assigned to a relaxation treatment (audio tape). Following their attempted description of the target, participants were required to rank-order 4 drawings (1 the target, and 3 the decoys). For the whole sample, based on the rankings by participants (but not those of an independent judge), the sum-of-ranks statistic was significantly positive ($z = -2.98, p = .002$, two-tailed), as it was also for the sighted participants ($z = -2.41, p = .016$, two-tailed), whereas results for the vision-impaired were not significant. The relaxation tape appeared not to induce relaxation, at least as indicated by the heart rate measure, but the 'relaxed' groups (the whole sample, and the sighted group, but not the vision-impaired group) scored marginally better than the respective non-relaxed groups. Belief in ESP did not affect scores in the expected direction. We refer to the significant and marginally significant effects as evidence of exosomatic psychopraxia (the latter effects indicating that relaxation might have been conducive to psychopraxia). However, a specific mode of psychopraxia^{3/4} compensation^{3/4} was not found in the vision-impaired group.

¹ We wish to acknowledge funding from the Bial Foundation.

*The sensory world of the blind in fact
appears to be very rich in meaning.*

Allan Paivio (1971, p. 520)

*The blind do not have the same knowledge
of how vision works as do their sighted
peers.*

Ann Bigelow (1992, p. 184)

THE NATURE OF EXOSOMATIC PSYCHOPRAXIA

In the research and arguments reported in Storm and Thalbourne (1998-1999; 2000; 2001), attention was focused on the dichotomy between ESP and PK. Paranormal effects were found in two experiments with the *I Ching*, but no convincing argument could be put forward that the cause behind those effects was exclusively ESP, or PK, or ESP and PK combined. It was concluded that such circumstances beg for a more neutral terminology if we are to take up the broader issue of paranormal mechanisms. In fact, mechanisms should not be proposed or implied if they cannot lead to an equitable solution as to whether paranormal processes involve anomalous information acquisition, or anomalous energy transfer, or some such factor as yet undetermined.

Thalbourne (2000, Ch. 1) categorised the above problem as part of the “conceptual malaise” of modern parapsychology, and specifically referred to it as the “process uncertainty problem”. He also advocated a rejection of the terms ‘ESP’ and ‘PK’ in favour of the longer but more neutral term ‘exosomatic psychopraxia’ to describe ostensible paranormal phenomena that occur in regions outside, or beyond (“exo”), the soma—the body.

Thalbourne (2000, Ch. 2) also describes the so-called “diasomatic hypothesis”, in which paranormal processes are seen as acting both within the body and outside of it. Exosomatic psychopraxia was seen as acting either in a compensatory way (substitution mode) or as a ‘spill-over’ effect. In this article, exosomatic psychopraxia, acting as compensation for some temporary or permanent ostensibly ‘adverse condition’ (namely, vision-impairment) in the test participant was to be investigated. This experiment is the first of its kind in which vision-impaired participants were administered a free-response task rather than a forced-choice (card-guessing) task. In addition, the conditions of relaxation and belief in paranormal processes, hypothesised as being necessary conditions that help

bring about exosomatic psychopraxia, were also investigated. Thus, the aims of the present study were:

1. To determine whether there is a significant difference in regard to paranormal performance between vision-impaired participants and sighted participants.
2. To determine whether relaxation is conducive to paranormal performance.
3. To determine whether belief in paranormal processes is conducive to paranormal performance.

It might be argued that in certain paranormal tasks, where visual acuity could be regarded as an advantage, a deficit in vision may work against vision-impaired participants. If so, should the vision-impaired perform poorly (compared to sighted participants) on a given paranormal task, an artefact of vision-impairment rather than lack of paranormal ability may be said to have occurred, but this conclusion may be wrong. In the attempt to 'level the playing field', as it were, for the sighted and the vision-impaired alike, we note that much research has been done to allay the commonly held belief that totally or partially blind¹ individuals must in some way be limited in their capacity to form visual images in their minds (see Gardner & Paivio, unpublished, cited in Paivio, 1971; Paivio, 1971; Paivio & Okavita, 1971; Schlaegel, 1953; Zimler & Keenan, 1983).

Ring and Cooper (1997) found that the majority (64%) of congenitally blind participants in their study claimed to 'see' during near-death experiences and out-of-the-body experiences. They claimed that there were occasional reports from participants of 'visually-based' knowledge that could not have been obtained by normal means. The term 'mindsight' was coined by the authors to describe this ostensible perception of the vision-impaired that functioned like sight involving a deep awareness and profound ability to know (see also Ring & Cooper, 1999). Christie-Murray (2000) and Parker (2000) have commented on this alleged ability, and both hint at the implications it may have for parapsychological research in regard to the nature of paranormal processes.

¹ The term 'partially blind' is now superseded by the more appropriate term 'vision-impaired' (P. Greco, personal communication, May 17, 1999). The latter term is used by the authors to describe, generally, any participants in the vision-impaired experiment whose levels of blindness may be partial or total (degrees of vision-impairment are assigned on the basis of legal, clinical, or even personal considerations).

When comparing task performances between sighted and vision-impaired, it must also be acknowledged that the world of the vision-impaired individual is unlike ours in that perception for the vision-impaired depends on sense data that we may ignore for the most part, such as tactual contacts involving air pressure and temperature changes, sound distortion (e.g., echoing or dampening effects), and changes in light intensity, as sensed by the corresponding indicators of changes in irradiated heat from certain objects (for further examples, see Brodey, 1969). Thus, at this stage, it may be too early to arrive at categorical conclusions about who is really disadvantaged in visually oriented tasks—the sighted or the vision-impaired. Nevertheless, the limited evidence so far indicates that it is reasonable to compare both types of participant if the task can be judged as showing no sign of bias for or against either type. In parapsychology, many paranormal tasks are, for the most part, free from bias that might compromise the performance of the vision-impaired. After all, success at paranormal tasks is often shown not to depend on vision at all (for example, consider the ganzfeld percipient who is effectively ‘blind’ during the experiment).

Only if it can be argued that certain spatial skills and/or manipulation of target pictures allows for concept formation that may lead to a greater capacity to form imagery with knock-on effects conducive to paranormal performance could it then be claimed that sighted participants might have an advantage over their sighted cohorts. But again, as was shown above, where sight might seem to be an advantage, the vision-impaired and even the congenitally blind do not seem to be challenged to quite the degree that we may have come to believe.

PARANORMAL EXPERIMENTATION WITH THE VISION-IMPAIRED

Alvarado (1988) reports that blindness, imagery and paranormal performance have been topics of interest as far back as 1891. He cites F. W. H. Myers (1891), who was one of the first psychical researchers to conjecture that paranormal ability might manifest in the blind, suggesting that the blind person “will exercise a sight, which he [sic] does not recognize as sight, which belongs in fact to that pre-natal undifferentiated continuum of perceptive faculty of which telepathic and clairvoyant phenomena show us the vestigial or obsolescent trace” (p. 127). Myers (1891) thought it possible that clairvoyance, in particular, might manifest through “novel channels where specialized [i.e., auditory and tactile] sense is in default” (p. 126).

Decades later, Price and Pegram (1937) were the first to investigate paranormal performance in the vision-impaired (they referred to their

participants as “blind,” but their sample included partially impaired individuals). Sixty-six participants were given Zener card-calling tests with 25 calls per run, using three matching techniques: Open Matching (cards in the pack are face up, and the participant is told the order of the cards in the pack, each of which must be placed against 1 of 5 unidentified key cards), Blind Matching (same as Open Matching, but cards in the pack are face down, and the participant is not told the order of the cards in the pack), and Match Piling (the participant divides the 25 cards into 5 piles, and names the piles, e.g., “this is the circle pile, that is the star pile,” etc.). The number of runs per participant ranged from 3 to 86. There was a significant deviation from chance, with forty-four percent of the sample producing individually significant scores. Price and Pegram found that age and extent of impairment did not make significant differences to scoring trends. Even more surprising was the fact that scores actually improved when the cards in the pack were placed in opaque sealed envelopes!

Price and Pegram (1937) recognized the problem of testing a specific group without using a control group for comparative purposes (i.e., they did not test sighted people). They concluded that the “high proportion [of hits] cannot be considered significantly unusual until further research has been done with non-blind groups of comparable age and grade under similar social conditions” (p. 153). Consequently, in a follow-up study, Price (1938) tested vision-impaired and sighted participants so that performance comparisons could be made. The two groups “were selected for similarity on age and institutional status” (p. 286). There were 66 “blind” and 40 “seeing” participants. Open Matching and Blind Matching methods were primarily used, as in the Price and Pegram (1937) study. When both groups were combined, overall scoring was significantly above chance. The vision-impaired produced higher average scores than the sighted, but the differences were not significant. When cards were sealed in opaque envelopes, scoring was significantly higher for both groups compared to the ‘open-card’ method. Price concluded that “something meaningful” (i.e., “extra-sensory perception”) took place in the tests, and she dismissed the rival hypotheses of sensory leakage that might explain the effects, as was shown by the fact that “subjects scored better in tests with enclosed cards than with the open cards” (p. 282).

Gonzales-Scarano (1982) looked at paranormal task performance in the sighted and the vision-impaired. She (after Paivio, 1971) assumed that individuals who suffered a sensory deficit in one modality would be compensated by other unimpaired modalities. On this basis, Gonzales-Scarano theorized that unconscious memory images (visual, auditory, etc.) would be activated into consciousness by noncognitive factors—even paranormal processes might be activated by these factors.

