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A REVIEW OF APPARENTLY SUCCESSFUL METHODS FOR THE ENHANCEMENT OF ANOMALOUS PHENOMENA

by **KONRAD MORGAN** and **ROBERT L. MORRIS**¹

The authors present a selected review of apparently successful examples of applied parapsychological studies over the sixty years that have passed since Dr J. B. Rhine founded the modern scientific era of parapsychology. The paper concludes with a summary of what are felt to be promising directions for future research.

INTRODUCTION

This paper attempts to provide an overview of the various attempts and advances that have been made by academic parapsychology to increase the effectiveness of or use of the phenomena they study. Although the researchers of the late nineteenth century and early twentieth century could be said to have been applying the phenomena they studied (such as attempts to contact the dead, or to provide solace to bereaved people, depending upon your viewpoint), this paper will concentrate more upon the experimental work that has been conducted since modern parapsychology came into existence. For purposes of convenience this date is assumed to be the early 1930s², since that marked the beginning of Louisa and Joseph Rhine's September research programme at Duke University. Of primary concern to us in this review will be studies which have contributed in an applied manner to the modern discipline of parapsychology.

BASIC PROBLEMS WITH THE PHENOMENA

The problem involved in trying to use psi in any useful way is that it is too unreliable and weak. It is also notoriously difficult for experimenters or subjects to differentiate hitting from chance guesses (Rhine, 1958; West, 1962, p.142; Delaney, 1986; Milton, 1986), although admittedly there is some evidence that this is not always the case (Kanthamani & Kelly, 1974). Indeed, some theorists believe that one of the consequences of the way psi works makes it an unreliable source of information (Von Lucadou, 1987). Most attempts at applying it have tried to increase the signal-to-noise ratio using techniques from a branch of the computational sciences known as information theory.

SIGNAL-ENHANCEMENT TECHNIQUES

In traditional engineering terms signal-enhancement techniques include several options. The first of these is altering the transmission rate or strength of the transmitted signal. This is to try to avoid possible amplitude or frequency clashes between interfering or competing signal(s) and the target signal. The next option is to increase the receiver's sensitivity. In mechanical

¹ Correspondence should be addressed to the second author.

² Although there had been some earlier experiments it can be argued that they did not form a systematic effort.

terms this means increasing the accuracy of the physical receiving device. Often this involves modifying the characteristics of the physical receiver, or reducing the noise within the receiving system which is causing the system to corrupt the target signal once it has been received. The alternatives to these physical techniques involve altering the target signal's content. These measures include duplicating the transmitted information, and including confirmatory check data within the signal. This check data allows the receiver to check that the received data is correct. Duplication can involve either multiple transmission of the same data, or massive amounts of duplicated redundancy within the transmitted signal. Internal message checks range from simple check sums (a parity check being among the simplest examples), to highly complex checks which involve encoded versions of large parts of the data. Parity checks can be used when transmitting a string of ones and zeros. The sender guarantees that the sum of all the ones will add up to an even number—either a one or a zero is added at the end to make the sum even. At the receiving end, if the received digits do not add up to an even number, you know that an error has been made in transmission. When dealing with known signal-transmission methods these techniques can combat very high degrees of signal interference. The problems with their use in parapsychology are that they assume that something is transmitted from a source to a receiver in ways analogous to the physical systems described above. Many researchers (such as the observational theorists) are not sure this assumption is justified (see Stokes (1987) for a good discussion of the diversity of theoretical positions on this issue).

SIGNAL-ENHANCEMENT TECHNIQUES IN PARAPSYCHOLOGY

The Multiple-Guessing Technique

One of the earliest examples of an attempt to enhance the signal is a wartime study by Foster (1943) which used 50 Plains Indian children at a primary school. Foster was interested in the use of a then novel method for enhancing ESP, by using multiple guesses made by the children to an unknown 'yes'/'no' target answer. This multiple-guessing technique was based upon the assumption that ESP would respond to standard signal-enhancement techniques.

