Understanding the Factors at Play in the Sender-Receiver Dynamic During Telepathy Ganzfeld: A Meta-Analysis[1]

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Abstract: *Objective*. To use meta-analysis to explore five previously uninvestigated factors related to the sender-receiver dynamic in the telepathy ganzfeld. The five factors of interest are: a) did the receiver see the sender's room prior to the session?; b) could the sender hear the receiver during the mentation period?; c) could the sender hear the receiver during the judging period?; d) was the sender explicitly told to be silent?; and e) did the experimenter assist in the review section of the session? *Method*: Telepathy ganzfeld studies conducted post *Joint Communiqué*, with one session per day and the receivers rating the targets, were chosen. Two mixed-effects models were fit: 1) using the study hit rates as the binomial mean; and 2) using the study hit rates as a proportion. Both models have the five factors as binary moderators. *Results*: Both the binomial mean and proportion models suggest a significant effect of the moderators overall and two factors individually: 1) the sender being able to hear the receiver during the mentation period; and 2) a review period after the mentation period. Permutation tests for both models also show significant effects of the moderators and the two factors. *Conclusion*: The sender being able to hear the receiver's mentation appears to increase overall study success, while the review period decreases overall study success.

Keywords: meta-analysis, ganzfeld, psi, telepathy, extrasensory perception, anomalous cognition

Highlights

- There was a significant overall effect of the moderators on study success (hit rate)
- The sender being able to hear the mentation period was associated with a significant increase in study success
- A review period after the sending period was associated with a significant decrease in study succes

1 Address correspondence to: Abby Pooley, Department of Psychology, School of Philosophy, Psychology and Language Sciences, 7 George Square, University of Edinburgh, EH8 9JZ, United Kingdom, apooley@ed.ac.uk. Preliminary results were presented at the *Society for Psychical Research's* 2021 Annual Conference. The analysis discussed at the conference only contained one analysis that used the hit rate as the outcome variable and based upon the ratings by the first author, before inter-rater disagreements could be resolved. The current report details the final methods, analyses and results. The authors would like to thank Umberto Noé for assisting with the standard deviation formula for the Binomial approximation distribution, and rater Stacey Bruce. Caroline Watt thanks the Bial Foundation for Grant 190/18 to support her ganzfeld work.

https://doi.org/10.31156/jaex.23878

The ganzfeld is a procedure commonly used to test for anomalous cognition or extrasensory perception (ESP; Cardeña, 2018; Cardeña et al., 2015) and researchers have often reported replicable findings using this method (Baptista et al., 2015; Honorton et al., 1998; Storm & Tressoldi, 2020; Storm et al., 2010). The method uses an environment where the participant experiences a mild form of sensory deprivation. More specifically, the ganzfeld is defined as: homogeneous, unpatterned sensory stimulation: audio-visual ganzfeld may be accomplished by placing translucent hemispheres (for example, halved ping-pong balls) over each eye of the participant, with diffused light (frequently red in hue) projected onto them from an external source, together with the playing of unstructured sounds (such as "white" or "pink" noise) into the ears, and generally with the person in a state of bodily comfort; the consequent deprivation of patterned sensory input is said to be conducive to introspection of inwardly-generated impressions, some of which may be extra-sensory in origin. [From the German for "entire field"]. (Parapsychological Association, 2015)

With a telepathy design, there are two participants, one acting as the sender and the other as the receiver. Telepathy can be formally defined as "Anomalous cognition (AC) to refer to ostensible acquisition of information in ways that are currently unexplained" with telepathy referring to the source presumably being another person's mind (Cardeña et al., 2015, p. 2).

During a telepathy ganzfeld session, the receiver is exposed to the ganzfeld environment. Their task is to become aware of the sender's thoughts while the sender views a randomly chosen target such as a video clip r static image in a different room. Usually receivers are asked to make a verbal report of any impressions or sensations they are experiencing and this mentation is audio recorded as well as being noted by an experimenter. Often the experimenter may review the mentation with the participant after

the impression period, a part of the session typically referred to as the review period. After the impression (and review) period, the receiver views a random selection of decoy video/image clips, along with the target (the clip the sender was aiming to communicate). While the receiver and experimenter remain unaware of the identity of the actual target, the receiver ranks the similarity of their impressions with the presented targets. If the highest rated target is the same as the target that the sender was viewing the session is registered as a hit.

Parapsychologists have been reporting significant results in ganzfeld studies since the 1970s, however there has been little systematic investigation of which aspects of the experimental set-up are associated with elevated hit-rates. Ganzfeld design features such as target type have been analyed, with dynamic targets producing larger study effect sizes (Honorton et al., 1990), though this observation was not confirmed in Milton and Wiseman's (1999) analysis of "new generation" ganzfeld studies. Honorton (1977) reported that successful sessions have on average 37 minutes of ganzfeld exposure. Bem and colleagues (2001) found that more standard studies obtained higher hit-rates, although there is little consensus on the definition of the standard ganzfeld (Milton, 1999; Schmeidler & Edge, 1999).

Most attention has been paid to the role of the sender, with studies hoping to shed light on the sender's influence and whether it is instrumental (inherent to the communication process) or peripheral (pertaining to psychological or motivational factors). Honorton's (1995) meta-analysis of the ganzfeld literature reported that studies using senders perform better than those without. However, later studies designed directly to compare sender and no sender conditions generally report no significant difference between conditions (e.g. Morris et al., 1995; Roe & Holt, 2005; Roe et al., 2003). Other potentially important aspects of the ganzfeld set-up, especially around the sender-receiver dynamic, remain unexplored. As Cardeña (2020) argues, although there is abundant evidence that the ganzfeld creates a psi-conducive environment, we need to be more systematic in investigating which elements of the ganzfeld procedure are important. Therefore, the focus of this meta-analysis is to explore how five previously uninvestigated ganzfeld telepathy study design features may influence study outcome.

Factors of Interest

Factor 1: Do Receivers See the Sender's Room?

Psi-conduciveness is often mentioned in the ganzfeld literature, with some stating that creating a warm and pleasant atmosphere creates a more psi-conducive session (Dalton, 1997; Milton, 1997). However, more information is required about the detailed protocol of each study, especially concerning experimenter-participant interactions, which are quite extensive in the ganzfeld due to the one-to-one nature of the testing, and the duration of each session (Smith & Savva, 2004). Ganzfeld researchers often mention rapport building chats between experimenter and participants, however it is not known whether having the receiver see the sender's room before the session is a key aspect of the study. Being told there is a sender in a different room may be unnerving to a new participant, especially given the length and intensity of the study. Furthermore, perhaps any emotional or social connection between the sender and receiver will be stronger if the receiver has been introduced to the sender's environment and the sender, in turn, is aware that the receiver knows where they are. Thus, the rationale for assessing this factor is to understand whether scoring is higher when the receiver has seen the sender's room before the session commences.

Factor 2: Do Senders Hear the Receiver's Mentation Live?