Gonzales-Scarano used a visual memory test similar to that of Paivio and Okovita (1971). High-visual/low-auditory word-pairs and high-auditory/low-visual word pairs were randomized and presented verbally to the participants. The paranormal component of the test was described as involving the identification of pre-designated specific word targets. The experimenter was 'blind' to the identity of the targets. Two hypotheses were proposed: (i) that the sighted would recall more 'high-visual concrete nouns' than the congenitally totally blind, and (ii) that the congenitally totally blind would recall more 'high-auditory concrete nouns' than the sighted. Both hypotheses failed to be confirmed. These results suggest that the totally blind participants were no more advantaged or disadvantaged than the sighted.

Like Price (1938), Barnard and Nelson (1983) also ran a card-matching task using 10 sighted and 10 "nonsighted" participants. They hypothesized that the nonsighted would perform significantly better than the sighted, especially when the nonsighted were allowed to "touch" the cards (i.e., "directly handle the cards", p. 58). There were therefore four groups, but no significant main effect, or interaction effect, was found. However, a significant variance difference was found (as a so-called *F max* ratio of the variances) between the sighted and nonsighted groups. Also, in a post hoc *t*-test comparing overall group scores to chance, significant "psi-hitting" was found for the "nonsighted" (p. 59). The combined sample of 20 participants also produced a significant hit rate, but only in the 'touch' condition.

Overall, the few available studies do no more than suggest that paranormal performances of the vision-impaired may be superior to those of the sighted. Perhaps, more importantly, Gonzales-Scarano's (1982) negative findings suggest that the vision-impaired and the sighted should not be treated as incommensurable groups when given tasks that test their capacities to form images in their minds. There may be no good reason not to compare the vision-impaired and the sighted.

Price and Pegram's (1937) hypothesis, that "the blind may be better at ESP than are the sighted," has been reiterated by Thalbourne (2000). The experiment described in this article tested Thalbourne's compensation hypothesis.

RELAXATION AS A MODERATOR OF PARANORMAL PERFORMANCE

Considerable research has been done on the ostensible effects of relaxation as a modifying variable of paranormal performance. Smith and Gibson (1941) were amongst the first to apply a systematic investigation of factors that "inhibit or facilitate performance of subjects in ESP tests" (p. 58), and in so doing, identified relaxation as one of many facilitators of

ESP. Rhine (1946) extended Smith and Gibson's finding by showing that participants' PK results were significantly improved when they were hypnotized and instructed to act "in a spirit of fun and relaxation" rather than "try very hard" (p. 126).

Ultimately, Braud (1975), having identified relaxation as an epiphenomenon of hypnosis, also noted that it was conducive to "good psi performance" (p. 142). He found, (a) relaxation of the "skeletal musculature," (p. 143) and, more generally, "deep mental and physical relaxation" (p. 144) could be achieved if participants listened to relaxation tapes, and (b) those participants on relaxation protocols tended to be the "good psi performers" compared to the "poor psi performers" who were not on the protocols. Relaxation inevitably became one of Braud's seven major characteristics of the "*psi-conductive syndrome*" (p. 142).

Honorton (1977) cursorily reviewed the 'relaxation' literature, and found 13 studies that used relaxation protocols to "enhance psi receptivity" (p. 457). Seven principal investigators were involved in these studies dating back to the late 1950s. There was a 77% success rate (10 out of 13 studies). However, these figures are misleading (but, we emphasize, not necessarily flawed) because only Schmeidler's (1952, 1957) two studies each used non-treatment (i.e., control) groups, whereas the other 11 studies used alternative designs: That is, (a) split-sample design for a two-group comparison with no control group (such as 'low'-relaxation versus 'high'-relaxation), or (b) relaxation combined with some other treatment(s) for all participants in the sample, and no control group (e.g., relaxation + hypnosis), or (c) all participants on relaxation, but no other treatment, and again, no control group.

Results from studies using experimental designs such as these do not give a clear indication of either, (a) valid performance differences that may be expected between experimental (relaxation) groups and control (non-relaxation) groups, and/or (b) the exclusive influence of relaxation above and beyond the additional influence of another treatment, a situation that may be complicated by (say) an interaction effect between relaxation and the other treatment. In order to gain a general idea of how successful the relaxation studies have been, only the studies that used a two-group design, with an experimental group on relaxation (the treatment group) and a control group, were analysed using the 'vote-counting' technique.² The results are presented in Table 1.

² The vote-counting technique draws "inferences about an experimental effect by counting the number of significant versus nonsignificant studies of the effect" (Utts, 1991, p. 369).

Table 1 shows that 5 out of 7 studies yielded significant differences on performance due to the exclusive effect of relaxation (i.e., a 71% success rate), with the relaxation groups yielding the better performances. However, the success rate drops dramatically if all available studies that featured relaxation in their design are counted again, with the three alternative designs mentioned above not being used as criteria for excluding them in the count. These studies may also be regarded as indicating in some way the psi-conducive effects of relaxation, albeit due to the possible influences of other treatments besides relaxation.

Table 1
Relaxation Studies Using Control (i.e., Non-Relaxation) Groups for Comparison

Year	Author(s)	Significant Group Difference	
		Yes	No
1952	Schmeidler	*	
1957	Gerber & Schmeidler	*	
1975	Honorton	*	
1979	Rao (Series II) [#]		*
1982	Debes & Morris	*	
1984	Quider		*
1987	Palmer and Kramer	*	
Totals		5	2

[#] Rao's (1979) study yielded a significant relaxation effect in a single-participant 'pilot' study (Series I).

Table 2 lists all relevant and 'appropriate' studies (see 'Note', Table 2, for criteria of inclusion). Twelve out of 25 studies yielded significant differences in paranormal performance between the two groups (a 48% success rate).

Note that Tables 1 and 2³ are not comprised of ganzfeld studies that feature relaxation as a crucial component of the design protocol (see the

³ In Table 2, four studies—Braud and Braud (1973, 1974), Honorton and Barksdale (1972), and Rao (1979)—are counted (twice each) as eight

meta-analyses: Bem & Honorton, 1994; Honorton, 1985; Milton & Wiseman, 1999; Storm, 2000; Storm & Ertel, 2001). Note also that regardless of which table one decides to take as definitive of the efficacy of relaxation, the number of successful studies in either table is considerably more than might be expected by chance, using critical $\alpha = 5\%$.

Table 2

Relaxation Studies Using Additional Treatments (includes Control and Non-Control Studies)

Year	Author(s)	Sig. Diff.		Additional Treatments (1 = Group One; 2 = Group Two; ws = whole sample)	Control Group
		Yes	No		
1946	Rhine	*		Hypnosis (1 + 2); relax (2)	No
1952	Schmeidler	*		None	Yes
1957	Gerber & Schmeidler	*		None	Yes
1968	Krippner		*	Relax. (1); hypnosis (2)	No
1970	Stanford & Lovin		*	None	No
1972	Honorton & Barksdale (Expt. 1)	*		Relax. (1); tension (2)	No
1972	Honorton & Barksdale (Expt. 2)		*	Relax. (1); tension (2)	No
1973	Braud & Braud (Expt. I)	*		None	No
1973	Braud & Braud (Expt. II)	*		None	No
1973	Friedman, Ganzt, & Sinclair		*	Relax. + visualization (ws)	No
1974	Braud & Braud (Expt. I)		*	High relax. (1); low relax. (2)	No

‘studies’, thus deflating the success rates of relaxation studies. If taken as individual studies, using aggregated counts, only one successful experiment would be ‘absorbed’, but the overall success rate would rise to 52% (11 out of 21 studies).

Year	Author(s)	Sig. Diff.		Additional Treatments (1 = Group One; 2 = Group Two; ws = whole sample)	Control Group
		Yes	No		
1974	Braud & Braud (Expt. II)	*		Relax. (1); tension (2)	
1975	Honorton	*		None	Yes
1976	Altom & Braud		*	None	No
1976	Braud & Thorsrud		*	Relax. + incubation period (ws)	No
1976	Braud, Smith, Andrew, & Willis	*		Relax. (1 + 2); sound FX tapes (2)	No
1976	Miller & York		*	High relax. (1); low relax. (2)	No
1979	Morris & Bailey		*	Visualization (1); concentration (2)	No
1979	Rao (Series I)-single S study	*		None	No
1979	Rao (Series II)		*	None	Yes
1982	Debes & Morris	*		None	Yes
1984	Palmer & Kramer		*	Relax. + drumming (ws)	No
1984	Quider		*	Relax. + music (1); music (2)	Yes
1987	Palmer & Kramer	*		None	Yes
1992	Van der Sijde & Snel		*	Relax. (1); tension (2)	No
Totals		12	13	(12 + 13 = 25)	7

(Note: Studies excluded from Table 2 include those where participants were merely instructed to relax, but no actual relaxation treatments were administered. Also excluded, were studies that did not use comparison groups, or studies where relaxation was regarded as *no treatment at all*. One exception was found: Honorton and Barksdale (1972) reported an uncharacteristic reversal of effect where the tension treatment caused significantly higher scoring than the relaxation treatment. This study is excluded from Table 2 since relaxation must be conducive for a study to be included).

