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THE EFFECT OF VARIATIONS IN TARGET MATERIAL ON ESP AND MEMORY

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If we are to integrate ESP into psychology and to learn more about its relationship to other processes one of the first questions to ask is whether ESP resembles cognitive processes such as memory and perception. I have discussed five methods used for investigating this which are 1. The study of errors made in ESP (Blackmore, 1981), 2. Correlations between ESP and memory or other cognitive skills (Blackmore, 1980a), 3. Studies of the effects of varying target material on ESP, 4. The use of the recall situation as a psi-conducive state and 5. The study of associative habits and their effect on ESP (Blackmore, 1980b). This paper is concerned only with the third of these approaches, that is studies of the effects of varying target material on ESP performance.

When considering other cognitive processes, the nature of the material used affects the outcome. The attributes of stimulus material affecting memory under different test conditions have been studied in some detail (see e.g. Herriot, 1974; Brown, 1976). Some words or pictures are easier to recall than others, others easier to recognise. The same can be said of perception. Under imperfect conditions, certain material is easier to perceive or to identify. The threshold for hearing one's own name is lower than for other names, the quality, clarity and familiarity of a stimulus affects the ease with which it is perceived in a brief exposure. Again the stimulus variables involved have been thoroughly studied (see Haber and Hershenson, 1973). If ESP involves the same processes as either memory or perception then we should expect variations in certain stimulus

attributes to affect the level of scoring. The attributes concerned may not be the same as for more familiar test paradigms but it would be reasonable to start by testing these before proceeding to new ones.

There is a certain amount of evidence relating to stimulus attributes and ESP. In general, early studies, such as those by Rhine (1937), showed little effect of varying obvious target variables such as size or distance (see e.g. Rhine and Pratt, 1954; Rhine, 1977). MacFarland and George (1937) and Murphy (1938) found no reduction in scoring when symbols were distorted and Rhine (1934) noted the simple point that the angle of presentation of the deck of cards is not important as one might expect on a 'radiation' theory. Van Busschbach (1956) found that colours were more effective targets than either arithmetic symbols or words, but he failed to control for the order of the different targets and in a later study (1961) found no effect. Van de Castle (1953) found that colours and ESP cards made better targets than numbers, letters or drawings, but he used only one subject and under poorly controlled conditions. The reason for the apparent effectiveness of ESP cards has been attributed to their relative freedom from the effects of guessing habits. All this evidence appears inconclusive at best, but if anything indicates no effect of varying the stimulus attributes tested.

Apart from these considerations little systematic study of stimulus variables has been carried out, other than incidentally. Perhaps this is because they are generally thought to be unimportant. Certainly it is not the practice in parapsychology for authors to report in any detail the nature of the stimulus. For example, when ESP symbols are used they may be bold black figures printed on white cards, small symbols typed in lists, or faint symbols from a computer's repertoire. They may be on individual cards, or on lists flat or folded. Such details are rarely thought to warrant inclusion in the experimental report.

These particular variables may indeed be unimportant, but if ESP resembles other cognitive processes, some attributes of the stimulus ought to affect it and the various theories of ESP may give clues to those attributes. Not all theories, though, make such predictions. Some, such as the observational theories or Stanford's conformance model (Stanford, 1978), do not make specific predictions about the type of target material most effective and they may be compatible with many findings. I shall consider here only those theories which relate ESP to other cognitive processes and so have implications for the

effects of different types of target.

Firstly, any perceptual model of ESP would predict that the perceptual characteristics of the stimulus ought to be important. For example, we might expect size, clarity or relative position to have some effect. These are precisely the kind of variables which have already been shown to be irrelevant to ESP. However, this fact does not necessarily contradict a perceptual model for if some new perceptual system were involved we might not be aware of the relevant variables. This may be considered an unlikely possibility but should perhaps not be ruled out (see Blackmore, 1980). A more general approach is to vary the amount of information or redundancy in the stimulus material. If the process resembles perception then a stimulus with more information or more redundancy should be more effective.