It takes some effort to set up a one-way audio connection from the ganzfeld receiver to the sender. Researchers often make this effort thereby enabling the sender to hear the receiver describe out loud their feelings, impressions and sensations during the

sending period. The stated justification for this design feature is to allow the sender to mentally reinforce the correct images and impressions to the target (Dalton, 1997) and to add an air of excitement and active involvement for the participants (Parker et al., 1997). If the sender's influence is peripheral via motivational factors (as suggested by Honorton, 1995), then the sender being able to hear the receiver during the sending period may be the most important aspect of a telepathy design because by hearing the receiver's mentation the sender should, theoretically, be able to reinforce receivers at times when they seem to be describing the target. Further, not every ganzfeld study features this audio channel (or perhaps does not clearly report this aspect of procedure), so it is also of interest to establish how common this practice is.

Factor 3: Do Senders Hear the Receiver During the Judging Period?

If the sender can hear the receiver produce their mentation during the sending period and reinforce impressions linked to the target (Factor 2), the same logic extends to the judging period - the time when the receiver decides which target clip is most like their experiences. As the receiver (and/or the experimenter) are reviewing the mentation report and making decisions about the ratings, the sender being able to hear this should, in theory, be able to mentally reinforce the target. Nevertheless, to date there has been no analysis of the impact of the sender hearing the judging period.

Factor 4: Sender Told to be Silent

This factor is primarily assessed from a target security concern: even if senders are physically distanced from the other experimenters and receiver and the target is shielded, explicitly telling the sender to be silent provides an extra layer of security. Although a minor aspect of the ganzfeld procedure, if this factor is significantly related to study outcome then it suggests that previous studies may have been susceptible to sensory leakage. Instructions for the sender to "silently communicate" the target have been used in study protocols throughout the ganzfeld literature (e.g., Berger & Honorton, 1986; Honorton et al., 1990). Thus, assessing the prevalence of this factor may help us to evaluate whether subtle sensory leakage (such as vibrations) may potentially influence study outcome, even if acoustic shielding in these studies is assumed to be adequate (see Wiseman et al., 1994).

Factor 5: Mentation Review

It is common for ganzfeld studies to have review periods (after the sending and before the judging period) in which the experimenter reviews the mentation notes and allows the receiver to elaborate or clarify their mentation (Kanthamani & Broughton, 1994; Roe et al., 2004; Watt et al., 2020). The review period may assist participants in processing their experiences, remembering their mentation and in making connections between their mentation and the targets that they may have otherwise not noticed (Wooffitt, 2003). However, there has not yet been a systematic review of the importance, or otherwise, of the mentation review.

Objective

This meta-analysis is exploratory as there has been no previous systematic review of the above aspects of the ganzfeld study procedure. The research questions originate from a pragmatic motivation: to provide evidence to guide the design of future ganzfeld telepathy studies. Hence, there are no expectations from the analysis. Nonetheless, the null hypothesis is that there will be no effect of the moderators (five factors) on study success (hits significantly greater than chance). Ganzfeld telepathy studies published between January 1988 and September 2021 are included, to assess studies conducted with the potential benefit of the methodological guidelines from the *Joint Communiqué* (Hyman & Honorton, 1986).

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The independent variables are the five factors (detailed above) rated by two raters (details in Appendix Figure C2). The dependent variable for both meta-analytic models is the study hit rate (percentage of hits). The first author created two models, the first treating the study hit rate as a mean, following the approximated binomial distribution. The intention was to use the *z*-scores for each study, which are approximated from the binomial distribution, but the standard deviations could not be computed. The model effect size metric is defined in Appendix Formula A6. The second, supplementary, model uses the study hit rate as proportion and uses the effect size metric defined in Appendix Formula A8. Homogeneity analysis was automatically calculated by the model function, which calculated the I^2 value (See Appendix Formula A3). The I^2 statistic describes the variation across studies due to heterogeneity, rather than chance and is a simple description of the inconsistency of studies' results (Higgins & Thompson, 2002; Higgins et al., 2003). Analyses were conducted with RStudio Workbench Version 1.4.1717-3 © 2009-2021 RStudio, PBC, and models built with the *metafor* package (Viechtbauer, 2010). A protocol was not pre-registered for this project due to its exploratory nature. The data set used for analysis, analysis code, and information are all publicly and freely available at https://github.com/yeloopa/telepathyMA.git

Method

Inclusion and Exclusion Criteria

We include all ganzfeld telepathy studies using visual targets and human participants from January 1988 to September 2021. All studies had a measure of hit rate (%) as well as session binomial *z*-score as their outcomes, and a four-option design with one target and 3 decoys (thus resulting in a 25% mean chance expectation; MCE). Study hit rate is a percentage calculated as the overall number of hits obtained across the study sessions (see Appendix Formula A2). The associated *z*-scores are the related binomial distribution *z*-ratio for situations of the general "k out of n" type with the formula as defined in Appendix Formula A1.

Information Sources

We first extracted all telepathy studies from Tressoldi's ganzfeld database, accessible at the *Society for Psychical Research's* open-access data website *Psi Open Data* (Tressoldi, 2019), which contains all studies conducted since 1974 to 2018, used for the two recent meta-analyses of the ganzfeld literature (Storm & Tressoldi, 2020; Storm et al., 2010).

To check for studies produced since 2018, a literature search on Google Scholar was conducted, using the search terms "ganzfeld," "telepathy," and "study," using the Boolean connector "&" in the title and abstract fields for the years 2018 to 2021. Inspection of reference lists of included papers was also used as a part of the search strategy to ensure all relevant studies were included. The literature search resulted in one addition, a telepathy study published in 2020 (Cardeña & Marcusson-Clavertz, 2020). ALP contacted the author of the 2020 paper to establish if the multiple sessions had been performed on a single day by the participants – which they had not.

Study Selection

The study selection procedure is outlined in Appendix Figure C1. Studies were excluded based on these criteria:

- Duplicated: for example, if a published paper was produced from a conference proceeding, the conference proceeding was removed from the database. Published papers have more detailed and full analyses and usually all planned sessions are complete.

- Studies using external judges: the factors Hear and Hear judging asses if the sender hearing the receiver during the two periods (outlined above) influences study outcome. Thus, using external judges would not help this assessment, especially for the Hear judging factor (see Hyman, 1995).

- Multiple sessions a day: if the studies had a repeated participants design which ran multiple sessions on the same day, they were removed. Participants contributing to multiple sessions violates the independence assumption of most statistical hypothesis tests. Likewise, there is literature noting a decline effect due to fatigue in experimenters (Broughton & Alexander, 1997; Parker et al., 1998; Wezelman & Bierman, 1997)

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• Multiple trials per session: like the point above, only one trial per session in the current study design.

• Stimuli material: Studies which used non-visual targets were removed. Visual targets are considered standard (specifically dynamic targets; Bem et al., 2001).

• Multiple or no senders: Some studies included designs that involved 0, 1, or 2 senders. In these reports, it was unclear if the analysis combined all of these trials into one analysis, or the different sender options had low sample sizes (< 10).

• Low sample size: studies with samples of 10 or less were removed because of potential bias in results stemming from sampling error.