In conclusion, Honorton (1977) made an important observation about relaxation that has had a resounding influence on experiments on the paranormal ever since. He described relaxation as necessarily involving the “elimination” of “somatic noise,” and spoke of the need for “relative sensory deprivation” so that “psi retrieval” might be better achieved as a result of “internally-mediated mental processes” (p. 457). We can detect in these words the first hint of a new avenue of paranormal research and experimentation, viz., the ganzfeld paradigm. In this article, replication of the findings for relaxation (as shown in Table 2) was to be sought.

BELIEF IN THE PARANORMAL

Belief in the paranormal is a variable that may predict paranormal performance. Of particular importance was Palmer’s (1977, p. 193) statistically based finding that the “sheep-goat” (i.e., believer-disbeliever) dichotomy is probably the most reliable measure we have for determining the relationship between belief in the paranormal and paranormal performance. In support of this claim, Lawrence’s (1993) meta-analysis of sheep-goat studies spanning 47 years showed that sheep score significantly higher than goats on paranormal tasks.

In this article, attempts to replicate the overall findings for the belief hypothesis were to be undertaken.

THE FREE-RESPONSE (QUASI-GANZFELD⁴) EXPERIMENT

The experimental component of this study involved testing the ability of vision-impaired and sighted participants to rank a target picture, a copy of which was initially concealed in an envelope, amongst three other

⁴ The term ‘quasi-ganzfeld’ is reasonably applied here, given the fact that relaxation and sensory homogenisation treatments akin to the ganzfeld design were administered to half the participants (particularly the vision-impaired). The multiple-choice ranking protocol (by participants, or by an independent judge) typical of the ganzfeld was also incorporated into the design. However, the experimenter did not use ‘senders’, as is usually the case in ganzfeld experiments. Also, the “normal, waking state” (Milton, 1998, p. 31), characteristic of the consciousness of the free-response participant (as in this experiment), is not typical of the ganzfeld participant. Hence, the term: ‘quasi-ganzfeld’.

pictures (decoys). The task was essentially free-response⁵ as opposed to forced-choice. Heart rates of participants were also to be taken in order to determine the effects, if any, of a relaxation tape on heart rate and paranormal performance.⁶ Prior to the experiment proper, a target picture (a hand-drawn image corresponding to a word randomly selected from a dictionary) was randomly selected from four similarly derived pictures, photocopied, and then concealed in a target envelope.⁷ The four-picture set, and the target picture, were each wrapped in aluminium-foil, and then concealed in their respective manila envelopes.⁸ These tasks were not performed by the experimenter (L.S.), nor was the experimenter present during the selection process.⁹ The contents of the target envelope and the target-set envelope were never made known to the experimenter prior to the trial.

Participants were first required to describe verbally the line drawing that was concealed in aluminium-foil inside the manila envelope. Sighted participants (controls) were also tested on the same task.

⁵ The free-response design has some advantages over the forced-choice design. Thalbourne (1981) points out the “more life-like and more interesting” (p. 151) attributes of free-response compared to forced-choice (see also Utts, 1991, p. 368). Watson (1973, p. 254), in fact, criticized Rhine for his repeated use of the forced-choice paradigm, which was notorious for decline effects, and motivational problems, etc.

⁶ Regarding the relaxation measure, we thank Dr. Chris Cooper for his advice that we take the pulse using two fingers and a stopwatch. It was on his recommendation that this procedure be used as the best available.

⁷ The gallery of 180 pictures used in this experiment are hand-drawn originals by M. A. Thalbourne, who first used a smaller set of 120 pictures (12 sets of 10) in his Honours thesis (Thalbourne, 1976), and then, as the full set of 180 pictures (18 sets of 10), in his Ph.D. thesis (Thalbourne, 1981). In the vision-impaired experiment, the 180 pictures were systematically divided into 45 sets of 4. It eventuated that no target set was selected more than 4 times. Four sets were never used (#26, #27, #31, and #44). Although the selection procedure of target sets and targets, using random number tables, was apparently entirely random, we could not demonstrate this statistically.

⁸ The usual number of alternatives, k , in a ganzfeld experiment is four, and we have adhered to this convention. Note Rosenthal and Rubin's (1992-1993) recommendation: “In general, the smaller the effect size is expected to be, the smaller should be the value k selected” (p. 4).

⁹ The selection process was conducted in secret by M.A.T.

Participants were then required to rank the four pictures #1 to #4 using their mentation reports¹⁰ as a guide in the ranking process (the experimenter gave impartial assistance in this process by describing the pictures when they could not be seen by vision-impaired participants). The ranking was performed using the preferential ranking method (Thalbourne, 1981, pp. 55-56), where the participant assigns rank #1 to the most preferred picture, rank #2 to the second most preferred picture, and so on, until all four pictures are ranked.

After testing, the mentation reports were transcribed by L.S., assessed for their accuracy by a person skilled in discourse analysis and transcription techniques, and then judged by an independent judge in order to assess the mentation reports for their possible paranormal content from a non-participant's point of view. The judge was a qualified and recognized graphic designer, who was selected for the judging task on the basis of his graphic arts skills and conceptual and topographical 'eye' for imagery. His score on the forced-choice Australian Sheep-Goat Scale was 14, which is just below the median of 17 (Range = 36).

The analytical component of this study involved testing for overall rank scores, testing for group differences on paranormal performance, and determining correlates, if any, between paranormal ability and the relevant variables (i.e., relaxation and belief in ESP), in accordance with the hypotheses given below.

PARAPSYCHOLOGICAL HYPOTHESES

The following parapsychological hypotheses were proposed. (The tests used are given in parentheses with each hypothesis):

1. For all three groups, (i) the combined sample, (ii) the vision-impaired, and (iii) the sighted, the levels of scoring (expressed as sums-of-ranks scores) differ from chance ($MCE = 2.50$). (The sum

¹⁰ Due to the increased interest in analysis of qualitative data in the behavioural sciences, mentation reports in parapsychological research are becoming an important source of information to researchers (e.g., see Wooffitt, 1994). Thalbourne (1981) described the use of mentation reports in the near future as, possibly, a "routine requirement" in parapsychology (p. 28). These reports may hold information about parapsychological targets identifiable only with the use of sophisticated computer programmes capable of 'drawing out' distinctive patterns and concepts.

of ordinal weighted ranks formula, two-tailed. Solfvin, Kelly, & Burdick, 1978, p. 99).

2. There is a difference in paranormal performance between the vision-impaired and the sighted such that mean rank scores for vision-impaired are lower (better) than the mean rank scores for the sighted. (Wilcoxon signed-ranks matched-pairs test, one-tailed.)
3. There is a difference in paranormal performance between the relaxation group and the non-relaxation group such that mean rank scores for the relaxation group are lower (better) than the mean rank scores for the non-relaxation group. (The whole sample, the vision-impaired group, and the sighted group were to be tested; Mann-Whitney *U* test, one-tailed.)
4. There is a difference in paranormal performance between believers and disbelievers such that mean rank scores for the believers are lower (better) than the mean rank scores for disbelievers, based on answers to the belief in ESP question: "Do you think it is possible for at least some people to exhibit ESP under the conditions of this experiment?" (The whole sample, the vision-impaired group, and the sighted group were to be tested; Mann-Whitney *U* test, one-tailed.)

PSYCHOLOGICAL HYPOTHESES

The following psychological hypotheses were proposed. (The tests used are given with each hypothesis):

5. Relaxation lowers the pulse (i.e., heart rate after the test, HR_{After} , is lower in the relaxation group compared to the non-relaxation group). (The whole sample, the vision-impaired group, and the sighted group were to be tested; Univariate analysis of covariance (ANCOVA) is used because the test removes the unwanted source of variance in HR_{Before} , which is the covariate.)
6. Relaxation lowers the pulse (i.e., HR_{After} is different between response groups, according to answers to the relaxation question [see below]). (The whole sample, the vision-impaired group, and the sighted group were to be tested; Univariate ANCOVA.)

METHOD

Participants

A total of 84 participants¹¹ volunteered for the experiment. There were 42 participants in the vision-impaired group and 42 participants in the sighted group, which acted as a control group so that performances between the two groups could be compared. Every second participant in each group was assigned to the relaxation group. Thus there were four groups altogether: 21 participants in each (see Table 3).

The vision-impaired and sighted groups were matched for age and sex. Vision-impaired participants were tested first, and then sighted participants, according to their age and sex, were selected for either the relaxation group or the non-relaxation group (e.g., if a 40-year-old vision-impaired male had been randomly assigned to the relaxation group, then an approximately 40-year-old sighted male would be assigned to the other relaxation group, the two males constituting a matched pair).

Table 3
Four Group (2 x 2) Experimental Design

Group Type	Relaxation	No Relaxation	Totals
Vision-Impaired	21	21	42
Sighted	21	21	42
Totals	42	42	84

The average age was 48 years ($SD = 19.97$; 16 to 83 years; Range: 71 years). There were approximately equal numbers of males (52%) and females (48%). For the vision-impaired group, the average age was 49 years ($SD = 20.38$; 16 to 86 years; Range: 70 years). For the sighted group, the average age was 48 years ($SD = 19.80$; 15 to 83 years; Range: 68 years).