In studies of perception the subject's expectancies interact with the type of material. For example, a subject primed with more information about a stimulus, such as its position, whether it will be in upper or lower case letters etc, will be able to identify that stimulus more quickly and accurately when it occurs (see Haber, 1966; Neisser, 1967). Similarly false information may slow down responses. If ESP resembles perception we should expect similar effects of set or expectancy on scoring levels. I know of no parapsychological experiments which have systematically varied subjects' expectancies or set for target type. These two possibilities were investigated in experiments in which the amount of information in the target was varied and the subjects' expectations changed (experiments 1 and 2).

Various memory models of ESP also predict effects of different target material. Those I have called paranormal storage models, of the type proposed by Carington (1945) or Price (1939), suggest that the information obtained in ESP is stored in the same way as memories and depends upon processing prior to that storage. For example a second person, or agent must create an idea or 'psychon' before it can be picked up by ESP. This leads to the prediction that better processing by an agent, perhaps producing clearer or more well defined ideas, would make for more effective ESP. In addition Carington stressed the importance of associations. His theory predicts that if one person makes a strong association between two ideas then another person, with access to the first should be able to retrieve the second. Assuming a close enough relationship between 'ideas' and stimuli or targets, we can predict that if an agent learns pairs of words, for example, then subjects presented with one of the pair should be more likely to

choose the correct pair word than if the agent merely looked at the pairs. In Carington's terms the first word would act as a 'K-object'.

An effect of agent learning is only specifically predicted by Carington's and Price's theories, but it is compatible both with Roll's psi-field theory (Roll, 1964) and his 'memory theory of ESP' (Roll, 1966), in fact Roll (1966) discusses the possible importance of the agent in ESP. Such an experiment cannot therefore discriminate between these theories. Nonetheless, if an effect were found it would be evidence for a memory theory rather than the perceptual model and it should be possible to proceed to more specific tests of the particular theories. Two experiments of this kind are reported here (experiments 3 and 4).

Another approach is to ask directly whether the same stimulus variables affect ESP and memory in the same way. Since a great deal is known about stimulus variables affecting memory performance (see e.g. Baddeley, 1976; Brown, 1976) this should provide fertile ground for experimental comparisons. One could vary ESP targets along relevant dimensions and determine the effect on performance. However, two problems immediately arise to complicate the issue. The first is that the effect of stimulus variables on memory performance is specific to the type of memory task. The second is that some of the effect of stimulus variables might be on the learning stage of the task, and this is obviously missing in the case of ESP. Let us consider these in turn and see whether predictions for ESP can still be derived.

The nature of the task

For different types of memory task different stimulus variables affect performance. For example in free recall and item recognition, performance is better with pictures than with concrete words, and worst with abstract words (Paivio, 1976). It appears that concreteness affects these tasks in similar ways and it has been argued that imaginal coding, which is more likely for concrete items, occurs alongside verbal coding of words. A different effect is found with sequential memory tasks, that is ones requiring memory for the order of unrelated items. Here imagability or concreteness of items does not appear to affect performance (Paivio, 1971).

Comparing the effects of frequency (in the language) of stimulus

words the so-called frequency paradox arises. That is, for free recall of verbal material common words are recalled better than uncommon ones, but the reverse is the case for recognition (Gregg, 1976). On a retrieve-recognise model of memory this is accounted for if the retrieval process generates more common words but the recognition process is more effective for uncommon ones, especially if the recognition attributes include recency and familiarity.

Considering just these two variables there is already a problem. Do we compare ESP with any one type of memory task? If so which one? I would suggest that different types of ESP task are comparable to different memory tasks. Most interesting to note, is that in the usual ESP test, the requirement is to generate a small number of items, which are themselves unlikely to be forgotten, in the right order. This seems most closely comparable to the sequential memory task which is, unlike recall and recognition, unaffected by stimulus concreteness, and is a task rarely used in memory studies.

