ERRORS AND CONFUSIONS IN ESP

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There have been many theories which attempted to understand ESP in terms of the more familiar psychological processes of memory and perception. Among them are several relating ESP to memory, the most well-known of which is Roll's (1966) 'memory theory of ESP'. I have suggested five approaches to testing the relationship between ESP and menory or perception (Blackmore, 1980a). These are 1) The study of errors and confusions made in ESP; 2) Studies of correlations between ESP and memory (Blackmore, 1980b); 3) Investigation of the effects of varying target material on ESP performance (Blackmore, 1981); 4) The use of the recall situation as a psi-conducive state; and 5) Studies of associative habits. Here I shall consider just the first of these, that is the study of errors made in ESP.

Examination of errors is a powerful method of investigating any cognitive process. An obvious example is the investigation of errors in memory, which can give clues to the underlying organisation of storage (Norman, 1969) or to the coding strategies being used. For example in a verbal learning task confusions of the words big and large would indicate semantic coding, of rough and bough, visual coding, and of court and caught, auditory coding (Baddeley, 1976). Visual illusions provide another example. Attempts to explain, say, the Muller-Lyer illusion have led to insights into the processes involved in depth perception (Gregory, 1970) and study of the errors made in vigilance tasks casts light on the underlying attentional processes (Neisser, 1967).

Numerous other examples could be given to illustrate the value of studying errors. In the case of ESP experiments errors may be very common and this could be exploited by making use of them. Since a great deal is known about the kind of errors made in tasks using perception and memory, it should be possible to compare them with the errors made in ESP.

At the most general level we should predict that if ESP resembles other cognitive processes, then the errors made should be, at least to some extent, systematic. Perhaps subjects would tend to make particular errors in particular circumstances, or when they confuse two items there might be some discernible relationship between them. This is seen in other cognitive processes. If we forget a word we can usually produce another related word or, as in the case of the tip-of-the-tongue feeling (Brown and McNeill, 1966), we can say something about it. We may have access to some of its attributes such as its first letter or number of syllables. Similarly, if we make a mistake in identifying a word, a wild flower, or even a friend, it will usually be because we have confused it with ones similar along recognisable dimensions. If ESP is like other cognitive processes we should be able to find similar patterns among the errors made.

More specific predictions may be derived from certain theories of ESP. Firstly, if ESP is seen as a process analogous to perception, with information input directly from a target, then we should expect the properties of that target to be important and the errors made to correspond to confusions based on the perceptual characteristics of that target. For example, subjects in ESP tests might confuse targets which looked similar. If this occurred then it would be possible to investigate which particular characteristics of the target were most important.

Different kinds of errors would be predicted by various models which compare ESP with memory. Several describe ESP and memory as aspects of the same process. These include the ´Psychic ether hypothesis´ put forward by Price (1939), Carington´s (1945) ´Association theory of telepathy´ and Marshall´s (1966) physical theory of ESP and memory. Since all these theories include the idea that ESP and memory involve the same process they would presumably predict that errors in ESP should resemble those in memory. However, errors made in memory vary with the situation and the task, and none of these theories is so well articulated that it would allow us to specify which type of memory task to compare with ESP. Nonetheless, they might predict that

associative rather than perceptual errors would dominate.

Even less unambiguous predictions follow from the only memory theory that has been extensively tested, that is Roll's 'memory theory of ESP'. This is based on the idea that 'The ESP response consists of the percipient's own memory traces and that the effect of the external (ESP) stimulus is to activate memory traces rather than supply new ideas or images' (Roll, 1966, p.505). Although superficially this theory appears to relate ESP and memory, I have argued that it is in fact barely distinguishable from a simple perceptual model of ESP. That is, one which likens ESP to a 'sixth sense' with input occurring as in other sensory modalities (Blackmore, 1980a). Such models face serious theoretical difficulties. It is hard to understand how the information is transmitted, how received (unless there is some undiscovered ESP sense-organ), and how transformed so as to make sense to the perceptual system. And, I believe Roll's 'memory theory of ESP' also faces these problems since it requires a stimulus (he calls it the 'ESP stimulus') to select which memory traces are to be activated. For this reason, at least, it is not easy to predict from this theory what sort of errors would be made in ESP.

Predictions are therefore not simple. None of the theories predicts precisely the types of errors we should expect, but they do predict general differences. A knowledge of the kinds of errors made in ESP would make it easier to assess the relationship between ESP and more familiar processes, and so to assess the theories. We may consider this in two stages. The first step is to establish that there may be consistency in the errors made in ESP, the second to find out what types of confusions are involved.