The first author conducted an initial analysis presented at the *Society for Psychical Research's* 2021 Conference (Pooley, 2021) using the data set composed of the studies rated by her using the study hit rate as the outcome measure. She stated then that this was not the final analysis, with corrections and changes still to be made, such as resolving the rater discrepancies and analysis with *z*-score as an outcome. After the conference and study selection was assumed to be final, numerous reports in the *Journal of Scientific Exploration* reported the serious fraudulent actions and widespread plagiarism conducted by Alejandro Parra (Braude, 2021; Cardeña, 2021; Nahm, 2021). Because of the seriousness of the accusations and evidence collected, we deemed it best to remove all the Parra studies from the dataset (a total of 5 data points). Likewise, there was duplicate reporting of some results in the Gothenburg study series (Parker & Westerlund, 1998; Parker et al., 1997). Given the removals and corrections to the database, the final data set is 41 studies.

Data Extraction and Coding

As the data are primarily sourced from a freely available ganzfeld database (Tressoldi, 2019), the number of variables of interest for experiments were reduced to:

- Study author(s) and year (and series number if multiple series per study)
- Study hit rate (%; see Appendix Formula A2)
- Study *z*-score (see Appendix Formula A1)
- Number of participants
- Number of trials

Studies were then organized according to the five factors of interest:

- Did the participant (receiver) see the sender's room before the session? (See)
- Could the sender hear the receiver produce their mentation? (Hear)
- Could the sender hear the receiver during the judging period? (Hear judging)
- Was the sender explicitly told to be silent? (Silent)
- Did the experimenter review the receiver's mentation notes with the receiver, after the sending period? (Review)

Each factor is rated on a binary scale (0 for no presence, 1 for presence of factor). See Appendix Figure C2 for the instructions given to the raters. For the five factors, the first author first assessed each paper and provided ratings based on the instructions. A second rater then did the same, following the same instructions. However, because of health issues with the second rater, it was not possible to arrange a meeting to resolve the discrepancies in ratings and those ratings were disregarded, so CW was recruited as a third rater. Discrepancies in ratings between Raters 1 (ALP) and 3 (CW) were resolved in a meeting (see Table 1 for the inter-rater reliability scores). Due to the ambiguity of what constitutes a "review period," ALP and CW agreed in the rating meeting that if the study report explicitly stated a review occurred, then it was rated a 1. If a review period was not explicitly stated in the paper, it was up to the rater to decide if a review stage could be inferred: hence the rating instructions included the opportunity for the receiver to add, alter and/or discuss their mentation with the experimenter (Appendix Figure C2).

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Summary Measures

Primary Analysis: Binomial Test with Mean Number of Hits

For the primary analysis we intended to use the *z*-score as the outcome measure. However, we noted that a recent pre-publication of a ganzfeld meta-analysis has been criticized during open peer review for the effect size calculation for the study *z*-scores as not being scientifically sound (see Tressoldi & Storm, 2021). Thus, for the current analysis, ALP performed the Binomial test using the mean number of hits rather than the total number of hits, using a random-effects model with study hit rate treated as a mean. The five factors (all binary) of interest were added as moderators in the model, thus resulting in a mixed-effects model. The final model is as follows:

$$\theta_i = \beta_0 + \beta_1 * See + \beta_2 * Hear + \beta_3 * Hearjudge + \beta_4 * Silent + \beta_5 * Review + \mu_i$$

where $\mu_i \sim N(0, \tau^2)$

First, the number of trials, study hit rate and the associated standard deviation of the binomial distribution for treating the hit rates as a mean were calculated and entered into the *escalc* function, which resulted in the observed effect sizes and sampling variances in order to fit the meta-analytic model (see Appendix Formula A5 and A6, respectively). We estimated the heterogeneity of the effect sizes by fitting the model with a restricted maximum-likelihood (REML), which is better when working with smaller samples (Viechtbauer, 2005), and using the Knapp-Hartung adjustment (Knapp & Hartung, 2003).

Secondary Analysis: Proportion of Hits

For this model, we used the proportion of hits as the outcome measure. As the meta-analysis used aggregate scores that provide data about individual groups in respect to a dichotomous dependent variable (hit or miss), the number of events and number of trials are required to calculate the appropriate effect size. We provide the formulae for the model in Appendix Formulas A7 and A8. Due to the similarity between the primary and secondary models, we report the primary analysis in full in the Results section with the model prior to the removal of outliers. The secondary model results can be found in full in Appendix A1-A4.

Methods of Synthesis

Because of the exploratory nature of the study and lack of previous relevant research, a meta-regression for both models was created. Meta-regression not only provides a summary of the selected studies but also evaluates how the five potential moderators may influence study outcome. Study results are not weighted.

Publication Bias and Selective Reporting

Funnel plots for each analysis were created (a funnel plot is a useful visual aid to assess publication (and other) potential bias in the database). Because of the inclusion of moderators in the models, we could not perform the trim-and-fill method to assess publication bias. However, multiple reviews of the ganzfeld literature have reported no suggestion of publication bias problem (Baptista & Derakhshani, 2014; Cardeña, 2018; Storm et al., 2010).

Results

Inter-Rater Reliability

For the sake of transparency, Table 1 presents the results of the initial ratings between Raters 1 and 3. These disagreements were resolved before the final analyses reported below (also see Appendix Figure C1).

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Table 1

Unweighted Kappa Scores and Agreement Between Raters 1 and 3

Factor	Kappa	Observed agreement
See	76%	83%
Hear	50%	78%
Hear judging	21%	71%
Silent	33.5%	63%
Review	8%	71%

Descriptive Statistics

Appendix Table C3 details the studies included in the models and the respective measures. A total of 41 studies (or series reported as part of a wider study) were conducted by 17 different lead authors who reported their results in a total of 23 articles. All 41 studies used a four-choice design therefore the mean chance expectation is 25%. A total of 1,496 participants contributed to 1,624 ganzfeld telepathy sessions. The average hit rate across the studies is 32% (*SD* = 10.40%) with a skewness of 0.72. An exact binomial test is reported to assess if the mean hit rate in the data set is significantly greater than chance. There are 520 hits in 1,624 trials, resulting in a significant difference from chance at the 5% significance level: Binomial Exact p <.001, one-tailed. The mean z-score is 0.91 (*SD* = 1.37), the sum of z-scores is 37.20 and Stouffer's Z is 5.81, although, as discussed earlier, the z scores were not used in the models reported.

Results of Binomial Mean Model (Model 1)

The model was first fit with all 41 studies. The model output is reported in Table 2. The test for moderators is non-significant at the 5% level $F(5, 35) = 1.89$, $p = .12$. However, the coefficient Review is significant suggesting that the presence of a review session in a ganzfeld telepathy study decreases the average study success by 12%, when all the other study features are set to 0. See Table 2)

Table 2

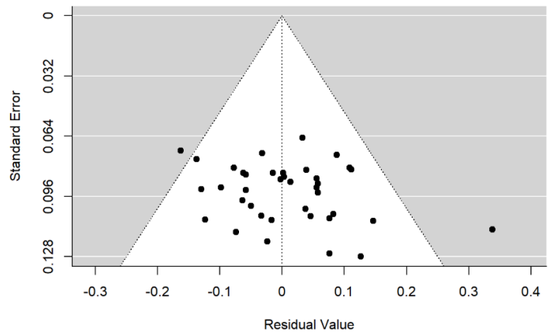
Model 1: Hit Rate as Binomial Mean Summary Prior to Influential Studies Removed