More familiar tasks are variants of free recall, cued recall (such as paired associate learning) and recognition. Analogues of these can be suggested for ESP. Free response ESP tasks can be likened to free recall. The task used by Rao, Morrison and Davis (1977) and that suggested here for the agent learning experiments, provide analogues of paired associate learning. As for recognition, I can think of no common ESP task comparable, but I would suggest one in which subjects were presented with a large number of items and were asked to choose those they thought were targets. Interestingly, if we postulate a similarity between ESP and memory, then this task might arguably be far easier than the conventional tasks on the grounds that recognition is usually easier than either recall or sequential learning. For this reason experiments using this type of task were carried out here.

Returning to the effects of stimulus variables, we might expect to find that frequency and imagability affect ESP in different ways according to the task. Since the sequential learning task is least likely to be affected, other ESP tasks would be preferable. I chose to use a recognition-type task and to vary frequency and imagability of target words (see experiment 5).

Few previous studies are relevant here. Gambale (1976) used the paired-associate technique designed by Kanthamani and Rao (1975) and varied the frequency of the words used. He found no effect of this variable on ESP scores, but in any case it is difficult to know why

any such effect would be expected. In this method the words are not used as targets, as discussed here, but are used as items in a learning task, the ESP task being to ring either the trigram or the word in each pair at recall. Possibly motivational factors might mediate such an effect, but this method is not strictly relevant here. (It is discussed in more detail in Blackmore 1980).

Somewhat similar is the study by O'Brien (1976), but he used both a recall and a recognition task as well as varying frequency. Again this study is not directly relevant here since the ESP task was to write the recalled word in one of two spaces. The words themselves did not act as targets. The same can be said of Sargent's (1978) study investigating the interaction between visual imagery and psi. Both frequency and imagability of learned words were varied and the ESP task was to write the letters of the recalled words in different boxes. No direct effect of word imagability or frequency was reported, but an interaction was found between the subjects' visual imagery scores and word imagability.

The only study to vary the targets themselves was reported recently by Kanthamani and Rao (1979). Using a standard clairvoyance method, they varied imagery, concreteness and meaningfulness of target words but found no systematic effect on ESP scoring. Although this study varied the target words, the ESP task was different to that argued here to be most likely to show an effect.

These studies provide little indication of any effect of these variables, but only one used the varied words as the targets in the ESP task, and this used the familiar sequential-type task. With the task suggested here, some effect might be found. But before carrying out such an experiment we should ask what predictions would be made on the basis of various theories of ESP.

According to any perceptual model of ESP we might expect frequency to be the major predictor of ESP performance. Since high frequency words are more easily perceived (Paivio, 1971) we would expect them to make better ESP targets. Imagability would not be expected to affect ESP.

Theories which state that ESP and memory involve the same processes (such as those of Carington 1945, or Price 1939) lead to quite different predictions. In general we should expect the same effects on ESP and on memory where the tasks are comparable. For the tasks

suggested here we should expect low, not high frequency words to make better targets, since frequency affects recognition in the opposite direction to its effect on identification. Also imagability should have some effect, with imagable words being better targets.

Roll's (1966) 'memory theory of ESP' leads to less unambiguous predictions. The above findings would be compatible with his theory, but another possibility is that the paranormal retrieval process does not utilise the same attributes as the normal process (see Blackmore, 1980). This might lead to the prediction that frequency (relevant in recognition) would affect ESP, but not imagability, although I believe other predictions are possible. Nevertheless, Roll's theory could still be distinguished from the perceptual model on the basis of the effect of frequency. This proposed experiments could therefore provide a direct test of both perceptual and memory models of ESP. If this approach were successful further experiments could test the same variables in different tasks and attempt to distinguish the various theories in more detail. These speculations, though, are somewhat undermined by the second consideration.