¹¹ Vision-impaired participants were acquired with the assistance of Townsend House, the Royal Society for the Blind, the Blind Welfare Association, Guide Dogs Association, and Radio Station 5RPH. Elderly sighted participants were acquired through the assistance of the Probus Organization.

Scales

Three scales were used in this experiment:

- (i) Degree of vision, rated on a five-point scale, ranging from “totally blind from birth” = 1; “totally blind since [age here] year(s) old” = 2; “partially blind from birth” = 3; “partially blind since [age here] year(s) old” = 4; and “sighted” = 5.
- (ii) A relaxation question, asked of all participants after the relaxation exercise or friendly conversation. Participants answered the question: “To what extent do you feel relaxed?” by rating themselves on a scale from 1 to 5, thus: “very unrelaxed” = 1; “somewhat unrelaxed” = 2; “neutral” = 3; “somewhat relaxed” = 4; and “very relaxed” = 5.
- (iii) A sheep-goat (i.e., attitude to ESP) question requiring a ‘yes’ or ‘no’ answer, asked after the experiment (but before the target picture was announced) in order to ascertain the participant’s category of belief: “Do you think it is possible for at least some people to exhibit ESP under the conditions of this experiment?” This measure was used by Schmeidler (1945) in her sheep/goat experiments, and is endorsed by Lawrence (1993).

Apparatus

Materials/equipment used in the experiment included: (a) instructions to the participant; (b) a relaxation tape (Braud’s, 1986, *Balanced Body/Tranquil Mind*, Track #6: “Breathing,” and Track #7: “Mental Quietude.” Total running time: approximately 14 minutes), (c) a stopwatch, (d) a cassette tape recorder to record the mentations, (e) for each participant, a manila envelope containing a concealed drawing (target) wrapped in aluminium foil, (f) for each participant, another manila envelope containing four randomly chosen pictures (one target picture and three decoys), (g) sheet for participant’s details and score, (h) discourse analyst’s declaration form (an assessment of the accuracy of the mentation transcriptions), and (i) instructions to the independent judge on how to rank the four pictures based on the mentation transcriptions; and (j) independent judge’s declaration form (declaring that he, the judge, read all 84 transcriptions and ranked each of the four pictures himself according to his best judgment).

Procedure

1. **Vision-impaired participants:** Ethical approval for this experiment was given by the Psychology Department's Ethics Subcommittee. In advance of the session, a four-picture set was randomly selected from the pool of 45 sets (see Footnote 8) using random number tables (Pagano, 1986, pp. 479-480, Table J) and, using the same random number tables, a target picture was selected. At the start of the session, a consent form was filled in, whereupon the experimenter then took the pulse of the participant (HR_{Before}) using two fingers on the wrist and a stopwatch. Half the group of participants (alternately selected) listened to approximately 14 minutes of the relaxation tape. (Note that most participants were tested in the relative silence of their own homes.) After relaxation, the 'relaxed' participants had their pulse taken again (HR_{After}). The other half (control participants) did not receive the relaxation treatment: they and the experimenter engaged in casual conversation. All participants were asked the relaxation question.
2. A target envelope was then presented to, and held by, the participant. The participant attempted to describe the picture concealed in this envelope before they were allowed to know what it was. The participant's verbal responses—the mentation report—were recorded and transcribed later by L.S. for evaluation and judging purposes.
3. Four pictures (one target plus three decoys), similarly sealed in aluminium foil, were then removed from another envelope (i.e., the four-picture set described above), and were then described/shown to the participant who ranked (as '#1') the picture that they believed best corresponded to their previous descriptions. The second most preferred picture was ranked as '#2', and so on, until all four pictures had been ranked. These rankings were recorded on the participant's details-and-score sheet, which was signed by the participant at the end of the test. Only then was the target picture removed from its envelope so that its rank score could be determined. The rank score given to just that picture was also recorded on the score sheet as the target rank score.
4. All the above procedures (1) to (3) were conducted afterwards for all sighted participants (note that all sighted participants were tested in the relative silence of a laboratory room).

5. The transcriptions of the mentation reports were assessed for accuracy by a discourse analyst. They were then ranked by an independent judge, and these ranks were used for further analysis (see the section below: “Results based on the Independent Judge’s Rank Scores”).

RESULTS

Effects of the Relaxation Exercise on Heart Rates

All participants in the experiment (vision-impaired and sighted), read and signed a consent form, and had their personal details recorded. Participants’ pulses were then taken, and these were also recorded. Therefore participants were already seated and settled down for the few minutes that it took to prepare the paperwork. Table 4 shows means and standard deviations for HR_{Before} and HR_{After} for all 84 participants.

As can be seen from Table 4, those participants who were on the relaxation treatment were already 2.10 beats/minute (bpm) slower than those participants not on relaxation. This difference actually translates as a bias *against* the relaxation group because the mean $HR_{\text{Diff.}}$ for the relaxation group might have been larger had they started at the same higher HR_{Before} of the non-relaxation group (76.81 bpm). Thus, although the relaxation group’s $HR_{\text{Diff.}}$ was almost one full beat slower than that of the non-relaxation group, the efficacy of the relaxation technique may have been undermined somewhat by this unavoidable circumstance. To control for the covariate (HR_{Before}), univariate ANCOVA was used to test Hypotheses 5 and 6.

Table 4
Treatment, Pulse (HR_{Before} and HR_{After}), and Heart Rate Difference ($HR_{\text{Diff.}}$) in Beats/Min.

Treatment	HR_{Before}	SD	HR_{After}	SD	$HR_{\text{Diff.}}$	SD
No Relaxation	76.81	10.38	75.00	9.58	−1.81	4.73
Relaxation	74.71	9.91	71.95	9.68	−2.76	3.77
Mean Diff.	2.10	12.79	3.05	12.39	0.95	5.56

Results based on Participants' Rank Scores

Hypothesis 1A¹²: For all three groups, (i) the combined sample, (ii) the vision-impaired, and (iii) the sighted, the levels of scoring (expressed as sums-of-ranks scores) differ from chance (MCE = 2.50).

Tables 5, 6, and 7 show the frequencies of rank scores for the whole sample ($N = 84$), the vision-impaired group ($n = 42$), and the sighted group ($n = 42$), respectively.

The following results were obtained:

- (i) For the whole sample, the sum-of-ranks statistic was $z = -2.98$, $p = .002$, two-tailed. The mean rank score was 2.29 ($SD = 1.03$), which was below (better than) chance (Effect Size,¹³ $ES = 0.19$, a 'weak' effect size¹⁴). The hypothesis for the whole sample was supported. Scoring appeared to be anomalous.
- (ii) For the vision-impaired group, the sum-of-ranks statistic was $z = 0.00$, $p = 1.00$, two-tailed. The mean rank score was 2.50 ($SD = 1.04$), which was at chance ($ES = 0.00$). The hypothesis for vision-impaired participants was not supported.
- (iii) For the sighted group, the sum-of-ranks statistic was $z = -2.41$, $p = .016$, two-tailed. The mean rank score was 2.07 ($SD = 0.97$), which was below (better than) chance ($ES = 0.39$, a 'weak-to-medium' effect size). The hypothesis for the sighted

¹² Note that the initial 'A' refers to hypotheses that were tested using participant data, and later, the initial 'B' refers to hypotheses that were tested using independent judge data.

¹³ The effect size (ES) measure used in this study is the one used "most often in remote viewing" (Utts, 1995, p. 293), and is calculated using the formula: $(R_{MCE} - R_{obt}) / [(N^2 - 1)/12]^{1/2}$, where R_{MCE} = average rank expected by chance, R_{obt} = average rank obtained, and N = the number of choices. In a four-choice design, the effect size can range theoretically between -1.34 and $+1.34$.

¹⁴ An effect size of zero is consistent with chance, and ES 's of 0.20, 0.50, and 0.80 are, by convention, considered small, medium, and large, respectively (Utts, 1995, p. 294).

participants was supported. Again, scoring appeared to be anomalous.

Table 5

Participants' Rank Scores: Whole Sample (N = 84)

Rank Score	Frequency	%
1	22	26.2
2	29	34.5
3	20	23.8
4	13	15.5
Total	84	100.0

Table 6

Participants' Rank Scores: Vision-Impaired Group (n = 42)

Rank Score	Frequency	%
1	8	19.1
2	14	33.3
3	11	26.2
4	9	21.4
Total	42	100.0

Table 7

Participants' Rank Scores: Sighted Group (n = 42)

Rank Score	Frequency	%
1	14	33.4
2	15	35.7
3	9	21.4
4	4	9.5
Total	42	100.0

Hypothesis 2A: There is a difference in paranormal performance between the vision-impaired and the sighted such that mean rank scores for vision-impaired are lower (better) than the mean rank scores for the sighted.

According to the theory of psychopraxia, compensation for vision-impairment would improve paranormal performance, hence the directional hypothesis. However, performance by sighted participants ($M = 2.07$, $SD = 0.97$; $ES = 0.39$) was actually superior to that of the vision-impaired

participants ($M = 2.50$, $SD = 1.04$; $ES = 0.00$). Thus, there was a difference in performance between the vision-impaired and sighted participants, but it was in the wrong direction. The null hypothesis was retained.

Hypothesis 3A: There is a difference in paranormal performance between the relaxation group and the non-relaxation group such that mean rank scores for the relaxation group are lower (better) than the mean rank scores for the non-relaxation group. (The whole sample, the vision-impaired group, and the sighted group were each tested.)