Several early studies reported consistency among the confusions made in ESP. Warcollier (1939) suggested that the elements of an ESP target may become scrambled and recombined, and listed various rules by which this may occur. However, his experimental methods cannot be compared with those used today and his findings may reflect his own associations rather than any intrinsic to the ESP process.

The tendency to make consistent confusions was later termed 'consistent missing' by Cadoret and Pratt (1950). They first suggested statistical methods for detecting such an effect and defined it as the 'tendency of the subject in an ESP test to mistake a given symbol for a certain other symbol to a greater-than-chance degree when making his calls' (p.244). Cadoret and Pratt were the first to suggest that a

psychological, or cognitive process rather than a motivational one could underlie such an effect. This was particularly important with respect to psi-missing. Timm (1969) suggested that consistent missing could be responsible for overall scores lower than chance, rather than some kind of negative motivation.

More recently Kennedy (1979) reviewed the literature on consistent missing. He analysed available data and sought to determine the extent of consistent missing, its relationship to scoring rates and the factors which lead to it. From data for 11 subjects he found about half showed the effect. However the results relating to scoring rate were not so clear. If consistent missing is a cause of psi-missing then one would expect to find a more consistent missing effect when overall scores are lowest, but this was not found by Kennedy. There appeared to be no reliable relationship between the two.

That consistent missing occurs at all may be evidence that ESP resembles other cognitive processes, but to investigate this further it is important to know what kinds of confusion occur. The usual analysis, a chi-square test on the complete confusion matrix, or all except for the direct hits, cannot reveal this. It can only detect an overall effect. Kennedy states "the confusions apparently can stem from factors such as the visual similarity of the targets or from the more abstract relationships of associations between targets" (p.126). In order to compare ESP with other psychological processes we need to know about these factors. Several studies are relevant here.

In studies by Rao and his associates (Rao, Morrison and Davis, 1977; Rao, Morrison, Davis and Freeman, 1977; Rao, 1978), subjects learned paired associates consisting of a trigram and one of ten words. The same words acted as ESP targets to be paired with new trigrams. Each subject gave association ranking scores for each pair of words and it was therefore possible to tell, when an error was made, how closely associated were the chosen word and the target word. Rao, Morrison and Davis found that psi-hitters chose more closely associated words than missers, on missing trials, but this was not confirmed in the subsequent studies. If confirmed this indicates the kind of lawful relationship in errors which would be expected if ESP is like other cognitive processes. It was also suggested that a relationship between ESP and memory was indicated, but this conclusion was not supported since the expected effect was not found in memory trials in the subsequent experiment.

Particularly relevant to a comparison of ESP with perception are studies by Kelly and his colleagues. Consistent missing was studied in two exceptional subjects (Kelly, Child and Kanthamani, 1974). In tests with playing cards, with the subject B.D. similarities were found between ESP errors and visual errors for both number and suit. With another subject (S.H.) no such effects were found. In a second study (Kelly, Kanthamani, Child and Young, 1975) B.D. guessed the identity of long series of playing cards, shuffled and taken from a drawer out of his sight. In an analogous visual task he was presented, tachistoscopically, with slides of playing cards and asked to identify them. Confusion matrices for the two tasks were then compared. A strong confusion structure for the visual task was obtained. For the ESP task the structure was very weak and was only extracted by the use of multi-dimensional scaling techniques, but it was found to resemble the visual structure, especially in high scoring runs. This indicated, for this subject at least, a similarity in processing between ESP and vision. But as Kelly et al pointed out, this could be due to intrinsic similarities between ESP and vision, or to the way this particular subject relies on visual imagery.

Another method for investigating errors in ESP is to design specially related targets and measure how often each is confused with another. Clock cards (Fisk and Mitchell, 1953) were designed so as to have more or less closely associated targets. Subjects could make a direct hit on the number or could make a near miss by choosing one close to it on the clock face. But though this method used related targets they were not related in the ways of interest here. Nash and Nash (1961) also designed specially related targets. They used eight animal pictures which were in groups of four mammals and four birds, and in pairs of very similar animals. However, they found no consistent confusions.