The effect of learning

The effects of certain stimulus variables on memory performance have been compared with their effects on ESP, but an important difference exists between the two. In the case of a test of memory a subject learns, or is exposed to, certain material and subsequently shows evidence of having learned it. The effect of variations in material used may act at both the learning and reproduction stages.

In paired associate learning meaningfulness and frequency of the response item will affect performance more than that of the stimulus item, but the reverse is so for imagability which affects the stimulus more than the response. Further indications that imagery affects learning rather than retrieval are that instructions to use mnemonics during the learning aid affects both recall and recognition, presumably by improving imaginal coding (Paivio, 1976). Detailed discussion of this issue is not relevant here. Suffice is to say that there are many indications that the coding strategy used at learning affects retrieval performance and is in turn affected by the material used.

In the case of ESP, though, there is no learning and no input coding in the percipient. This has different consequences according to the different theories. On a perceptual model of ESP the input process is unspecified but there is little opportunity for any input coding. We would not therefore expect variables which affect such coding necessarily to affect ESP. On the models of Carington and Price prior coding does take place, but in another individual. Therefore stimulus variables may affect learning in that individual but not necessarily the percipient's retrieval. On Roll's 'Psi field' theory (Roll, 1964) again no input processing is specified and on his 'memory theory of ESP' (Roll, 1966) even retrieval apparently occurs paranormally and therefore both stimulus and response variables may be irrelevant.

All this may be offset to some extent by the consideration that prior coding of those items by the percipient may be related to the type of material. Where targets are words such variables as meaningfulness, familiarity and imagability will already have influenced organisation within the percipient's memory. However, individual differences may be large, and comparisons with a single learning task almost meaningless. Therefore these models do not predict any effect of variables which predominantly affect coding at the learning stage.

This really brings us face to face with the intrinsic problem of ESP, that without organisation and coding at input it is well-nigh impossible to see how information could be retrieved. Of course a partial answer is available on the models of Price and Carington, for at least they posit some form of coding, albeit in another individual. They cannot account for clairvoyance, but it may be worth considering that the presumed equivalence of clairvoyance and telepathy might be in error.

Returning to the other models we can now see that the target variables which affect ESP should be those whose primary effect is on retrieval rather than on learning. Since there is evidence that frequency is important in retrieval, especially in recognition, but imagery plays a greater role in learning we should expect the greater effect of frequency. This means that the expected effects may be limited, but even so, if effects were only found for frequency this would still allow some discrimination between the theories. I concluded that a straightforward test of the effect of frequency and imagability of target words would provide data with which to test the

models and carry the above arguments further. For the reasons already discussed a recognition-type ESP test was used for the preliminary study and the imagability and frequency of the target words was varied (see Experiment 5). I hoped that the results of this experiment would provide some answers on which to base further studies.

The approach just considered compared the effects of target variables on memory and ESP by assuming the effects on memory. A more direct comparison may be made by measuring the memorability of targets in an ESP experiment, in that experiment. Memory models of ESP would predict that the more memorable items should also make the more effective targets, for any subject. In experiment 6 subjects were therefore given a memory test and an ESP test in the same session and using the same items. These were words varied in frequency and meaningfulness to maximise memorability differences. The memory test was recall and the ESP task the same kind of recognition-type test already mentioned. The number of times each word was recalled and the effectiveness as ESP target were compared. It could be argued that it would be preferable to have more directly comparable ESP and memory tasks and an experiment of this kind is planned.

All the above approaches have in common the aim of comparing the effect of differences in stimulus material on both ESP and other cognitive tasks. Five experiments were carried out and are reported here.

PRELIMINARY EXPERIMENTS

EXPERIMENT 1

In two experiments (this and experiment 2) stimuli of varying amount of information were used to determine whether this affected ESP scoring rate. The subjects' expectations were also varied or elicited so that on some trials they conformed to the target type (e.g. a picture was target and a picture was expected) or they conflicted (e.g. a picture was target but a word was expected). In the first experiment the sole subject was myself.