The use of multiple guesses or, as some authors have called it, the majority-vote technique, assumes that when a subject repeatedly guesses the nature of a target, each guess is independent, and the accuracy of those guesses can be enhanced by the use of simple mathematics³. Thus if there were two possible targets, say red and blue, by getting a subject to guess the same target on several occasions, the total cumulative number of guesses made for each target should give a more accurate indication of the target. Obviously such a simple example as having two possible targets, red or blue, would make the subject's natural biases toward the target more problematic. Fortunately this can be overcome either by making the subject blind to the number or nature of the targets, or by ensuring that the target order controls for any bias. In this first use of the multiple-guessing technique Foster got the children's non-Indian (Caucasian) teacher to conduct two types of ESP tests which compared the

³ Assuming that the S is blind to the previous guesses made on that same target.

old technique (single call) with the new multiple-guess technique. Even though this was a novel approach it had an unfortunate start, since Foster found only chance results with multiple guessing, and significance with the old method.

Due to the intervention of the Second World War there was little work carried out in applied parapsychology⁴. Foster's ideas were not followed up until Fisk and West's (1957) attempt to use the majority-vote guessing technique. Although Fisk and West got an impressive number of repeated guesses for some targets, they were unfortunately not the correct targets. The repeated-guessing technique was also investigated by Thouless (1960), but with little success. However Thouless did introduce the 'index of preference', which he tried to use to compensate for the inherent preferences of subjects for certain responses. Although Thouless's 'index of preference' was a helpful advance it also created some statistical problems, which were corrected by Scott (1960).

Internal Message Checks

As well as duplicating transmissions, the reader will recall that an alternative method of signal enhancement is to use some form of redundant accuracy checks within the transmission. It was not until the early 1950s that the first attempts to use a form of accuracy check were made within an ESP task. This task was finding lost objects, by the use of dowsing. Although scientific evaluation of dowsing had also been made by Dalton (1952), an investigation of more importance to this study is the work of Cadoret (1955). Cadoret tried to improve the reliability of dowsing success by getting some measure of the accuracy of the predictions, before they were used on a more major task. This was done by using a sample of trials to predict performance in the main series of trials. This use of a sample to predict performance was similar to the idea proposed by Stuart (1941), except that Stuart was interested in ESP card calls and not in any form of applied use. In his work Cadoret used a local test target and real remote target in the same study. The test targets were hidden coins. The Ss had to predict which row and column of 25 (5 x 5) tiles concealed the coin. On the basis of Ss' success with this first guess predictions were made for the real target, which was a hidden object on a plot of land in the author's residence. This crude method appeared to enable Ss' guesses to be more accurately applied to finding the target⁵. Good sample guesses on the test target tended to be followed by good guesses on the real target as well. The communication system was found to work best on the remote target following occasions when it had already shown that it was functioning well by producing an accurate response to the nearby target.

The most serious attempt was the work of Taetzsch (1958), who proposed using ESP targets with two sets of characteristics. These dual characteristics allowed one set to be used as a testing index, and the other as the actual target.

⁴ Although Rhine (1945) commented upon the applied use of parapsychology, and its problems, his comments were directed more towards the personal use of psi, and not towards the mechanical enhancement of the phenomena.

⁵ Cadoret's findings were later replicated by Osis (1960). However, Osis did find the technique less effective for targets that were at a very large distance from the S (Osis, 1960; West, 1962, p. 179).

However, work by Schmeidler (1960) which used such dual-aspect targets did not show a consequential increase in significance. Taetzsch (1962) further improved his proposed method by the suggestion of using a machine or computer to record the repeated guesses. This idea has formed the basis for many of the developments that have taken place in the applied use of parapsychological phenomena.