These few studies provide some evidence on ESP errors, but it is very limited and the results have rarely been consistent. If we are to compare ESP with the psychological processes of memory and perception, more specific information is needed. As a start, a simple question which could be answered by experiment is 'Are the errors made in ESP based on perceptual or associative cues?' In other words are perceptual or associative errors predominant in ESP?

Of course there may be no simple answer to this question. Both types of error may occur in different circumstances or in subjects who habitually make different types of error in memory or perception. Even

if an answer were obtained, we should not be able to decide unequivocally between the theories. Nevertheless, with even a partial answer we should come closer to understanding the relationship between ESP and psychological processes. Accordingly the experiments reported here were addressed to this question.

There are various methods which can be used to investigate errors and confusions. One has already been described, that used by Kelly et al (1975). The comparison of confusion structures in this way is potentially a very powerful method but was not used here for three reasons. Firstly it depends on highly complex statistical techniques which, apart from the work involved, may introduce doubt as to whether the stringent assumptions on which they depend have been met (indeed Kelly et al comment on this problem in their analysis). Secondly this study used only one subject. If models of ESP are to be tested more general principles need to be explored, testing many subjects. However, it should be noted that any such approach depends on assuming that the errors or confusions made result from general characteristics of the ESP process rather than individual idiosyncracies. Finally Kelly et al used playing cards as targets, but these, or ESP cards, will produce confusion structures which are unlikely to be meaningful or to shed much light on underlying processes. Indeed, the ESP cards were specially designed not to be easily confused. Instead specially designed targets are needed. Nash and Nash (1961) and Rao (1978) used specially designed targets but used relationships between targets which are not relevant to the question posed here. Bearing these points in mind it was thought preferable to test many subjects, to manipulate the relationship between targets and to use somewhat simpler statistical techniques.

The method chosen was to incorporate into ESP tasks the opportunity for subjects to make specific types of error or confusion. For example, associated targets and targets which looked similar were devised and the numbers of confusions between each type were recorded. It was hoped that if preliminary experiments showed a preponderance of one type of error it would be possible to examine further the variables influencing those errors.

Three pilot studies were carried out. They were performed quickly using large numbers of subjects with only one target order. They were therefore subject to a stacking effect but it was hoped that they would provide hypotheses to be tested in further experiments. Because these studies suffered from various flaws they are only described in

outline here.

PILOT STUDY 1

Eighty-nine students in a parapsychology class took part in a GESP task. Nine pictures were designed in groups of three so as to incorporate two possible types of error. In each group one key word was related to one other by association and one by visual similarity. For example the key picture of a leaf was related to that of a tree by association and to that of a fish by visual similarity. It was therefore possible to see how many direct hits were made and how often subjects chose each type of related picture.

An assistant (KK) prepared the target sheet from random number tables, sealed it in two opaque envelopes and took no further part in the experiment.

An agent and an assistant were chosen from among the students, left the lecture theatre and locked the doors. The assistant then opened the sealed envelope and gave the pictures to the agent to look at one at a time at four minute intervals. Timing was coordinated by the experimenter who controlled a light switch.

Meanwhile the experimenter explained the task to the remaining 89 students. They were told that the agent was going to look at a series of 9 pictures and they were asked to try to imagine what was being looked at and draw a picture on a prepared sheet. There was one run of nine trials. After all the drawings were completed the subjects were shown the 9 target pictures, each lettered A to I and asked to decide which was target for each of their own drawings and to mark them accordingly with the appropriate letter. The task was thus equivalent to a forced choice task although the subjects did not know this at the time of their drawing. It was hoped that this method would be more conducive to the operation of ESP than a simple forced choice procedure while allowing the same simplicity of analysis.

RESULTS

The complete results are best shown in a 9x9 confusion matrix (see

appendix 1). The most important results concern the comparison between the numbers of direct hits (type 1), the two special types of error (types 2, associative, and 3, perceptual error) and misses. Spurious results could be obtained if one did not take account of the differential popularity of the various targets. This is allowed for by calculating the expected number of responses for each cell of the matrix by dividing the total number of times any picture was chosen by 9 (the number of targets). Expected means for hits and errors can then be calculated and compared with the obtained means. Note that these are means for each target. The results for all subjects have been pooled. These results are shown in table 1. It should be noted that the degrees of freedom vary because there are 9 possible ways of making a direct hit, but only 6 each of the two kinds of error.