	Estimate	Standard error	t-value	p-value	95% CI Lower Bound	95% CI Upper Bound
Intercept	.38	.07	5.71	<.0001***	0.25	0.52
See	-.01	.05	-0.32	.75	-0.11	0.08
Hear	.07	.04	1.66	.11	-0.01	0.15
Hear judging	-.02	.04	-0.35	.73	-0.07	0.09
Silent	.01	.04	0.20	.84	-0.07	0.09
Review	-.12	.06	-2.16	.04*	-0.24	-0.01

The unaccounted variability in the model is moderate (I^2 = 43%) and the QE test for residual heterogeneity is significant $QE(35) = 62.38$, $p = .003$. As shown in Figure 1, the funnel plot suggests that there is publication bias in the dataset. A mixed-effects meta-regression model Egger's regression test for funnel plot asymmetry was performed and was significant $t(34) = 2.15$, $p = .04$. Further assessment of the model revealed there were influential studies in the dataset. First, Honorton 302 (Honorton et al., 1990) was removed due to having the highest standardized residual value of 3.41, where standardized residuals between -2 and 2 are commonly used as acceptable limits. The model with Honorton 302 removed still flags an influential case, Goulding et al. (2004) with a standardized residual value of -2.7. With the removal of Honorton study 302 and Goulding et al. (2004), the model checks flag another influential study exceeding the limit: Broughton and Alexander (1997) FT2 has a standardized residual value of -2.7. The model was run once again and checked for influential values and returned no more influential cases, thus we detail the final model below.

Figure 1

Funnel Plot for Model 1 Before Removal of Influential Studies



Binomial Mean Final Model (Model 1.1)

With the three influential cases removed, the test for moderators is significant at the 5% level $F(5,32) = 3.78$, $p = .01$. As in Model 1, Review is significant and Hear now is also significant, as shown in Table 3. On average, study success rate is increased by 7% when the sender can hear the mentation period, when all other factors are set to 0. However, the addition of a review period in a ganzfeld telepathy study decreases the average study success by 10% when all other factors are set to 0. A permutation test (5000 iterations) was performed and confirmed the findings, with the test for moderators significant $F(5,32) = 3.78$, $p = .016$. The factors Hear (Factor 2) and Review (Factor 5) were significant, as shown in Table 4. The forest plot for the final model (Model 1.1) is shown in Appendix Figure A1.

Table 3

Model 1.1: Hit Rate as Binomial Mean Summary Output

	Estimate	Standard error	*t*-value	*p*-value	95% CI Lower Bound	95% CI Upper Bound
Intercept	.36	.05	7.22	<.0001***	0.26	0.46
See	.00	.03	0.10	.92	-0.07	0.07
Hear	.07	.03	2.26	.031*	0.01	0.13
Hear judging	-.04	.03	-1.10	.28	-0.11	0.03
Silent	.02	.03	0.62	.54	-0.04	0.08
Review	-.10	.04	-2.40	.022*	-0.19	-0.02

The estimated amount of residual heterogeneity for the model is very low ($\tau^2 < .001$, $SE = 0.001$), unaccounted variability is also low ($I^2 = 2.8\%$) and total amount of heterogeneity accounted for by the model is very high ($R^2 = 92\%$). Model funnel and forest plots are shown in Figures 3 and 4, respectively.

Because of the inclusion of moderators in the model, the trim-and-fill method could not be performed (the trim-and-fill method was applied to the binomial mean model without the moderators, using the original dataset and the dataset that had influential studies removed. Trim-and-fill analyses did not estimate missing studies). However, as shown in Figure 3, there is little evidence to suggest publication bias in the data set. Furthermore, a mixed-effects meta-regression model Egger's regression test for funnel plot for asymmetry was performed and was non-significant $t(31) = 0.17$, $p = .87$.

Binomial Mean Model with Review Factor Removed (Model 1.2)

Because of the high incidence rate of the Review factor (only 3 studies were rated to have *no* identifiable review period), the Binomial final mean model (Model 1.1) was performed with the Review factor removed to assess if the model results changed with this factor removed. The model formula is the same as the primary analysis, just with this

factor removed. Given the similarity between the Binomial mean model (Model 1.1) and Proportion of hits model (Model 2), only the Binomial mean model was performed. Full results are reported in Appendix B5, B6, and B7.

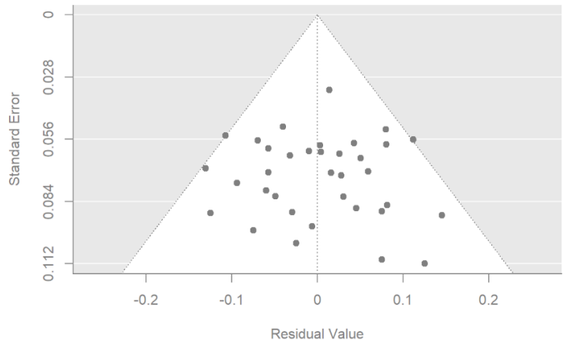
Table 4

Permutation Test Results (5,000 iterations) for Model 1.1

	Estimate	Standard error	*t*-value	*p*-value	95% CI Lower Bound	95% CI Upper Bound
Intercept	.36	.05	7.22	.04*	0.26	0.46
See	.00	.03	0.10	.92	-0.07	0.07
Hear	.07	.03	2.26	.04*	0.01	0.13
Hear judging	-.04	.03	-1.10	.29	-0.11	0.03
Silent	.02	.03	0.62	.55	-0.04	0.08
Review	-.10	.04	-2.40	.03*	-0.19	-0.02

Figure 2

Funnel Plot for Model 1.1



Discussion

In this study, we used a meta-analysis to explore how five potentially important aspects of ganzfeld telepathy study procedure might be associated with study outcome., and found two factors that had significant impacts on study outcome. First, studies that allowed the sender to hear the receiver's mentation (Factor 2) were associated with an increase in study hit rate by approximately 7%. This suggests that the sender hearing the receiver may motivate them to actively reinforce the target during the sending period and keep the receiver "on track." An alternative interpretation arises from work by Fox (2004), who found senders are susceptible to wandering and boredom, suggesting that perhaps an audio link is sufficient reinforcement to keep the sender engaged and motivated throughout the session.

In contrast, the inclusion of a mentation review period (Factor 5) was associated with a significant decrease in study hit rate by 10%. This supports Dalton's observations in her doctoral thesis that the experimenter-receiver interaction during the review period decreases study success (Dalton, 1997). However, this finding is based upon only three studies (after influential cases were removed) that the raters judged did not have an identifiable review period. Nonetheless, perhaps the review period with the experimenter and receiver discussing correspondences between the mentation and clips does not provide clarity but rather introduces ambiguity and could allow the experimenter to direct the receiver away from the target. Alternatively, perhaps the review period introduces confusion about who (experimenter or receiver) is making the final judgement. In support of this latter interpretation, Model 1.2 with the Review factor (Factor 5) removed resulted in Hear (Factor 2) becoming more significant than in Models 1.1 and 2 and Hear judging (Factor 3) becoming significant (as shown in Appendix B).