There were 10 target items each of which could appear in 5 forms. These were a complete word, clearly written in upper case, a degraded

word of the same form, a word and matching picture together, a complete picture and a degraded picture. There were 50 stimuli altogether. Each was drawn on a card approximately 2x3 inches. Examples are shown in Figure 1.

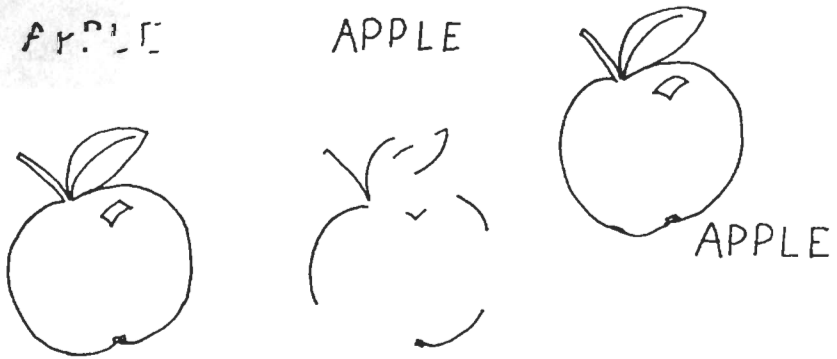

FIGURE 1
Examples of targets
Experiments 1 and 2

The target orders were prepared by an assistant (T.T.) who took no further part in the experiment.There was one of each of the 50 stimuli in each of 10 envelopes. The subject had a sheet on which to write the guessed order of the cards and a list of the 10 items to choose from. On half the 50 trials of each run the subject visualised pictures and on half words.After all 10 runs were complete the envelopes were opened and the order recorded. This was later checked and rechecked against the response order. The number of hits on each of the five types of target was recorded.

RESULTS

The number of hits of each type can be seen in Table 1. There is no sign of any ESP in the overall scores. MCE is 5.0, the obtained mean was 4.5 ($t=0.92$, $df=9$, $p=0.38$).

TABLE 1
Results of experiment 1

Target type	Number of hits	Visualise pictures	Visualise	Match	Mismatch
1 Degraded words	13	7	6	6	7
2 Complete words	5	3	2	2	3
3 Words and pictures	9	6	3	-	-
4 Complete pictures	8	5	3	5	3
5 Degraded pictures	10	5	5	5	5

We can determine whether target type has any effect on scores. We might expect to find most hits on the targets where both word and picture was given and least for the degraded words and pictures. A histogram should show a maximum in the middle. The histogram obtained is shown in Figure 2. There is no significant departure from the pattern expected by chance (chi square =3.78, $df=4$, $p=0.44$).

Other variables of interest were whether words or pictures were visualised during the guessing. There were more hits when visualising pictures, but not significantly so ($t=2.74$, $df=4$, $p=0.52$). It might be expected that more hits would be obtained when a match occurred, that is when the target was in the form expected, but there was no difference ($t=0$). The results obtained do not confirm any of the hypotheses but there was only one subject and few trials. A second experiment was therefore carried out with more subjects.

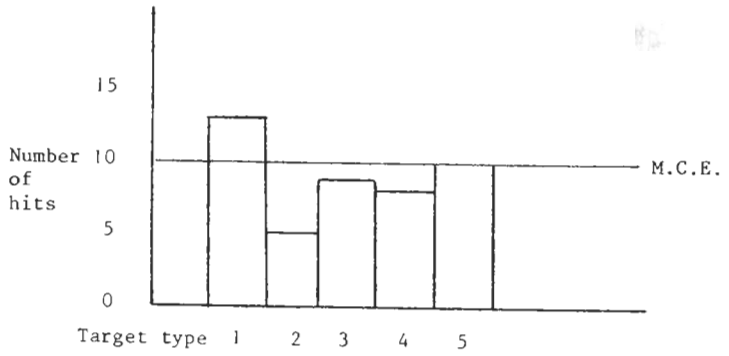

FIGURE 2
Histogram showing the number of hits
for each target type. Experiment 1

EXPERIMENT 2

The target material and objectives were the same as for experiment 1. but a larger group of subjects and a different procedure were used.