- (i) For the whole sample, performance by relaxed participants ($M_{\text{relaxed}} = 2.14$, $SD = 1.05$; $ES = 0.32$) was superior to that of the non-relaxed participants ($M_{\text{non-relaxed}} = 2.43$, $SD = 0.99$; $ES = 0.06$). However, the difference in performance between the two groups was not significant, $z = -1.36$, $p = .087$, one-tailed. Though not significant, the result was in the hypothesised direction.
- (ii) For the vision-impaired participants, performance by relaxed participants ($M_{\text{relaxed}} = 2.24$, $SD = 1.05$; $ES = 0.23$) was superior to that of the non-relaxed participants ($M_{\text{non-relaxed}} = 2.76$, $SD = 0.99$; $ES = -0.23$). There was a marginally significant difference in performance between the two groups, $z = -1.62$, $p = .053$, one-tailed. This result supports the directional hypothesis.
- (iii) For the sighted participants, performance by relaxed participants ($M_{\text{relaxed}} = 2.05$, $SD = 1.07$; $ES = 0.40$) was superior to that of the non-relaxed participants ($M_{\text{non-relaxed}} = 2.10$, $SD = 0.89$; $ES = 0.36$). However, the difference in performance between the two groups was not significant, $z = -.37$, $p = .356$, one-tailed. Though not significant, the result was in the hypothesised directional.

Hypothesis 4A: There is a difference in paranormal performance between believers and disbelievers such that mean rank scores for the believers are lower (better) than the mean rank scores for disbelievers, based on answers to the belief in ESP question. (The whole sample, the vision-impaired group, and the sighted group were to be tested.)

- (i) For the whole sample, performance by believers ($M_{\text{believers}} = 2.34$, $SD = 1.01$; $ES = 0.14$) was *not* superior to that of

disbelievers ($M_{\text{disbelievers}} = 2.00$, $SD = 1.08$; $ES = 0.45$). Therefore, the null hypothesis was not rejected.

- (ii) For the vision-impaired group, performance by believers ($M_{\text{believers}} = 2.45$, $SD = 1.03$; $ES = 0.04$) was superior to that of disbelievers ($M_{\text{disbelievers}} = 3.00$, $SD = 1.16$; $ES = -0.45$). However, there was no significant difference between the two groups on rank scores, $z = -0.93$, $p = .175$, one-tailed. Therefore, the null hypothesis was not rejected.
- (iii) For the sighted group, performance by believers ($M_{\text{believers}} = 2.21$, $SD = 0.99$; $ES = 0.26$) was *not* superior to that of disbelievers ($M_{\text{disbelievers}} = 1.56$, $SD = 0.73$; $ES = 0.84$, a large effect size). Therefore, the null hypothesis was not rejected.

Hypothesis 5: Relaxation lowers the pulse (i.e., HR_{After} is lower in the relaxation group compared to the non-relaxation group). (The whole sample, the vision-impaired group, and the sighted group were each tested.)

- (i) For the whole sample, the mean HR_{After} for the relaxation group was a low 71.95 ($SD = 9.68$), whereas the mean HR_{After} for the nonrelaxation group was relatively high at 75.00 ($SD = 9.58$). However, using ANCOVA, the mean difference (3.05) was not significant, $F(1, 81) = 1.94$, $p = .168$.
- (ii) For the vision-impaired group, the mean HR_{After} for the relaxation group was a low 71.05 ($SD = 7.92$), whereas the mean HR_{After} for the nonrelaxation group was relatively high at 74.38 ($SD = 9.95$). However, the mean difference (3.33) was not significant, $F(1, 39) = 0.44$, $p = .512$.
- (iii) For the sighted group, the mean HR_{After} for the relaxation group was a low 72.86 ($SD = 11.31$), whereas the mean HR_{After} for the nonrelaxation group was relatively high at 75.62 ($SD = 9.39$). However, the mean difference (2.76) was not significant, $F(1, 39) = 1.94$, $p = .172$.

In all three cases, the descriptive statistics differed in the hypothesised directions, but not significantly so. Thus, there is only suggestive evidence that the relaxation tape had an effect.

Hypothesis 6: Relaxation lowers the pulse (i.e., HR_{After} is different between response groups, according to answers to the relaxation question). (The whole sample, the vision-impaired group, and the sighted group were each tested.)

Although there were 5 possible answers to the relaxation question, only 3 responses were used by all participants: 3 ('neutral'), 4 ('somewhat relaxed'), and 5 ('very relaxed'). Thus, three response groups were formed and a one-way ANCOVA was performed (HR_{Before} is the covariate).

- (i) For the whole sample, the mean HR_{After} for the 'neutral' group was 75.00 ($SD = 9.58$), the mean HR_{After} for the 'somewhat relaxed' group was 73.50 ($SD = 11.68$), and the mean HR_{After} for the 'very relaxed' group was 70.55 ($SD = 7.44$). Although heart-rate did decline across the 3 groups, as expected, there were no significant differences between the 3 groups, $F(2, 80) = 0.99$, $p = .377$.
- (ii) For the vision-impaired group, the mean HR_{After} for the 'neutral' group was 74.38 ($SD = 9.95$), the mean HR_{After} for the 'somewhat relaxed' group was 72.67 ($SD = 10.68$), and the mean HR_{After} for the 'very relaxed' group was 69.83 ($SD = 5.22$). Although heart-rate did decline across the 3 groups, as expected, there were no significant differences between the 3 groups, $F(2, 38) = 0.23$, $p = .794$.
- (iii) For the sighted group, the mean HR_{After} for the 'neutral' group was 75.62 ($SD = 9.39$), the mean HR_{After} for the 'somewhat relaxed' group was 74.18 ($SD = 12.91$), and the mean HR_{After} for the 'very relaxed' group was 71.40 ($SD = 9.71$). Although heart-rate did decline across the 3 groups, as expected, there were no significant differences between the 3 groups, $F(1, 39) = 1.13$, $p = .334$.

Participants appeared to be accurate in reporting their states of relaxation, which corresponded appropriately with lower HR_{After} scores across the three groups ('neutral', 'somewhat relaxed', 'very relaxed'). The descriptive statistics supported the directional hypothesis in all three cases, but the test results did not allow the conclusion that the outcomes were other than chance effects. For Hypotheses 5 and 6, the test statistics did not

indicate that a lowering of the pulse was due to the direct effects of the relaxation exercise.

Results based on the Independent Judge's Rank Scores

Hypothesis 1B: The levels of scoring, as sums-of-ranks scores for (a) the whole sample, (b) the vision-impaired group, and (c) the sighted group, deviate from chance (MCE = 2.50).

Tables 8, 9, and 10 show the frequencies of the independent judge's rank scores for the whole sample, the vision-impaired group, and the sighted group, respectively.

The following results were obtained:

- (i) For the whole sample, the sum-of-ranks statistic was $z = 1.02$, $p = .308$, two-tailed. The mean rank score was 2.63 ($SD = 1.10$; $ES = -0.12$). The hypothesis was not supported for the whole sample.
- (ii) For the vision-impaired group, the sum-of-ranks statistic was $z = 1.03$, $p = .304$, two-tailed. The mean rank score was 2.69 ($SD = 1.14$; $ES = -0.17$). The hypothesis was not supported for vision-impaired participants.
- (iii) For the sighted group, the sum-of-ranks statistic was $z = 0.35$, $p = .726$, two-tailed. The mean rank score was 2.57 ($SD = 1.06$; $ES = -0.06$). The hypothesis was not supported for the sighted participants.

Using the sum-of-ranks method, there was no evidence that the independent judge was able to clearly discriminate correspondences between the picture targets and the mentation reports. However, see the Post Hoc Analysis section.

Table 8
Judge's Rank Scores: Whole Sample (N = 84)

Rank Score	Frequency	%
1	17	20.2
2	20	23.8
3	24	28.6
4	23	27.4
Total	84	100.0

Table 9

Judge's Rank Scores: Vision-Impaired Group (n = 42)

Rank Score	Frequency	%
1	7	16.7
2	14	33.3
3	6	14.3
4	15	35.7
Total	42	100.0

Table 10

Judge's Rank Scores: Sighted Group (n = 42)

Rank Score	Frequency	%
1	10	23.8
2	6	14.3
3	18	42.9
4	8	19.0
Total	42	100.0

Hypothesis 2B: There is a difference in paranormal performance between the vision-impaired and the sighted such that mean rank scores for vision-impaired are lower (better) than the mean rank scores for the sighted.

Performance by sighted participants ($M = 2.57$, $SD = 1.06$; $ES = -0.06$) was superior to that of the vision-impaired participants ($M = 2.69$, $SD = 1.14$; $ES = -0.17$). Thus, there was a difference in performance between the vision-impaired and sighted participants, but it was in the wrong direction. The null hypothesis was not rejected.

Again, sighted participants performed better than the vision-impaired participants. Note that the judge was 'blind' to the identity of the mentation reports (before judging, the reports were shuffled so that vision-impaired and sighted mentation reports were randomly stacked in the pile, and not classified as either). Nevertheless, the judge seemed to find that the mentation reports of the sighted participants corresponded to the targets somewhat better than those of the vision-impaired participants, although this difference may be a chance outcome only.