Our analysis revealed two factors to be clearly unrelated to study outcome. Factor 1 (See) was not significant in any model nor near significance at any point, suggesting that knowledge of the sender's location may not have a major influence over telepathy study success. Likewise, the non-significance of Factor 4 (Silent) may suggest that sensory leakage is less of a concern than has been suggested for some of the early

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ganzfeld telepathy literature (Wiseman et al., 1994), but this factor is an indirect measure of sensory leakage.

One caveat to our finding that the mentation review is associated with lower hit-rates, was that the rating instructions did not distinguish between a review period which was stipulated in the procedure in order for receivers to clarify or elaborate upon their mentation, but a simple opportunity for the receiver to add, comment upon, or discuss their mentation period. This is in contrast to a scenario where the receiver moves immediately from the sending/mentation period to the judging period. Hence, there is scope for future research to look more closely at the researcher-receiver relationship and to investigate how interactions during the session may influence study outcome. Likewise, the inter-rater reliability (kappa) scores are noticeably varied: Factor 5 (Review) was significant in all models, but this factor had the lowest kappa values. This illustrates a limitation with kappa values: kappa is not reliable for rare observations and low values of kappa may not necessarily reflect low agreement overall (Viera & Garrett, 2005), and given that there were four studies rated as not having a review period, the kappa value is unsurprisingly low for this factor. During the meeting to resolve disagreements, both raters discussed their ratings. Some discrepancies were merely mistakes whereas others were different interpretations. For example, for the Hear judging factor, it was decided during the rating meeting that if (after the receiver had logged their ratings) the sender was summoned via the one-way audio link then this *implied* that the sender could hear the whole judging procedure (given they could already hear the mentation period). Hence, the ambiguity of the phrasing used by the authors in their study methods allows for different interpretations of the study designs and we recommend future ganzfeld researchers take care to give a comprehensive description of possibly important aspects of study procedure. Similarly, with the Review factor, the rater clarified during their meeting that if there was an *opportunity* for the receiver to add, comment, or discuss their mentation notes with the researcher then this was rated as a review period, as were the more clearly defined review periods where the receiver *had* to explicitly elaborate their mentation and experiences during the sending period. This a limitation with the rating instructions due to the broad criteria for the Review factor.

One weakness of the current analysis is that the studies are not rated or weighted in terms of their study quality. For the current report, only studies produced years (1988 onwards) after the *Joint Communiqué* (Hyman & Honorton, 1986) were included, in an attempt to exclude earlier studies that did not have the benefit of Hyman and Honorton's methodological recommendations. Nonetheless, studies with better security protocols and clearer method sections could have been given more weight in our meta-analysis.

Even so, there are still some valuable findings from our analysis. First, this meta-analytic review shows that the results found in both models (Model 1.1 and Model 2) were confirmed in the permutation tests of the model coefficients. The omnibus test for the moderators shows that there was a significant effect of the factors, with the Hear and Review factors significantly affecting study outcome. Second, even when using different outcome and effect size measures than previous meta-analyses (Storm & Tressoldi, 2020; Storm et al., 2010), the results previously reported in the literature still stand: the noise-reducing ganzfeld protocol significantly produces hit rates greater than MCE. This is not surprising as the studies we used were primarily extracted from the same database; however, there is no need to account for selected participants in the current analysis as heterogeneity is low in both models, unlike what Storm and colleagues (2010) found. Third, although our study is limited in its generalizability, it has provided a new angle to look at the telepathy ganzfeld literature and can perhaps aid in providing an evidence-based procedure for future ganzfeld telepathy studies. The vast majority of reported ganzfeld telepathy studies have a review period, even though it appears from our analysis to be detrimental to study outcome. Likewise, the difficulty we had in coding some study reports should encourage future researchers to provide more detail when

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reporting their study designs. Given current day open science infrastructure and internet-based dissemination possibilities available, there are plenty of opportunities for full disclosure of study designs. This meta-analysis also adds to recent publications looking at study design factors in the ganzfeld, such as Schmidt and Prein's (2019) study investigating different auditory homogenizations and Kübel et al.'s (2020) assessment of red vs green light visual stimulation. This suggests that there is interest in ganzfeld design factors and prospective ganzfeld researchers should try to make their methodological decisions based on the available evidence.

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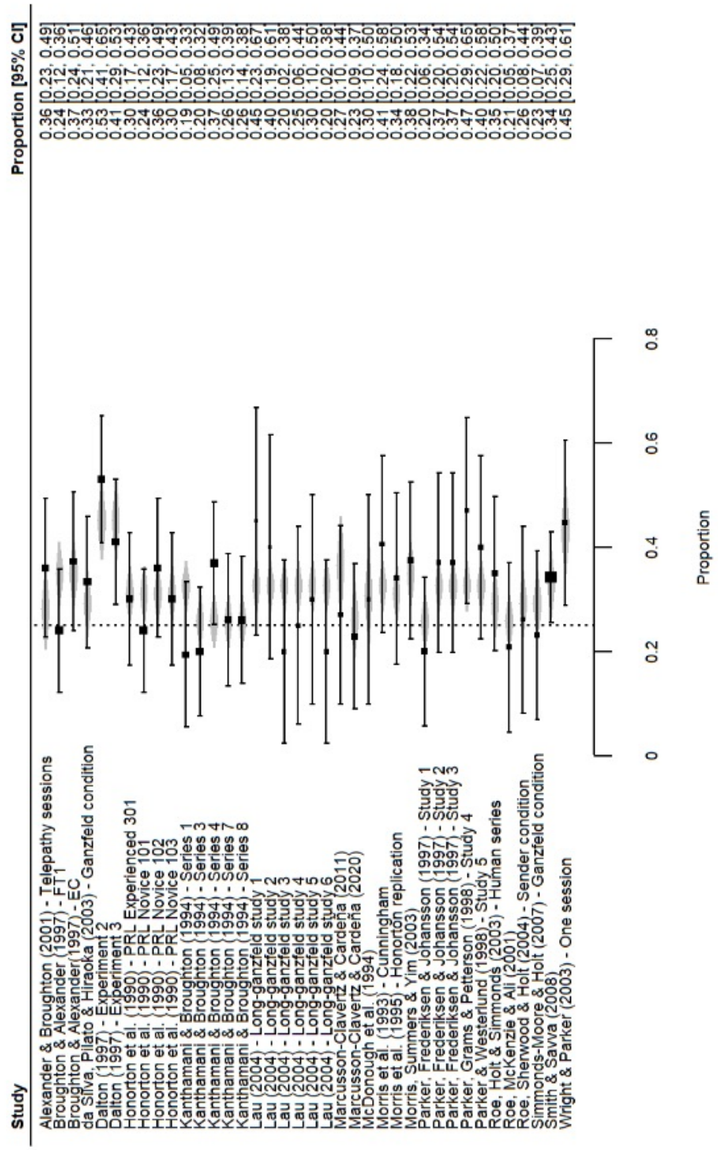
Appendix A

Forest Plot for Model 11 (reference Line is Set to MCE, 0.25)



Appendix B

Table B1

Model 2: Proportion of Hits Summary with same 3 Outliers Removed as Model 1.1

	Estimate	Standard error	*t*-value	*p*-value	95% CI Lower Bound 95	95% CI Upper Bound
Intercept	.36	.05	7.15	<.0001***	0.26	0.46
See	.00	.03	0.03	.92	−0.07	0.07
Hear	.07	.03	0.03	.03*	0.01	0.13
Hear judging	−.04	.03	0.03	.28	−0.11	0.03
Silent	.02	.03	0.03	.53	−0.04	0.08
Review	−.10	.04	0.04	.02*	−0.19	−0.01