Subjects were 43 students. A few completed more than one run, there being a total of 50 runs. The same target cards as in experiment 1. were used but they were arranged differently. 50 envelopes were prepared by an assistant (T.T.) so that each contained a total of 20 cards in random order, all of the same type. There were 10 envelopes of each of the 5 types, making 50 in all.

Subjects were given a sealed, numbered envelope and an answer sheet with 20 blank spaces and the list of 10 target items to choose from. In addition to filling in their guesses they were asked whether they thought the envelope contained words or pictures. After they had completed their guesses they gave their envelopes and sheets to

another student for marking. The number of hits on the 5 different target types was recorded and the results analysed in terms of target type and expectation. All sheets were subsequently rechecked.

RESULTS

The mean number of hits, 1.62 is significantly below MCE of 2.0 ($t=2/13$, $df=49$, $p=0.04$). This may indicate psi-missing but there appears no clear pattern relating target type to number of hits (see table 2., chi square= 2.27, $df=4$, $p=0.69$). These results are shown as a histogram in Figure 3.

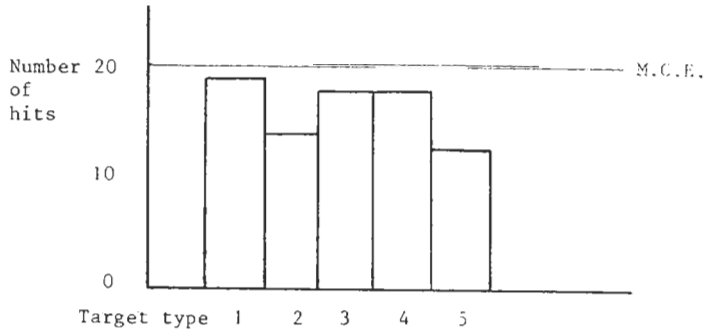

FIGURE 3
Histogram showing the number of hits
for each target type. Experiment 2

Some subjects thought the targets were words and others pictures, but this appeared to make no difference to the scores they obtained. (chi square=0.62, $df=1$, $p=0.43$. 3 subjects have been excluded as they did not answer the question unambiguously). It also appears to

TABLE 2
Number of hits for each target type in experiment 2

Target type:	Degraded words	Words	Words and pictures	Pictures	Degraded pictures
Number hits	19	14	18	18	12

make no difference whether the subjects' expectation matched their target types or not (chi square =0.76, df=1, p=0.38, data for type 3 excluded).

CONCLUSION

In this second experiment there was evidence that psi-missing occurred but none of the expected effects was found and it must be concluded either that the amount of information in the target, and the subjects expectations regarding the form of target, have no effect on ESP, or else this experiment was incapable of demonstrating any such effect.

EXPERIMENT 3

The following two experiments compared ESP scores on a test which required the subject to match pairs of words either when 'correct' pairs had been learnt by an agent or when only looked at by him. Subjects were 46 students in a parapsychology class.

For each trial a stimulus word and five other words were given, the task being to choose the correct pair for the first word. The 'correct' pairs were chosen from random number tables by an assistant

(K.K.) who took no further part in the experiment. Of the 20 trials half were randomly assigned to be 'learning' trials and half 'non-learning' trials. The subjects were unaware of the difference. It should be noted that only one target order was used for all subjects, allowing for a stacking effect. If the results had warranted further experiments these would have eliminated this problem.

PROCEDURE

An agent and assistant were chosen from the group and went outside where the assistant gave the agent a list of 10 word pairs to learn and tested him until he responded with the correct pair to every word on one run. He then notified the experimenter that learning was complete and gave the agent another list of 10 word pairs to look at. Meanwhile the subjects were given a response sheet listing the 20 stimulus words, each with 5 possible pair words and were asked to underline the one which they thought the agent was looking at. When all the subjects had completed this task they gave their sheets to another student, the answer sheets were brought in and they were marked. All were rechecked later.