The next developments of major importance were the series of casino-oriented trials conducted by Brier and Tyminski (1970). In the first of a pair of papers the authors described how they used the methods we have already covered to try to enhance ESP success at predicting the outcome of various gambling targets. The authors used repeated guessing at the same target, combined with a predictive sampling technique. This worked so that Ss produced ten 25-trial predictions which were to be matched for 50 spins of a roulette wheel. Five of the 25 predictions were then combined to be a (1 x 25 trial) run using a majority-vote system. If the first predictive sample run provided an above-chance number of hits, then the second series of 25 trials was produced using the same method. The authors conducted four pilots, of which the first and second gave positive results ($p < 0.01$), but during the third and fourth series the predictive indices were at chance, so the subsequent trials were abandoned. This was as well since the second half of the later series were at chance. The authors also reported having successfully used the same method to predict the outcome of casino-thrown dice (20 trials, $p < 0.05$); and cards at baccarat ($p < 0.05$). The authors reported that they felt one of the most important features for applying psi was the need to determine whether the psi-based deviation was going to be positive or negative, to make the percentage of hitting as high as possible.

In their second paper, based upon the data from the same study, Brier and Tyminski (1970b) asked two questions which had been raised by the research outlined in their previous paper. The first of these was how successful was the majority-vote technique. The second was, Did clear-cut majorities, those in which the vote was based on five correct guesses out of five guesses, produce more hitting than slim majorities, where there were three or four correct guesses out of five? In investigating the first question they found that the majority-vote technique had raised the percentage of correct trials in six out of every seven runs. Surprisingly, they found that the answer to the second question was that the most successful majority was when there were three out of five correct, and this occurred for both predictive and actual uses of the data.

The use of psi to help predict the outcome in gambling was also adopted, but with less success, by Dean and Taetzsch (1970). The fact that one group of researchers finds success while another does not, when both are using the same or similar techniques, is a persistent paradox within parapsychology⁶.

One of the most important applied studies was that conducted by Carpenter (1982). He used a repeated-guessing technique and a mood predictor to try to enhance ESP to the point at which a five-letter word, PEACE, could be sent via

⁶ Some researchers have remarked informally that inventors of techniques tend to get the strongest results with those techniques, especially when first starting to use them.

psychic means. He used the repeated-guessing method of improving the efficiency of psi, but noted that this technique was not useful unless some means of predicting psi hitting and missing was available. Another problem faced by Carpenter was that index sampling of performance as a run proceeds is only of help if a prediction of the size of the overall deviation is available. Otherwise the experimenter cannot tell if the signal is hitting or missing. It would be undesirable to enhance a signal which was in the wrong direction, since it would give the opposite result to that required. To try to overcome these problems Carpenter used a mood scale to predict the psi direction and deviation. He found that using this mood indication to 'swap directions' when appropriate enabled him to predict the direction (i.e. hitting or missing) to within 76 per cent. A second series of studies applied this technique, and the word PEACE was embedded (with sample targets) via Morse code into a 24-trial target list. This was successfully transmitted via 12 correct calls, using a single call. This was an enormous improvement in efficiency over that achieved by Ryzl in the early sixties, but was tremendously time-consuming. In a later paper Carpenter (1983) showed that the development of a so-called V-scale enabled him to predict the size of the departure of the total score from chance. This V-scale recorded the subject's mood state and was developed as a predictor of the run-score variance. Carpenter showed that with this enhancement the single lists of majority-vote calls from his previous series could be made significantly more accurate than the overall body of calls from which they were derived.

Over twenty years after the initial suggestion by Taetzsch (1962), Hal Puthoff (1984) reported the details of a system he had developed to enhance ESP guesses. He designed and wrote a small program for a Hewlett Packard (HP-41c) pocket calculator, which he claimed allowed him to enhance the predictions for the outcome of the spin of a miniature roulette wheel. Puthoff had used coding theory to allow him to enter the red or black calls as ones or zeros to the programmable calculator. These calls of one or zero were then scrambled, using the calculator's pseudo-random number generator⁷ (PRNG), and the products of this operation recorded into specific memory register locations that were associated with the two target states. This process, called by Puthoff 'the subtrial process', continued until three entries had been allocated to one of the two registers, thereby using a so-called five-bit majority-vote technique to try to amplify the signal. To generate the targets for this process Puthoff spun a miniature roulette wheel, located in his desk drawer. Since Puthoff was using a single-subject-experimenter protocol, he closed the desk drawer so that he could not determine the roulette wheel outcome until he had completed generating the votes, then all he had to do was pull open the drawer. Puthoff reported extremely high levels of success using this technique ($p < 0.01$ for the actual trials, and $p < 0.05$ for the subtrials).