Table B2

Model 2: Permutation Test Results (5000 iterations)

	Estimate	Standard error	*t*-value	*p*-value	95% CI Lower Bound	95% CI Upper Bound
Intercept	.36	.05	7.15	.05*	0.26	0.46
See	.00	.03	0.10	.92	−0.07	0.07
Hear	.07	.03	2.27	.03*	0.01	0.13
Hear judging	−.04	.03	−1.10	.29	−0.11	0.03
Silent	.02	.03	0.64	.53	−0.04	0.08
Review	−.10	.04	−2.38	.03*	−0.19	−0.01

Figure B3

Forest Plot for Model 2 with same 3 Outliers Removed as Model 1.1

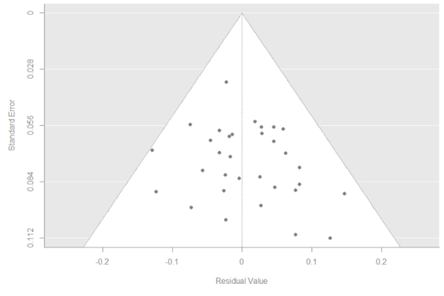


Figure B4

Funnel Plot for Model 2

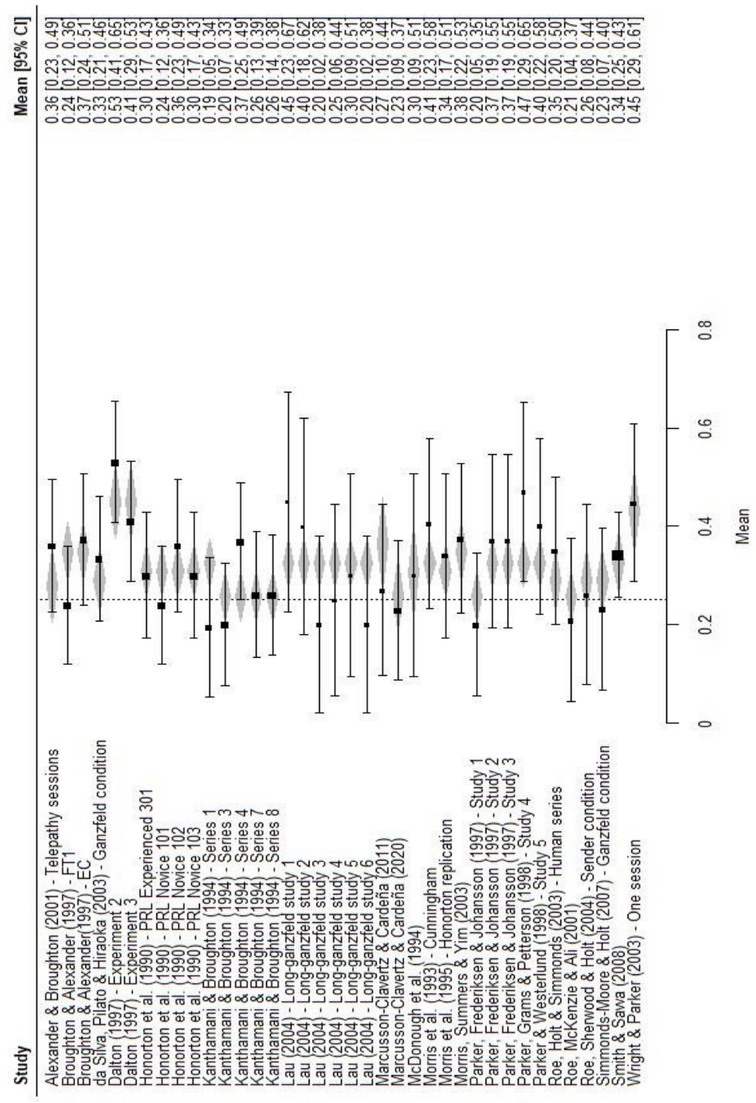


Table B5

Model 1.2: Binomial Mean Model with the Review Factor Removed (In addition to the three studies removed in Model 1 and 2, Broughton & Alexander FT1 was removed first, then Kanthamani & Broughton Series 4, then Dalton Experiment 2 until no more studies were flagged as influential. These studies were removed to the same criteria for the previous models with standardized residuals exceeding ±2).

	Estimate	Standard error	*t*-value	*p*-value	95% CI Lower Bound	95% CI Upper Bound
Intercept	.23	.02	10.22	<.0001***	0.19	0.28
See	.04	.03	1.51	.14	-0.01	0.10
Hear	.09	.03	3.38	< .01*	0.04	0.15
Hear judging	-.08	.03	-2.70	.01*	-0.14	-0.02
Silent	.03	.03	0.97	.34	-0.03	0.08

Table B6

Model 1.2. Permutation Test (5,000 Iterations)

	Estimate	Standard error	*t*-value	*p*-value	95% CI Lower Bound	95% CI Upper Bound
Intercept	.23	.02	10.22	.51	0.19	0.28
See	.04	.03	1.51	.15	-0.01	0.10
Hear	.09	.03	3.38	<.01**	0.04	0.15
Hear judging	-.08	.03	-2.70	.01*	-0.14	-0.02
Silent	.03	.03	0.97	.34	-0.03	0.08