TABLE 1
Results for experiment 1 pooled for 89 subjects

Hits type	Total	Mean	Expected mean	t	df	p
1	80	8.89	9.9	0.99	8	0.35
2	77	12.80	9.6	3.48	5	0.02
3	77	12.83	10.0	1.30	5	0.25
Comparison of 2 and 3				4.91	2	0.04

There are no more direct hits or type 3 hits than would be expected by chance but there are significantly more type 2 (associative) errors than expected ($t=3.48$; $df=5$; $p=<.04$). In addition for the key pictures only, a direct comparison can be made and this shows that there were significantly more type 2 (associative) than type 3 (perceptual) errors. This may appear to support the hypothesis that errors made in ESP more closely resemble those made in memory than in perception, but inadequacies in the experimental design make such a conclusion unwarranted.

Firstly all subjects were tested simultaneously using the same target order. It is possible that this order itself produced the particular distribution of hits and misses. A stacking effect like this can lead to an overestimate of the significance from conventional statistics. This can be dealt with by various methods such as the laborious procedure of calculating the true variance (Greville, 1944) or using a majority vote technique or index of preference (Thouless and Brier, 1970). In this case the latter would reduce the data so far that no conclusions would be possible. It is in fact far preferable to eliminate this problem altogether and to do this multiple target orders should be used preferably a different one for each subject. This was not possible here for a GESP task but the second pilot study used several target orders rather than one and it was hoped that this would be an improvement.

Secondly the target pictures were not ideal and could be improved, especially since the relationship between them was unknown. It would be preferable either to measure associations for the stimuli or to use those of known association value. This is easier for words than for pictures. The main experiment used words as targets.

Thirdly in this experiment three key targets and six others were all presented as possible targets to the subjects. This method means that special allowances have to be made for preferences of each type to each target which not only complicates the analysis but may introduce a possible source of error.

Other designs are possible. For example only the key pictures might be presented to the subjects while all the pictures are used as targets. This would avoid the complications noted above but would change the experiment from a study of errors (since a direct hit would in any case be impossible on many trials) to one on confusions, or the effectiveness of different types of targets. The main experiment described here used this method, as did a later one using child subjects (Blackmore, 1980d).

Fourthly, although the subjects were told that the selection of targets was random, they might nonetheless feel constrained to use one of each, especially since there were nine targets and nine trials. This problem of dependence of responses would be much less if more trials were used, as in the later experiments.

Finally in this experiment the subjects marked each others' answer

sheets. Obviously this introduces the possibility of cheating, though this was reduced by various simple measures. It could of course be eliminated altogether by marking the sheets in the subjects' absence. However, for this experiment it was thought more important to give immediate feedback. Some of these problems were eliminated from the later experiments.

PILOT STUDY 2

The same target pictures were used as in the previous experiment but there were two main differences in procedure. Firstly there were four runs with a different target order for each, instead of just one run. The targets were again chosen from random number tables by an assistant (KK) who prepared the pictures, sealed them in opaque envelopes and then took no further part in the experiment. Secondly a quicker forced choice procedure was used instead of the time consuming procedure used previously. Subjects were 84 students in a parapsychology class.

An agent and an assistant were chosen from among the class and left the lecture theatre, the assistant being responsible for locking all the doors and presenting the targets to the agent at the right time.

Meanwhile the subjects were given an answer sheet, the 9 target pictures were shown throughout on the overhead projector and subjects were asked to record which they thought was target for each trial. There were four runs of 9 trials each. Trials were at 45 seconds intervals with a few minutes break between runs. Timing was synchronised with a light operated by the experimenter as before.

RESULTS

The complete results can be seen, as before, in a 9x9 confusion matrix (see appendix 2). This shows the results pooled for the 4 runs and for all subjects. The important comparisons are shown in table 2. All means and expected means were calculated as for the previous experiment.

It can be seen that the significant results found in experiment 1

TABLE 2
Results of experiment 2 pooled for 84 subjects

Hits type	Total	Mean	Expected mean	t	df	p
1	360	40.0	37.3	1.25	8	0.25
2	219	36.5	37.9	0.88	5	0.42
3	230	38.3	37.4	0.39	5	0.71
Comparison of 2 and 3				0.12	2	0.92

are not replicated here. There are no significant differences either between the obtained and expected means or between the numbers of the different types of errors. Neither hypothesis is supported.

DISCUSSION

The results of this experiment do not support those of experiment 1. One possible conclusion is that the latter were due to uncontrolled target order and were spurious. However, the differing results could be due to other differences between the two experiments. Most important among them being the difference in procedure. Experiment 1 used an ostensibly free response procedure while 2 used a forced choice method. Since this difference might account for the difference in the results, the two procedures were tested and compared in a further experiment.