In a follow-up study to his previous work with a calculator, Puthoff (1985)

⁷ A discussion of the advantages and disadvantages of using pseudo-random number generators is given in Chapter 3 of Morgan (1989). Suffice to say that the use of manufacturers' built-in PRNG cannot be recommended.

enhanced the design of his system by making the subject's button presses interrupt a fast internal-logic flip-flop of 100 counts per second⁸. This allowed the system to sample the flip-flop and derive the states of one or zero to generate the multiple guessing. Puthoff used two subjects (E.M. and M.T.) and this new improved process to guess at the same roulette wheel concealed inside his desk drawer. One subject got chance results, but the other obtained significant hitting ($p < 0.01$).

OBJECTIONS TO SIGNAL-ENHANCEMENT TECHNIQUES

Kennedy (1979) has proposed that if psi was independent of task complexity, as he claimed he had shown in a previous review (Kennedy, 1978), then methods employed to enhance the signal would be irrelevant to the overall psi-effect size. This would be in direct conflict with the results found by those studies that had successfully used the 'majority-vote' technique. Kennedy reported having reanalysed the only detailed majority-vote data available (Brier & Tyminski, 1970), and found these results to be consistent with his proposed goal-oriented, or complexity-independent, psi. Kennedy reported that when he removed the effect of the majority-vote technique on the raw data the effect size remained constant. He proposed that this was consistent with the goal-oriented models of psi.

INCREASING THE RECEIVER'S SENSITIVITY

As already discussed in the introduction, the alternative to reducing the noise strength is to increase the sensitivity of the receiver. Within the communication paradigm this involves altering some aspect of the receiver. In a famous study a Czechoslovakian parapsychologist successfully used hypnosis to increase the sensitivity of individuals. This method was apparently so successful that Ss reached the point at which they could use these new abilities at will (Ryzl, 1962; 1963). Ryzl reported that from a total subject pool of 226 persons (73 male and 153 female), aged from 16 to 33 years, 3 men and 24 women displayed relatively good clairvoyant ability, and the ability of 13 women became 'very good'. Ryzl's method was illustrated by a detailed case description of a Ms J.K., who over a period of some months of intensive deep hypnosis developed extraordinary abilities⁹. Ryzl also attempted the use of repeated-guessing techniques with Ms J.K., but due to pressure from Ms J.K.'s family this research had to be interrupted (Ryzl, 1966). Unfortunately some attempts to replicate this most promising work have failed to achieve the dramatic success reported by Ryzl (Beloff, 1966).

Throughout the early 1960s Ryzl continued to be a major influence in the development of applied parapsychology, and with a male subject called P.S., who seemed to be reliably producing ESP, he tried a series of experiments in which he used repeated-guessing and predictive-index trials to send successfully five three-digit numbers (Ryzl, 1966). However, this needed some 19,350 ESP

⁸ The 100-counts-a-second rate was chosen because Puthoff felt it exceeded normal biological motor responses.

⁹ Apparently including precognitive clairvoyance of the outcome of a horse race, and locating lost objects and persons.

calls and took over 50 hours, so it could not be considered an efficient method of information transfer. It did however demonstrate that such information transfer was possible.

J. Jacobs and H. Breederfeld (1979) published the results from a study which had been an investigation into applying observational theories to influencing the outcome of the national German Lotto game. They used H.B. as the S, with the objective of trying to make the Lotto machine choose certain numbers. This study had two sets of conditions, the first where H.B. was hypnotized in his home (either by his wife or by J.J.). Once hypnotized, he was instructed to envisage the numbers chosen by the Lotto game as being the same as the target numbers. The second condition was similar except the hypnosis was omitted. This study reported finding that with a Mean Chance Expectation (MCE) of 3.7 hits, they got five hits using hypnosis, as opposed to only three when they did not ($p < 0.01$ corrected for optional stopping). However there were some unavoidable minor methodological weaknesses in this study, such that the sequence of the experiments (under hypnosis or not under hypnosis) could not be planned before-hand (Breederfeld & Jacobs, 1979, p.4). Such protocol of course has a weakness in that the hypnotizer chose when to select the conditions for the S's observation after the Lotto numbers had been published.