Figure B6

Forest Plot for Model 1.2

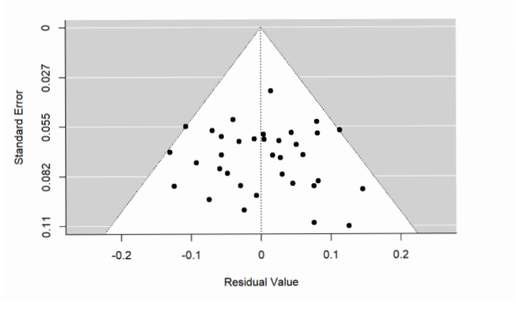


Figure C1

Flowchart of Study Selection

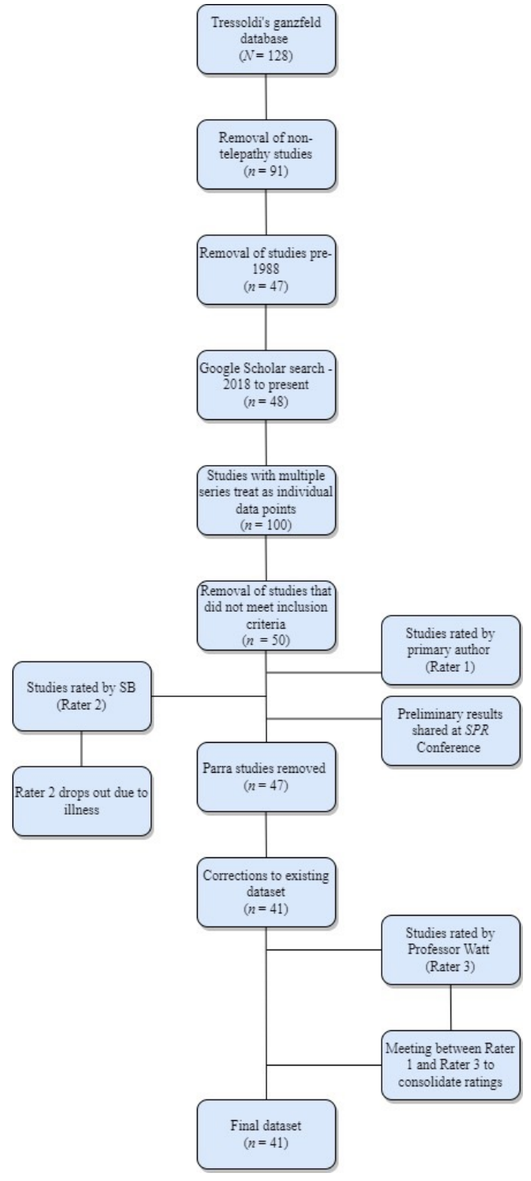


Figure D2

Rating Instructions

For each of the papers your task is to assess if they have certain characteristics present. If the characteristic is present then give it a 1, if not then a 0. Give a 1 if the characteristics are **explicitly** stated.

There are 5 characteristics to assess:

1. Did the receiver see the sender's room?

a. Some papers may say that both participants were shown the whole operation.

2. Did the sender hear the receiver produce their mentation (verbal report)?

3. Did the sender hear the receiver during the judging procedure?

4. Was the sender explicitly told to be silent?

a. Some are told that any shouting/loud noises from sender's room would abort the session.

5. Did the experimenter review/allow additions to the mentation notes with the receiver, after the sending period?

a. Some papers say they review the notes with the participant and allow for additions/changes.

Use your judgement and common sense to assess if these characteristics were present, some will require re-reading and thinking but the main question is, "Is this clearly stated? Would I be able to run the exact same procedure given the detail in this paper?"

Important Notes:

- Some shorter papers refer to other, already published papers and their procedures. Unless the authors state there were specific deviations from the previous design, you can give them the same ratings.

- Also, be careful for footnotes and procedural information outside of the 'Methods' section. It's worth skim reading all sections. Information about the study design may also be in the 'Participants'/'Procedure'/'Lab set-up'/'Design' parts of the paper (depending on how the paper is formatted).

- Some papers have multiple studies in them – you will be given a list of the studies of interest. However, this might require you to distinguish any differences in the procedures between the series, so it may take some deeper reading.

Figure D3

Dataset

Study	ID	See	Hear	Judge	Silent	Review	HR	z-score	ES(b)	N participants	Trials
Alexander & Broughton (2001) - Telepathy sessions	125	1	0	0	0	1	36.00%	1.63	0.24	50	50
Broughton & Alexander (1997) - FT1[b]	101.1	1	1	1	0	1	24.00%	0	-0.023	50	50
Broughton & Alexander (1997) - FT2[a]	101.2	1	1	1	0	1	18.00%	-0.98	-0.171	50	50
Broughton & Alexander(1997) - EC	101.3	1	1	1	0	1	37.30%	1.81	0.267	51	51
Cardeña & Marcusson-Clavertz (2020)	143	1	0	0	0	1	22.86%	-0.1	-0.05	35	35
da Silva, Pilato & Hiraoka (2003) - Ganzfeld condition	113.1	1	1	1	0	1	33.33%	1.26	0.184	37	54
Dalton (1997) - Experiment 2[b]	133.2	1	1	1	0	0	53.00%	5.06	0.584	64	64
Dalton (1997) - Experiment 3	133.3	1	1	1	0	1	41.00%	2.75	0.343	64	64
Goulding, Westerlund, Parker & Wackermann (2004) - Receivers' judging[a]	127	1	1	1	1	1	14.00%	-1.88	-0.28	64	64
Honorton et al. (1990) - PRL Experienced 301	103.7	1	1	1	1	1	30.00%	0.65	0.112	25	50
Honorton et al. (1990) - PRL Experienced 302[a]	103.8	1	1	1	1	1	64.00%	4.26	0.807	25	25
Honorton et al. (1990) - PRL Novice 101	103.1	1	1	1	1	1	24.00%	0	-0.023	50	50
Honorton et al. (1990) - PRL Novice 102	103.2	1	1	1	1	1	36.00%	1.63	0.24	50	50
Honorton et al. (1990) - PRL Novice 103	103.3	1	1	1	1	1	30.00%	0.65	0.112	50	50
Kanthamani & Broughton (1994) - Series 1	105.1	0	1	1	0	1	19.40%	-0.52	-0.135	31	31
Kanthamani & Broughton (1994) - Series 3	105.3	0	0	0	0	1	20.00%	-0.55	-0.12	35	40
Kanthamani & Broughton (1994) - Series 4[b]	105.4	0	0	0	0	1	36.90%	2.08	0.259	65	65
Kanthamani & Broughton (1994) - Series 7	105.7	0	0	0	0	1	26.10%	0	0.025	27	46
Kanthamani & Broughton (1994) - Series 8	105.8	0	0	0	0	1	26.00%	0	0.023	16	50
Lau (2004) - Long-ganzfeld study 1	139.1	0	1	1	0	1	45.00%	1.8	0.423	20	20
Lau (2004) - Long-ganzfeld study 2	139.2	0	1	1	0	1	40.00%	1.29	0.322	20	20
Lau (2004) - Long-ganzfeld study 3	139.3	0	1	1	0	1	20.00%	-0.26	-0.12	20	20
Lau (2004) - Long-ganzfeld study 4	139.4	0	1	1	0	1	25.00%	0	0	20	20
Lau (2004) - Long-ganzfeld study 5	139.5	0	1	1	0	1	30.00%	0.26	0.112	20	20
Lau (2004) - Long-ganzfeld study 6	139.6	0	1	1	0	0	20.00%	-0.26	-0.12	20	20
Marcusson-Clavertz & Cardeña (2011)	134	1	0	0	0	0	27.00%	0	0.044	26	26
McDonough et al. (1994)	131	0	1	1	1	1	30.00%	0.26	0.112	20	20
Morris et al. (1995) - Cunningham	110.1	0	1	1	0	1	40.60%	1.84	0.334	32	32
Morris et al. (1995) - Honorton replication	107	1	1	1	1	1	34.00%	1.02	0.068	32	32
Morris, Summers & Yim (2003)	119	1	1	1	1	1	37.50%	1.643	0.271	40	40
Parker & Westerlund (1998) - Study 5	118.1	0	1	0	0	1	40.00%	1.27	0.261	30	30
Parker, Fredenksen & Johansson (1997) - Study 1	102.1	0	0	0	0	1	20.00%	-0.42	-0.12	30	30
Parker, Fredenksen & Johansson (1997) - Study 2	102.2	0	1	1	0	1	37.00%	1.27	0.261	30	30
Parker, Fredenksen & Johansson (1997) - Study 3	102.3	0	1	1	0	1	37.00%	1.27	0.261	30	30
Parker, Grams & Petterson (1998) - Study 4	108.4	0	1	1	0	1	47.00%	2.53	0.464	30	30
Roe, Holt & Simmonds (2003) - Human series	136	1	1	1	0	1	35.00%	1.28	0.219	40	40
Roe, McKenzie & Alt (2001)	135	0	0	0	0	1	20.83%	-0.24	-0.099	24	24
Roe, Sherwood & Holt (2004) - Sender condition	137.1	1	1	1	0	1	26.10%	0.12	0.025	23	23
Simmonds-Moore & Holt (2007) - Ganzfeld condition	141.1	1	1	1	0	1	23.10%	0	-0.044	26	26
Smith & Sarvva (2008)	114	1	1	1	0	1	34.20%	2.16	0.202	114	114
Wright & Parker (2003) - One session	129.1	1	1	1	0	1	44.73%	2.62	0.418	10	38
Totals (factor, participants, trials)		**22**	**32**	**12**	**15**	**37**	**31.85%[c]**	**0.91[c]**	**0.139[c]**	**1496**	**1624**

Note. [a] indicates the three studies that were removed from both Models 1, 1.1 and 2 due to influence [b] indicates the three studies removed from Model 1.2 due to influence [c] is the column mean.