PILOT STUDY 3 6:3

Sixty five students in a parapsychology class took 2 ESP tasks. They were divided into two groups. Group 1 (N=41) took the free response

test (as in experiment 1) first followed by the forced choice task (as in experiment 2). Group 2 (N=24) took the same tests in reverse order. The groups were of different sizes because they depended on volunteers.

For the free response method at least it is desirable to have pictures which correspond closely with subjects drawings. Therefore 53 drawings from experiment 1 (801 drawings in all) were consulted and 5 pictures designed to be most representative of these. These were used as targets in both tests.

Target orders were chosen from random number tables and the pictures were sealed in opaque envelopes by an assistant (KK) who took no further part in the experiment.

The procedures used were the same as those for the previous experiments. Each test consisted of one run of 10 trials. Between the two tests there was a short break.

RESULTS

The MCE for each run is 2.0. With results for all subjects in both groups pooled the obtained means were as follows:

Test a	'free response'	M=2.09
Test b	'forced choice'	M=2.05

Neither of these means is significantly different from MCE and there is no significant difference between them ($t=0.23$; $df=64$; $p=0.82$). There is no indication that either method is more effective.

DISCUSSION

Neither of the methods used here produced any evidence of ESP occurring and there was no obvious difference between them in effectiveness. The most parsimonious account of all the results so far is that the significant effects in experiment 1 were spurious and a result of a stacking effect, and no ESP occurred in any of the three experiments. Of course other interpretations are possible. Differences

in the procedure, experimenter's expectation or subjects may have produced positive results on the first experiment but not on the others, but such a conclusion cannot be justified on the basis of these results.

One further experiment was carried out which incorporated various improvements suggested by the previous experiments. Words rather than pictures were used as targets, the method of confusions with only key words used as responses was adopted, and all subjects had individual target orders.

Like the pilot studies this experiment investigated the relative importance of meaning (or association) and visual appearance of ESP targets. The aim was to determine whether ESP is more effective when the target is identical to the response, or when it is related by association or by visual similarity. This experiment differs from the previous ones in several respects, to be discussed below.

MAIN STUDY

METHOD

Subjects were 59 students in a parapsychology class.

Targets were words. There was a pool of 12 response words given to the subjects, but a larger pool of 36 target words. Twelve of these were identical to the response words (type 1 targets), 12 were related by association (type 2) and 12 looked similar (type 3). It should be noted that this differs from the pilot experiments in which the response and target pools were identical. This method was preferred because it eliminates the necessity to allow for preferences. However, it also means that the experiment is strictly one comparing target effectiveness, or confusions rather than errors.

Target lists consisted of 72 words, each of the 36 target words appearing twice. Individual lists for each subject were prepared by computer and sealed in envelopes by an assistant (TT) who took no further part in the experiment. Examples of the response and target words can be seen in table 3.

TABLE 3
Examples of target and response words in the main experiment

Response words	Target words		
	Direct hit type 1	Associative hit type 2	Perceptual hit type 3
black	black	white	slack
cat	cat	dog	cap
love	love	hate	live

PROCEDURE

Subjects were given a response sheet with the 12 response words, 72 spaces for their responses and a sealed envelope containing their own target list. They were asked to use their clairvoyant abilities to 'see' what was in their own personal envelope and to write their answers on the prepared sheet in their own time. When all had completed the list (about 15 minutes) they were asked to swap sheets with a neighbour before checking. No subject was allowed to open any envelope until this time and the experimenter checked that this rule was obeyed.

The rationale behind the experiment and the method of scoring were explained to the subjects and the complete list of words shown to them. They then marked each others' sheets and the results were roughly calculated. All sheets were double checked at a later date.

RESULTS

Obtained and expected means are shown in table 4. Overall scores pooled for all subjects and for all three types of hit, did not differ

TABLE 4
Hits of three types in the main experiment

Hit type	Total	Mean	Expected mean	t	df	p
1	93	1.58	2.0	3.14	58	0.003
2	116	1.97	2.0	0.09	58	0.93
3	138	2.34	2.0	1.83	58	0.07
Total	347	5.88	6.0	0.29	58	0,77

significantly from MCE. However, there were differences between the numbers of hits scored on the different types of targets. Direct hits were significantly below MCE possibly showing psi-missing, while type 2 hits were close to chance and there were most type 3 hits. A one-way ANOVA shows a significant effect of word type on the number of hits ($F=4.95$; $p<0.01$). Additional comparisons were made between the different hit types. Only the comparison between type 1 and type 3 hits shows that there were significantly more type 3 hits than direct hits (see table 5).