Hypothesis 3B: There is a difference in paranormal performance between the relaxation group and the non-relaxation group such that mean rank scores for the relaxation group are lower (better) than the mean rank scores

for the non-relaxation group. (The whole sample, the vision-impaired group, and the sighted group were each tested.)

- (i) For the whole sample, performance by relaxed participants ($M_{\text{relaxed}} = 2.55$, $SD = 1.11$; $ES = -0.04$) was superior to that of the non-relaxed participants ($M_{\text{non-relaxed}} = 2.71$, $SD = 1.09$; $ES = -0.19$). However, the difference in performance between the two groups was not significant, $z = -.70$, $p = .241$, one-tailed. The directional hypothesis was not significantly supported.
- (ii) For the vision-impaired participants, performance by relaxed participants ($M_{\text{relaxed}} = 2.48$, $SD = 1.12$; $ES = 0.02$) was superior to that of the non-relaxed participants ($M_{\text{non-relaxed}} = 2.90$, $SD = 1.14$; $ES = -0.36$). However, the difference in performance between the two groups was not significant, $z = -1.21$, $p = .113$, one-tailed. This result supports the directional tendency only of the hypothesis.
- (iii) For the sighted participants, performance by relaxed participants ($M_{\text{relaxed}} = 2.62$, $SD = 1.12$; $ES = -0.11$) was *not* superior to that of the non-relaxed participants ($M_{\text{non-relaxed}} = 2.52$, $SD = 1.03$; $ES = -0.02$). This result does not support the significance or the direction of the hypothesis.

In two out of three tests, there was suggestive evidence that relaxation was conducive to better performances on the paranormal task.

Hypothesis 4B: There is a difference in paranormal performance between believers and disbelievers such that mean rank scores for the believers are lower (better) than the mean rank scores for disbelievers, based on answers to the belief in ESP question. (The whole sample, the vision-impaired group, and the sighted group were to be tested.)

- (i) For the whole sample, performance by believers ($M_{\text{believers}} = 2.62$, $SD = 1.13$; $ES = -0.11$) was superior to that of disbelievers ($M_{\text{disbelievers}} = 2.69$, $SD = 0.95$; $ES = -0.17$). However, there was no significant difference between the two groups on rank scores, $z = -0.17$, $p = .434$, one-tailed. The null hypothesis was not rejected.

- (ii) For the vision-impaired group, performance by believers ($M_{\text{believers}} = 2.63$, $SD = 1.15$; $ES = -0.12$) was superior to that of disbelievers ($M_{\text{disbelievers}} = 3.25$, $SD = 0.96$; $ES = -0.67$). However, there was no significant difference between the two groups on rank scores, $z = -1.03$, $p = .151$, one-tailed. The null hypothesis was not rejected.
- (iii) For the sighted group, performance by believers ($M_{\text{believers}} = 2.61$, $SD = 1.12$; $ES = -0.10$) was *not* superior to that of disbelievers ($M_{\text{disbelievers}} = 2.44$, $SD = 0.88$; $ES = 0.05$). Therefore, the null hypothesis was not rejected.

In two of the three tests, performances by believers were superior to those of the disbelievers.

POST HOC ANALYSES

Target Ranking by Participants and by the Independent Judge: A Comparison

Figures 1, 2, and 3 show the expected (flat) distributions (as dotted lines) compared with the observed distributions for the whole sample, the vision-impaired group, and the sighted group, respectively. For each figure, distributions of (a) participants' rankings and (b) independent judge's rankings are illustrated.

The uniformities of the distributions of target rank scores made by participants and by the independent judge were tested using one-sample Kolmogorov-Smirnov tests (two-tailed). First, in the case of participants' rank scores for the whole sample, the vision-impaired group, and the sighted group, all tests showed significant preferences for lower (better) rank scores: whole sample, $z = 2.51$, $p < .001$; vision-impaired, $z = 1.39$, $p = .021$, and sighted, $z = 2.31$, $p < .001$. The participants' rank scores appeared to show that a sufficient number of participants appeared to be guided in their choices by something other chance (see Figures 1a, 2a, and 3a).

Second, in testing the independent judge's rank scores for the whole sample, the vision-impaired group, and the sighted group, all showed significant deviations away from expected rank scores, whole sample, $z = 2.51$, $p < .001$; vision-impaired, $z = 2.32$, $p < .001$; and sighted, $z = 1.85$, $p = .004$. However, these deviations were not necessarily towards lower ranks (see Figures 1b, 2b, and 3b).

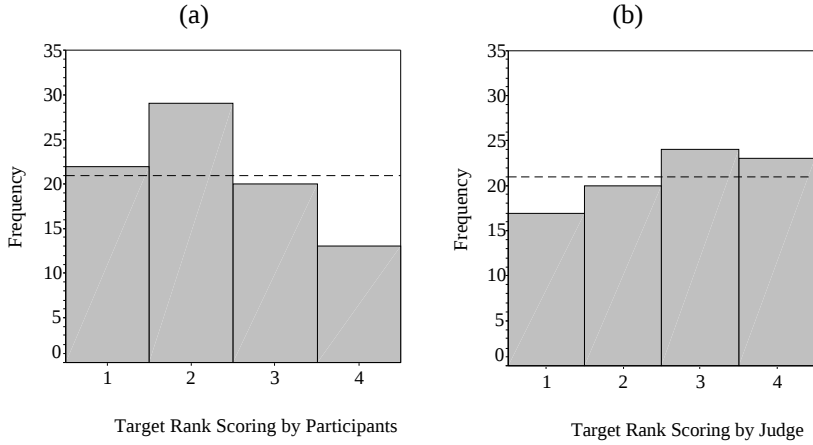


Figure 1. Uniformity distributions for the whole sample: (a) participants' ranks, (b) judge's ranks.

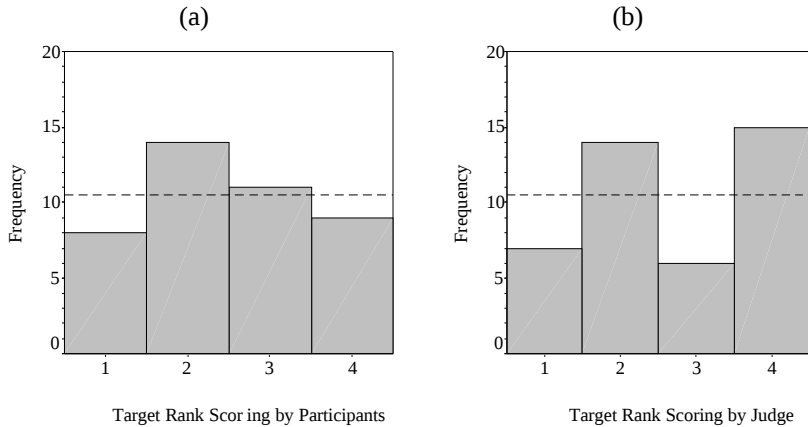


Figure 2. Uniformity distributions for the vision-impaired: (a) participants' ranks, (b) judge's ranks.

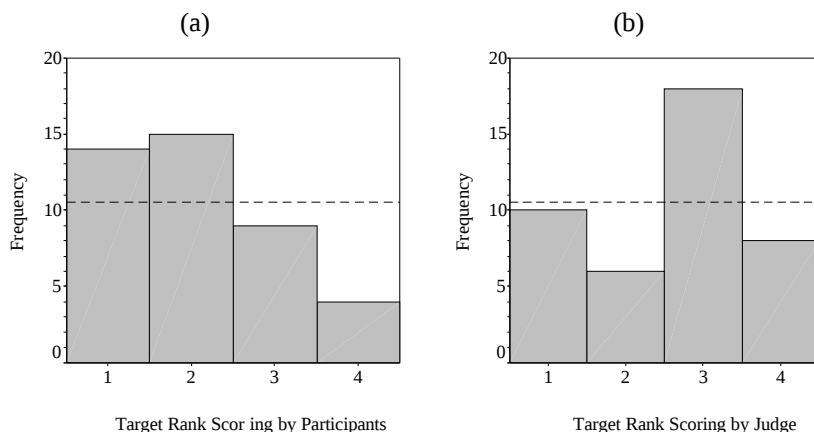


Figure 3. Uniformity distributions for the sighted: (a) participants' ranks, (b) judge's ranks.

Some interesting and difficult to interpret patterns emerge from the independent judge's rankings. For the whole sample, there was a definite trend towards higher (worse) ranks, and this trend suggests that participants' mentation reports, taken collectively, were interpreted by the judge in a way counter to the patterns showed by the actual participants. However, in regard to the vision-impaired group's mentation reports, the independent judge showed a significant preference for rank #2 and rank #4 (see Figure 2b). Mentation reports seemed to contain either sufficient and accurate details of the targets (resulting in rank #2), or completely irrelevant descriptions of the targets (resulting in rank #4). Yet, for the sighted group, the judge reversed this trend, showing an avoidance of ranks #2 and #4, in deference to rank #1, and a pronounced preference for rank #3 (see Figure 3b).

Thus, the distributions for vision-impaired and sighted groups were heterogeneous, suggesting that either the judging procedure is confounded by variables as yet undetected, or that the mentation reports do not contain all the relevant mentation (i.e., participants may be guided by information other than their verbalization). It may be that mentation reports require a qualitative analysis in advance of the capacity of a single judge. Or it may be that mentation reports are more useful to the participants than to the independent judge.