Zum Verständnis der Faktoren, die bei der Sender-Empfänger-Dynamik beim Telepathieversuch im Ganzfeld eine Rolle spielen: Eine Meta-Analyse

Abby L. Pooley Aja L. Murray Caroline Watt

Zusammenfassung: *Zielsetzung.* Mit Hilfe einer Meta-Analyse sollen fünf bisher nicht untersuchte Faktoren im Zusammenhang mit der Sender-Empfänger-Dynamik beim Telepathieversuch im Ganzfeld untersucht werden. Von Interesse sind fünf Faktoren: a) Hat der Empfänger den Raum des Senders vor der Sitzung gesehen? b) Konnte der Sender den Empfänger während der mentalen Übertragungsphase hören? c) Konnte der Sender den Empfänger während der Beurteilungsphase hören? d) Wurde der Sender explizit aufgefordert, zu schweigen? und e) Hat der Experimentator in der Sitzung bei der Beurteilungsphase geholfen? *Methode*: Es wurden Telepathie-Ganzfeld-Studien ausgewählt, die nach dem Gemeinsamen Communiqué durchgeführt wurden, mit einer Sitzung pro Tag und der Bewertung der Zielobjekte durch die Empfänger. Zwei Modelle mit gemischten Effekten wurden angepasst: 1) unter Verwendung der Trefferquoten der Studie als binomialer Mittelwert; und 2) unter Verwendung der Trefferquoten der Studie im Verhältnis. Bei beiden Modellen ergeben sich fünf Faktoren als binäre Moderatoren. *Ergebnisse*: Sowohl das binomiale Mittelwert- als auch das Verhältnismodell deuten auf einen signifikanten Effekt der Moderatoren insgesamt und zweier einzelner Faktoren hin: 1) die Möglichkeit des Senders, den Empfänger während der Überlegungsphase zu hören, und 2) eine Einschätzungsphase nach der Überlegungsphase. Permutationstests für beide Modelle ergeben ebenfalls signifikante Effekte der Moderatoren und der beiden Faktoren. *Schlussfolgerung*: Die Tatsache, dass der Sender die mentale Verarbeitung des Empfängers hören kann, scheint den Gesamterfolg der Studie zu erhöhen, während die Überprüfungsphase den Gesamterfolg der Studie verringert. Diese Analyse ist die erste, die die Auswirkung dieser Faktoren des Studiendesigns auf die Ergebnisse von Ganzfeld-Telepathie-Experimenten untersucht.

German translation: Eberhard Bauer

Compreendendo os Fatores em Jogo na Dinâmica Emissor-Receptor Durante a Telepatia Ganzfeld: Uma Meta-Análise

Abby L. Pooley Aja L. Murray Caroline Watt

Resumo: *Objetivo*. Utilizar a meta-análise para explorar cinco fatores previamente não investigados relacionados à dinâmica emissor-receptor na telepatia ganzfeld. Os cinco fatores de interesse são: a) o receptor viu a sala do emissor antes da sessão?; b) o emissor pôde ouvir o receptor durante o período de atividade mental?; c) o emissor pôde ouvir o receptor durante o período de julgamento?; d) o emissor foi explicitamente instruído a ficar em silêncio?; e) o pesquisador auxiliou na seção de revisão da sessão? *Método*: Foram escolhidos estudos de telepatia ganzfeld conduzidos após o *Joint Communiqué* (Comunicado Conjunto), com uma sessão por dia e os receptores avaliando os alvos. Dois modelos de efeitos mistos foram adaptados: 1) usando as taxas de acerto do estudo como média binomial; e 2) usando as taxas de acerto do estudo como uma proporção. Ambos os modelos têm os cinco fatores como moderadores binários. *Resultados*: Tanto os modelos de média binomial como os de proporção sugerem um efeito significativo dos moderadores, em geral, e de dois fatores, individualmente: 1) o emissor ser capaz de ouvir o receptor durante o período de atividade mental; e 2) um período de revisão após o período de atividade mental. Os testes de permutação para ambos os modelos também mostram efeitos significativos dos moderadores e dos dois fatores. *Conclusão*: O emissor ser capaz de ouvir a atividade mental do receptor parece aumentar o sucesso geral do estudo, enquanto o período de revisão diminui o sucesso geral do estudo. Esta análise é a primeira a examinar o impacto desses fatores de design de estudo nos resultados dos experimentos de telepatia ganzfeld.

Portuguese translation: Antônio Lima

Clarificando los Factores que Intervienen en la Dinámica Emisor-Receptor durante la Telepatía Ganzfeld: Un Metaanálisis

Abby L. Pooley Aja L. Murray Caroline Watt

Resumen: *Objetivo*. Usar un meta-análisis para explorar cinco factores no investigados previamente relacionados con la dinámica emisor-receptor en el ganzfeld de telepatía. Los cinco factores de interés son: a) ¿vio el receptor el cuarto del emisor antes de la sesión?; b) ¿podía el emisor oír al receptor durante el periodo de mentación?; c) ¿podía el emisor oír al receptor durante el periodo de evaluación?; d) ¿se le dijo explícitamente al emisor que guardara silencio?; y e) ¿ayudó el experimentador en la sección de revisión de la sesión? Método: Se eligieron estudios ganzfeld de telepatía realizados después del Comunicado Conjunto, con una sesión al día y los receptores evaluado los objetivos. Se ajustaron dos modelos de efectos mixtos: 1) usando las tasas de aciertos del estudio como media binomial; y 2) utilizando las tasas de aciertos del estudio como proporción. Ambos modelos tuvieron a los cinco factores como moderadores binarios. Resultados: Tanto el modelo de media binomial como el de proporción sugieren un efecto significativo de los moderadores en general y de dos factores individualmente: 1) que el emisor pueda oír al receptor durante el periodo de mentación; y 2) un periodo de revisión tras el periodo de mentación. Las pruebas de permutación de ambos modelos también muestran efectos significativos de los moderadores y de los dos factores. Conclusiones: El hecho de que el emisor pueda escuchar la mentación del receptor parece aumentar el éxito global del estudio, mientras que el periodo de revisión disminuye el éxito global del estudio.

Spanish translation: Etzel Cardeña