RESULTS

The mean number of hits was 4.04. This is not significantly different from MCE of 4.0 ($t=0.15$, $df=45$, $p=0.88$). The results can be divided on the basis of whether the pairs were learned or not (see table 3). Neither of these subgroups shows a significant deviation from MCE. Although there are more hits for the learned pairs, as expected, the difference is not significant ($t=1.42$, $df=45$ $p=0.16$). However, since the results were in the expected direction the experiment was repeated with a different group of subjects.

EXPERIMENT 4

This experiment used target words and procedure identical to that of experiment 3. A new set of 'correct' pairs was chosen as before. Subjects were 23 students in a parapsychology class.

TABLE 3
Results of experiment 3

	Mean	MCE	t	df	p
Learned pairs	2.24	2.0	1.26	45	0.21
Unlearned pairs	1.85	2.0	0.85	45	0.40
Total	4.04	4.0	0.15	45	0.88

RESULTS

The results can be seen in Table 4. Neither the total scores nor the scores on either type of pair show significant differences from MCE. Both learned and unlearned pairs give scores below MCE but there is no significant difference between them ($t=0.19$, $df=27$, $p=0.85$).

CONCLUSION

The results of these two pilot experiments provide no evidence to suggest that an agent learning pairs of words aids a subject in choosing the correct pair to a given stimulus word. No further experiments of this type were therefore carried out.

EXPERIMENT 5

It was predicted that according to a perceptual model of ESP, frequent words would make the best targets and imagability should have no effect. Many outcomes are compatible with Roll's 'memory theory of ESP' but according to most memory models infrequent, high imagery words should be the best targets. In this experiment the effects of

TABLE 4
Results of experiment 4

	Mean	MCE	t	df	p
Learned pairs	1.82	2.0	0.74	27	0.47
Unlearned pairs	1.86	2.0	0.50	27	0.62
Total	3.68	4.0	0.88	27	0.39

imagery and frequency of target words were tested. Subjects were 56 students in a parapsychology class.

Targets were 64 words falling into four groups of either high or low frequency and high or low imagery. The words were taken from Paivio, Yuille and Madigan (1968). Frequent words were designated A or AA, infrequent had a frequency of less than 10 per million. High imagery words had an i score of more than 6.5, and low imagery, less than 3.0. Examples from each group are given in Table 5.

TABLE 5
Examples of words used in experiment 5

FI:	Frequent, high imagery	APPLE, CHAIR, FLOWER
Fi:	Frequent, low imagery	DUTY, EFFORT, TROUBLE
fI:	Infrequent, high imagery	ABDOMEN, FJORD, TRELLIS
fi:	Infrequent, low imagery	ALLEGORY, FEUDALISM, SPREE

An agent and assistant were chosen from among the students and went outside the lecture theatre. The assistant was asked to give the agent 4 lists of 16 words each, at specified intervals, and ask him to concentrate on them. Meanwhile the subjects were given a set of 4 sheets each listing the 64 words. For each of four runs, at approximately 6 minutes intervals, they were asked to underline those 16 words which they thought the agent was looking at. After the last run all the test sheets were collected in and were later marked for each of the four types of word separately.

RESULTS

Overall ESP scores (for N=56) gave a mean of 16.02 which is not significantly different from MCE of 16 ($t=0.04$, $df=55$, $p=0.97$). To compare the results on different target types the percentage hits for each type was calculated. Since the subjects chose different numbers of each type the relevant measure was percentage of choices of each type which were hits. In all cases MCE is 1 in 4 or 25%, although the number of choices varies. The results can be seen in table 6. (N=55 since part of one subject's data was lost).