Target Ranking by Participants and by Independent Judge: An Alternative Comparison

There was a positive and highly significant correlation between participants' rank scores and the independent judge's rank scores, $r_s(82) = .31$, $p = .002$, one-tailed. This result suggests that there was some small degree of correspondence between the participants and the judge on the interpretation of the mentation reports, too small, in fact, to expect a large degree of overlap, which might explain why the judge's sums-of-ranks scores were not significant (see Hypothesis 1B). This correlation indicates that the judge, in a sense, concurs to a small degree with the participants' rankings of the mentation reports, but that there may not be enough information in them to allow highly concordant judging.

The Totally Blind versus the Partially Blind

A negative correlation was expected, and found, to some extent, between degree of vision and rank scores by participants, $r_s(82) = -0.17$, $p = .058$, one-tailed. This marginal result, if counted as significant, would suggest that more accurate scoring tended to be achieved as sight 'improved'. This interpretation could be seen as supported by the findings in Hypothesis 2A—the vision-impaired/sighted groups comparison. From that result, it *might* be hypothesized that those vision-impaired participants rated as totally blind ($n = 18$), who could not see the pictures at the ranking stage were the most disadvantaged compared to those partially blind participants who had at least some vision and could see the pictures ($n = 24$).

However, an analysis of rank scores for both vision-impaired subgroups showed that the totally blind subgroup got 5 direct (rank #1) hits (28%), compared to the partially blind subgroup's 3 direct hits (13%). The direct hit-rate for the blind participants translates as an effect size of $\pi = 0.54$, which is actually greater than the effect size for the remaining 66 participants in the sample on the direct-hit measure ($\pi = 0.51$). Thus, there was evidence that the partially sighted and fully sighted participants had no advantage over the totally blind participants. (Note that, for sighted participants the π value was 0.60, which is not significant, $p = .102$, and for the vision-impaired participants the π value was 0.41, which is not significant, $p = .537$.)

DISCUSSION

Target Ranking Based on Participants' Data

Using the sum-of-ranks formula, the overall performance of the 84 participants was significant, which supports the conclusion that some kind of anomalous (paranormal) performance took place during the experiment. However, the mean rank scores were higher (worse) for the vision-impaired than for the sighted, but the significant shifts towards ranks #1 and #2 for both groups (as shown in the post hoc analyses) imply that anomalous effects were not only produced by participants in the whole sample, and in the sighted group, but in the vision-impaired group also.

Perhaps if the two groups had been truly dichotomous (with the vision-impaired group consisting exclusively of totally blind participants), performance by the vision-impaired group may have been significant, even surpassing that of the sighted group. This possibility is strengthened by the fact that the 18 *totally* blind participants were not disadvantaged compared to the remaining 66 participants who were *at least* partially sighted—the former group performed better than the latter on the most conservative measure, direct hits.

Note that it was suggested that the mentation reports of all participants be analysed for any qualitative differences between the reports of the sighted and the vision-impaired to see if the nature of the impressions may have differed or not. The nature of the target-mentation correspondence may differ for sighted versus vision-impaired participants (W. G. Braud, personal communication, June 25, 2001). It should also be mentioned that many participants seemed to vacillate over which of the first two pictures should be ranked #1 and which should be ranked #2. All participants were new to this kind of experiment, so perhaps practice makes perfect. With more experience in tasks of this nature, participants may learn to make successful decisions more easily, perhaps by putting greater trust in their first impressions.

Target Ranking Based on the Independent Judge's Data

Performances by (i) the whole sample, (ii) the vision-impaired group, and (iii) the sighted group, as measured by the sum-of-ranks formula, were not significant. As the post hoc analyses show, however, there were significant deviations in the uniformity of ranks in all three cases, implying that anomalous effects were produced by the various groupings of

participants. Note that these effects were determined from mentation reports alone, which seemed to have been a little too ambiguous for the judge, resulting in heterogeneous distributions of target ranks for the vision-impaired and sighted groups, but less so for the whole sample combined.

As was shown, most of the significant results were found in the participants' data. Reasons have already been given as to why the independent judge may not have done as well.

The Relaxation Treatment

The evidence was only suggestive (that is, not conclusive) that the relaxation tape helped participants relax, and consequently assisted them in the paranormal process. On the one hand, regarding participants' own target rank scores, analyses on two of the three sub-hypotheses (Hypotheses 3A (i) and (ii)) marginally supported relaxation as conducive to paranormal performance. On the other hand, the judge's rankings gave no support at all for the three sub-hypotheses (Hypotheses 3B (i), (ii), and (iii)).

Some participants did not like the relaxation tape, and this might have disturbed their performance on the task. For example, some participants were distracted by the American accent, or the paradoxical contents of the tape (e.g., instruction to imagine a still pond while gushing water in a stream could be heard in the background!). For the vision-impaired participants, it was highly likely that they were relaxed to begin with, since most were tested at home. Therefore, the relaxation tape may not have had as much of an effect as it could have had.

The results of this experiment say little about the general efficacy of relaxation treatments as being conducive to paranormal effects, since there are many different techniques for inducing relaxed states in participants, relaxation tapes being only one. Alternative forms of relaxation and/or more sensitive measures of the effects of relaxation (besides pulse) should be considered in future experiments of this kind. If the parapsychologist is to gain from using relaxation tapes in the future, the quality and content of the material on the tapes, and/or the length of time that the relaxation treatments are administered must need serious consideration. In this study, the relaxation session lasted 14 minutes. Longer sessions may be preferable to shorter ones to give the participants more time to settle in.

Target Ranking and Belief in ESP

For the whole sample, and for sighted participants, based on participants' data, there was no convincing evidence that belief in ESP was conducive to lower (better) rank scores (Hypotheses 4A (i) and (iii)). However, for vision-impaired participants, believers' rank scores tended to be lower than disbelievers' rank scores, but not significantly (Hypothesis 4A (ii)).

For the whole sample, and for vision-impaired participants, based on the independent judge's data, rank scores of believers in ESP tended to be lower than rank scores of disbelievers, but again not significantly (Hypotheses 4B (i) and (ii)). However, rank scores of sighted believers tended to be higher than rank scores of disbelievers, but not significantly (Hypothesis 4B (iii)). Thus, in three out of six sub-hypotheses, the directional hypotheses were supported.

Conclusion

In terms of finding support for the theory of psychopraxia, the initial aims of the experiment must be considered. The first aim was to determine if there was a significant difference in regard to paranormal performance between vision-impaired participants and sighted participants. The successful achievement of this aim would support the hypothesis that exosomatic psychopraxia may act in a compensatory way for a temporary or permanent ostensibly adverse condition of the test participant.

While good evidence was found that the whole sample demonstrated psychopractic effects, the sighted group performed better, although both types of participant, sighted and vision-impaired, seemed to the principal experimenter to show preferences for (i.e., held pro attitudes towards) identifying the picture-target, which manifested as lower (better) ranks. While the pro attitude of the vision-impaired group may have been just as strong, it seemed that, generally, compensatory factors did not manifest for them. Thus the vision-impaired group failed to demonstrate paranormal compensation of their impairment.

Compensation comes in other, more normal, forms, as many vision-impaired participants attested. The typical vision-impaired individual may compensate for their impairment by improving their sense of smell, or touch, or hearing, or other senses, singly or in combination. It must not be overlooked, however, that although compensation may be effected by way of the normal sensory modalities, there is still reason to suspect that

compensation may also come from the paranormal domain, as was suggested by the post hoc finding that neither the partially sighted, nor the fully sighted participants, had advantages over the totally blind participants. The possible role of limited sample size, which may have produced insufficient power for the tests, should also be considered in relation to this study.

A further two aims were proposed to test the moderating variables of (i) relaxation, and (ii) belief in ESP. These variables were hypothesized as being necessary (or at least conducive) conditions that help bring about exosomatic psychopraxia. Regarding relaxation, there was suggestive evidence that relaxation helped improve paranormal performance—results from 4 out of 6 hypotheses were in the right direction (3 based on participants' rank scores, and 3 based on the judge's rank scores), but only one hypothesis was marginally significant, and that was for the vision-impaired participants based on their own scoring (Hypothesis 3A (ii)). These results suggest at least some tendency towards enhanced paranormal performance by relaxed participants compared to non-relaxed participants, and they indirectly suggest the advantage of having a relaxation treatment before the paranormal task. The success of the ganzfeld paradigm only supports the claims for relaxation made here.

Finally, belief in ESP seemed not to have an enhancing effect at all on exosomatic psychopraxia. The claims in the literature that have been made for belief in ESP were not generally supported in this experiment. The results of this study, however, may be artifacts of the single-item measure used to gauge belief in ESP. Many participants found it difficult to commit to a forced-choice (yes/no) answer, and ultimately decided, one way or another, after some degree of hesitation. A greater number of intermediate choices may have provided a more sensitive measure.

REFERENCES

- Altom, K., & Braud, W.G. (1976). Clairvoyant and telepathic impressions of musical targets. In J.D. Morris, W.G. Roll, and R.L. Morris (Ed.), *Research in parapsychology 1975* (pp. 171-174). Metuchen, NJ: Scarecrow.
- Alvarado, C.S. (1988). ESP and imagery in the blind: Some early speculations. *Parapsychology Review*, 19(5), 4-5.
- Barnard, B.N., & Nelson, S.M. (1983). The nonsighted versus the sighted in ESP testing using card-matching as the decisive factor. Abstract in *Journal of Parapsychology*, 47, 58-59.