DISCUSSION

On a simple hypothesis, assuming ESP to operate like known psychological processes, one might expect to find most direct hits with fewer of the other types of hit. The order of effectiveness of the types would be either 1-3-2 or 1-2-3, and might indicate that either perceptual cues or meaning were more important. However, the results obtained (3-2-1, with direct hits below MCE) highlight the impossibility of making such assumptions when dealing with ESP. In particular the possibility of psi-missing has been ignored. If this is taken into consideration a number of other arguments become possible 1) Since there are most type 3 hits it could be simply concluded that perceptual cues are more important for ESP.

TABLE 5
Comparisons between types of hits for the main experiment

Hit types compared	t	df	p
1 and 2	1.91	58	0.06
1 and 3	2.95	58	0.005
2 and 3	1.40	58	0.17

2) Since there is evidence for psi-missing in the experiment it could be assumed that any ESP occurring acted negatively and so since there were fewer type 2 hits, meaning or association is more important than visual appearance.
3) Since only direct hits differed significantly from MCE it could be concluded that psi only operated when the target was identical to the response and not when it was merely associated or visually similar.

These arguments lead to quite different conclusions. To decide which argument to adopt one needs a model for the operation of psi and psi-missing. Many have been suggested such as by Scott (1961) and by Palmer (1975). However, none is universally accepted and I had not decided, prior to the experiment which model I intended to use. It therefore seems that no definite conclusions can be drawn from the results obtained. The results highlight the fact that possibly untenable assumptions were made in designing the experiment. However, without making some such assumptions the experiments could not have been designed at all. Without more knowledge of the operation and limits of psi, experiments such as this may be incapable of providing meaningful data and so perhaps should not be attempted. Less pessimistically, it could be argued that with more data from similar experiments a regular pattern might emerge and this might make meaningful conclusions possible.

DISCUSSION AND SUMMARY OF RESULTS

The experiments reported here aimed to answer the question: 'Are the errors made in ESP based on perceptual or associative cues?' The number of direct hits (type 1) were compared with the number of errors or confusions made with targets related by association (type 2) or by perceptual similarity (type 3). Is it now possible to answer the question on the basis of the results obtained?

Direct comparison is not strictly fair since the experiments varied in procedure and design. Nonetheless an indication can be given by looking at the order for the hit types in each case. This is shown in table 6, which should show whether any systematic pattern emerges.

TABLE 6
Results of three experiments on errors or confusions in ESP

Experiment	N	Test type	Overall ESP?	Above or below MCE?	Order of hit types	Sign. effect of order?
1	89	GESP	No	below	2-3-1	yes: 2>3
2	84	GESP	no	above	1-3-2	no
3	59	Clair	no	below	3-2-1	yes: 3>1

Clearly it does not. Indeed the order is different in each case and there is no obvious pattern.

Experiment 1 may be excluded because of the faulty method used. This leaves two adequate experiments providing very different results. The order of hit types is different in each case and although one of these differences is significant it is only one among six similar analyses. In neither was there any evidence of ESP occurring and the most parsimonious account of the results seems to be that they were entirely due to chance. If this is the interpretation accepted we can only conclude that it was impossible to investigate the types of error

made in ESP in the absence of any ESP.

ABSTRACT

If ESP is related to more familiar cognitive processes, the errors or confusions made between targets should show consistencies. For example, they may resemble those made in perception or memory. If so this could throw light on theories relating ESP and memory. Previous studies of errors in ESP are considered and four experiments are reported. Two used special picture targets between which confusions of either association or visual similarity could be made. The first produced more confusions between associated pictures but the method proved to be flawed. A second study using a different design showed no significant differences. In a third a comparison of the two designs was made but no difference was found. None of the three experiments provided significant extra-chance scoring. A final experiment used words as targets, related to each other by either visual similarity or by meaning. Again no significant overall scoring was obtained. Although there were significantly more visual confusions than direct hits this unexpected finding must be considered in the context of the non-significant ones. The conclusion reached was that chance best accounted for the results. From these results it was not possible to determine whether visual or associative confusions would predominate.

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