DISCUSSION

We have surveyed several studies which, by using techniques drawn from standard signal-enhancement techniques, have frequently produced results sufficiently accurate as to be potentially applicable to real-world problems. Why have they not been used more often? One possibility is that they are not widely known, since by their very nature they are primarily described in long, dry technical articles, which may escape the attention of all but the most dedicated. Another problem is that the procedures used take a long time, are repetitive and boring, and can be quite generally tedious for the subjects.

However, it should be feasible to design and conduct more interesting studies through the use of computer graphic systems. The experiment must be set up such that, on any given trial, the subject is unaware of what responses he or she has made before to that particular target. For instance, suppose the task is to send a short message with complete accuracy, such as the SOS (dot-dot, dash-dash-dash, dot-dot-dot) distress signal. The computer could be programmed to designate each symbol with a separate number, and identify the symbol with an emotional or neutral slide, emotional for every dash and neutral for every dot. Thus targets 1-3 and 7-9 are emotional, 4-6 neutral. Each has a separate slide identified with it. The computer then scrambles them so that the targets are projected onto a screen in another room (with or without agent) in random order. The subject is asked then to respond to whether the target at any given trial is emotional or neutral, without having any idea of what he responded on any other occasion when that particular target was being used. If each target were presented nine times, there would be a total of 81 trials. The guesses for each target could then be tallied, and either a simple majority of 5-4 used, or a more stringent criterion such as

7-2. If the latter, then each target might be presented to the subject until on a particular series such a strong majority were achieved. The other techniques such as the use of a sample to predict whether psi hitting or missing is occurring could also readily be incorporated into the design.

The important point is that the precision of the earlier studies can be maintained, and yet with the use of target material that is more meaningful for the subjects involved. Although many trials would still be needed, the interval between trials could easily be adjusted to take into account preferred response rates or to search for optimally efficient ones. And of course the strongest reward of all is the possibility of achieving a sufficiently high level of reliability as to be seriously applicable in real-life situations.

It is hoped that this paper will encourage more researchers to take these basic ideas and develop procedures whereby they can be explored, refined and used.

School of Information Science

Portsmouth Polytechnic

Lockway Road, Southsea, Hants

KONRAD MORGAN

Department of Psychology

University of Edinburgh

George Square, Edinburgh. EH8 9JZ

ROBERT L. MORRIS

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PSI IN SCIENCE

by SUSAN BLACKMORE

We publish the references which should have been appended to the article, which we printed in our April issue. We apologise to the author to our readers for this oversight.
—Editor

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by KONRAD MORGAN and ROBERT L. MORRIS

ERRATUM

In our article in the July 1991 issue of the *Journal*, we made an error in reporting the results of an experiment by Brederveld and Jacobs. By mistake, we presented the hit-and-miss tally for a pilot study, rather than for the total of five formal series. The crucial sentence on p.7 should read, "This study reported that with a Mean Chance Expectation (MCE) of 18.4 hits, they got twenty-five hits using hypnosis, as opposed to only nine when they did not ($p < 0.01$ corrected for optional stopping)."

Additionally, in our reading of the original report we assumed that the subject viewed the results of the lottery on television after the lottery numbers had been chosen physically. Dr Brederveld has recently informed us that he viewed live television coverage of the generation of the Lotto numbers. Thus the objection we raised to his procedure in our report is not valid. We are grateful to him for calling our attention to this misunderstanding, and regret any confusion produced by our error.

School of Information Science
Portsmouth Polytechnic
Locksway Road, Southsea, Hants

KONRAD MORGAN

Department of Psychology
University of Edinburgh
George Square, Edinburgh. EH8 9JZ

ROBERT L. MORRIS