- Bem, D. J., & Honorton, C. (1994). Does psi exist? Replicable evidence for an anomalous process of information transfer. *Psychological Bulletin*, 115, 4-18.
- Bigalow, A.E. (1992). Blind children's ability to predict what another sees. *Journal of Visual Impairment and Blindness*, 86, 181-184.
- Braud, W.G. (1975). Psi-conducive states. *Journal of Communication*, 25, 142-152.
- Braud, W.G. (1986). *Balanced Body/Tranquil Mind*.
- Braud, L.W., & Braud, W.G. (1973). Preliminary explorations of psi-conducive states: Progressive muscular relaxation. *Journal of the American Society for Psychical Research*, 67, 26-46.
- Braud, L.W., & Braud, W.G. (1974). Further studies of relaxation as a psi-conducive state. *Journal of the American Society for Psychical Research*, 68, 229-245.
- Braud, W., & Thorsrud, M. (1976). Psi on the tip of the tongue: A pilot study of the influence of an "incubation period" upon free-response GESP performance. In J.D. Morris, W.G. Roll, and R.L. Morris (Ed.), *Research in parapsychology 1975* (pp. 167-171). Metuchen, NJ: Scarecrow.
- Braud, W.G., Smith, G., Andrew, K., & Willis, S. (1976). In J.D. Morris, W.G. Roll, and R.L. Morris (Ed.), *Research in parapsychology 1975* (pp. 85-88). Metuchen, NJ: Scarecrow.
- Brodey, W. (1969). The other-than-visual world of the blind. *Ekistics*, 28, 100-103.
- Christie-Murray, D. (2000). Book review: Mindsight by Kenneth Ring and Sharon Cooper. *Journal of Society for Psychical Research*, 64, 188-189.
- Debes, J., & Morris, R.L. (1982). Comparison of striving and nonstriving instructional sets in a PK study. *Journal of Parapsychology*, 46, 297-312.
- Gerber, R., & Schmeidler, G.R. (1957). An investigation of relaxation and of acceptance of the experimental situation as related to ESP scores in maternity patients. *Journal of Parapsychology*, 21, 47-57.
- Gonzales-Scarano, F (1982). ESP and imagery in the sighted and the blind. Unpublished Master's thesis, John F. Kennedy University, Orinda, CA.
- Honorton, C. (1975). Receiver-optimization and information rate in ESP. Symposium at the Annual Meeting of the AAAS, New York City.
- Honorton, C. (1977). Psi and internal attention states. In B. Wolman (Ed.), *Handbook of Parapsychology* (435-472). New York: Van Nostrand Reinhold.
- Honorton, C. (1985). Meta-analysis of psi ganzfeld research: A response to Hyman. *Journal of Parapsychology*, 49, 51-91.

- Honorton, C., & Barksdale, W. (1972). PK performance with waking suggestions for muscle tension versus relaxation. *Journal of the American Society for Psychological Research*, 66, 208-214.
- Krippner, S. (1968). An experimental study in hypnosis and telepathy. *American Journal of Clinical Hypnosis*, 11, 45-54.
- Lawrence, T.R. (1993). Gathering in the sheep and goats: A meta-analysis of forced-choice studies, 1947-1993. *Proceedings of the 36th Annual Convention of the Parapsychological Association*, pp. 75-86.
- Miller, S., & York, M. (1976). Perceptual defensiveness as a performance indicator on a free-response test of clairvoyance. In J.D. Morris, W.G. Roll, and R.L. Morris (Ed.), *Research in parapsychology 1975* (pp. 162-164). Metuchen, NJ: Scarecrow.
- Milton, J. (1998). A meta-analysis of waking state of consciousness, free-response ESP studies. In N.L. Zingrone, & M.J. Schlitz (Ed.). *Research in parapsychology 1993* (pp. 31-34). Lanham, MD: Scarecrow Press.
- Milton, J., & Wiseman, R. (1999). Does psi exist? Lack of replication of an anomalous process of information transfer. *Psychological Bulletin*, 125, 387-391.
- Morris, R.L., & Bailey, K.A. (1979). A preliminary exploration of some techniques reputed to improve free response ESP. In W.G. Roll (Ed.), *Research in parapsychology 1978* (pp. 63-65). Metuchen, NJ: Scarecrow.
- Myers, F. W. H. (1891). The principles of psychology. *Proceedings of the Society for Psychological Research*, 7, 111-133.
- Paivio, A. (1971). *Imagery and verbal processes*. New York: Holt, Rinehart, and Winston.
- Paivio, A., & Okovita, H.W. (1971). Word imagery modalities and associative learning in blind and sighted subjects. *Journal of Verbal Learning and Learning Behavior*, 10, 506-510.
- Palmer, J. (1977). Attitudes and personality traits in experimental ESP research. In B.B. Wolman (Ed.), *Handbook of parapsychology* (pp. 175-201). New York: Van Nostrand Reinhold.
- Palmer, J. & Kramer, W. (1987). Release of effort in RNG PK: An attempted replication and extension. *Journal of Parapsychology*, 51, 125-136.
- Parker, A. (2000). Book review: Mindsight: Near-death and out-of-body experiences in the blind. *European Journal of Parapsychology*, 15, 92-93.
- Price, M.M. (1938). A comparison of blind and seeing subjects in ESP tests. *Journal of Parapsychology*, 2, 273-286.
- Price, M.M., & Pegram, M.H. (1937). Extra-sensory perception among the blind. *Journal of Parapsychology*, 1, 143-155.

- Quider, R.P.F. (1984). The effect of relaxation/suggestion and music on forced-choice ESP scoring. *Journal of the American Society for Psychical Research*, 78, 241-262.
- Rao, K.R. (1979). Language ESP tests under normal and relaxed conditions. *Journal of Parapsychology*, 43, 1-16.
- Rhine, J.B. (1946). Hypnotic suggestion in PK tests. *Journal of Parapsychology*, 10, 126-140.
- Ring, K., & Cooper, S. (1997). Near-death and out-of-body experiences in the blind: A study of apparent eyeless vision. *Journal of Near Death Studies*, 16, 101-147.
- Ring, K., & Cooper, S. (1999). *Mindsight: Near-death and out-of-body experiences in the blind*. Palo Alto, CA: William James Center for Consciousness Studies.
- Rosenthal, R., & Rubin, D. B. (1992-1993). An effect size estimator for parapsychological research. *European Journal of Parapsychology*, 9, 1-11.
- Schlaegel, T.F. (1953). The dominant method of imagery in blind as compared to sighted adolescents. *Journal of Genetic Psychology*, 83, 265-277.
- Schmeidler, G.R. (1945). Separating the sheep from the goats. *Journal of the American Society for Psychical Research*, 39, 47-49.
- Schmeidler, G.R. (1952). Rorschachs and ESP scores of patients suffering from cerebral concussion. *Journal of Abnormal Psychology*, 16, 80-89.
- Schmeidler, G.R. (1957). Some relations between picture-frustration ratings and ESP scores. *Journal of Personality*, 18, 331-344.
- Smith, B.M., & Gibson, E.P. (1941). Conditions affecting ESP performance. *Journal of Parapsychology*, 5, 58-86.
- Solfvin, G.F., Kelly, E.F., & Burdick, D.S. (1978). Some new methods of analysis for preferential-ranking data. *Journal of the American Society for Psychical Research*, 72, 93-114.
- Stanford, R.G., & Lovin, C. (1970). EEG alpha activity and ESP performance. *Journal of the American Society for Psychical Research*, 64, 375-384.
- Storm, L. (2000). Research Note: Replicable evidence of psi: A revision of Milton's (1999) meta-analysis of the ganzfeld databases. *Journal of Parapsychology*, 64, 411-416.
- Storm, L., & Ertel, S. (2001). Does psi exist? Comments on Milton and Wiseman's (1999) meta-analysis of ganzfeld research. *Psychological Bulletin*, 127, 424-433.
- 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. (2000). A paradigm shift away from the ESP/PK dichotomy: The theory of psychopraxia. *Journal of Parapsychology*, 64, 279-300.
- Storm, L., & Thalbourne, M. A. (2001). Studies of the *I Ching*: 1. A replication. *Journal of Parapsychology*, 65, 105-124.
- Thalbourne, M.A. (1981). Some experiments on the paranormal cognition of drawings with special reference to personality and attitudinal variables. Unpublished Ph.D. thesis, University of Edinburgh, Scotland.
- Thalbourne, M.A. (2000). *The common thread between ESP and PK*. New York: The Parapsychology Foundation.
- Utts, J. (1991). Replication and meta-analysis in parapsychology. *Statistical Science*, 6, 363-378.
- 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 attempt to replicate. *Journal of the Society for Psychical Research*, 58, 244-249.
- Watson, L. (1973). *Supernature: A natural history of the supernatural*. London: Coronet.
- Wooffitt, R. (1994). Analysing verbal accounts of spontaneous paranormal phenomena: A sociological approach. *European Journal of Parapsychology*, 10, 45-65.
- Zimler, J., & Keenan, J.M. (1983). Imagery in the congenitally blind: How visual are visual images? *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 9, 269-282.

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