TABLE 6
Results of experiment 5

	Type of Target				
	FI	Fi	fI	fi	MCE
Hits	217	227	236	228	
Misses	647	669	700	651	
Total	354	896	936	879	
% Hits	25.4	25.3	25.2	25.9	25.0 %

It can be seen that there are only very small differences in the

effectiveness of the different types of target. For the number of hits by target type chi square =0.42, df=3, p=0.94. A 2-way ANOVA was planned but was not carried out since the differences were so small. It appears that type of target word made no difference to the percentage of hits.

DISCUSSION

There were two faults in the design of this experiment. The same target order was used for all the subjects. 4 runs with similar target material were carried out to try to minimise spurious effects but it would be better to have a different target set for each S. This was planned but in view of the results obtained here was not carried out. Instead a rather different kind of experiment (see experiment 6) was preferred.

Secondly word length was confounded with target type, the fi words tending to be the longest. Again it would be preferable to have words of equal length although, of course, this would only become important if significant differences were found.

These faults might be expected to produce spurious differences but are unlikely to be responsible for the uniformly chance results obtained here. In view of these results it can only be concluded that either frequency and imagery of target words has no effect or this experiment was incapable of detecting it.

MAIN EXPERIMENT

In the previous experiment the memorability of target words was assumed to be related to their capacity to evoke imagery. In this experiment (experiment 6) using a similar ESP test, memorability was measured for all target words used. In addition the correlation between the subjects' ESP scores and their memory scores was calculated and the negative response bias hypothesis (Stanford, 1967) tested. Problems found in the previous experiments were eliminated and all the subjects had individual target orders. It was predicted that, according to a memory model of ESP, target memorability should be positively correlated with the number of hits on that target.

DISCUSSION

It might have been preferable to have equalised the number of times each word appeared as target so as to simplify the ESP score used. However, I believe that the measure used here was satisfactory for testing the relationship between ESP and target memorability, but no such relationship was found.

In conclusion this experiment was intended to test firstly whether memorable words make better ESP targets and secondly whether subjects who score highly on ESP also recalled more words. There was no overall evidence of ESP, no evidence that memorable words make better targets and no significant correlation between ESP and memory scores.

CONCLUSIONS

Six experiments have been discussed, all of which attempted to investigate the effects of varying target material on ESP. In the first two the amount of information in the ESP targets was varied. In the first, preliminary study, there was no evidence of ESP. In the second, main study, overall scores were significantly below MCE but in neither was there any effect of variations in information content.

The next two experiments involved the learning of word pairs by the agent in a GESP test. Again there was no evidence of ESP and no difference between trials in which the agent learned or only looked at word pairs. In an experiment with words varying in imagability and frequency there was also no sign of ESP and no evidence that these two variables affected the efficacy of targets. Finally the memorability of words was measured but no correlation with ESP was found.

If we consider all these experiments, for overall ESP scores one t test in 6 gave significance at the level of $p<0.05$. None of the expected effects of varying target material was found to be significant. In the primary analyses 12 independent significance tests gave one $p<0.05$. I think we may conclude that there is no justification for rejecting the null hypothesis that chance alone accounted for all the results. Once again it has been impossible to test hypotheses about the nature of ESP when no ESP occurred.

ABSTRACT

If ESP resembles the processes of either perception or memory we should expect variations in the target material used to affect ESP scoring systematically. Predictions for such effects are drawn for various theories of ESP on the basis of psychological findings. The theories can then be tested by manipulating relevant target variables. For memory theories of ESP problems arise with the comparison of different ESP and memory tasks, and the fact that there is no identifiable equivalent of the learning stage in ESP.

Six experiments are reported. In two the amount of information in targets was varied but was not found to affect ESP scores. In two no difference was found between trials in which an agent learned or only looked at target word pairs. Imagability and frequency of target words were not found to affect ESP scores and finally target memorability was measured, but no relationship with ESP scores was found. Overall ESP scores were significantly different from mean chance expectation in only one experiment (2). It was not possible to draw conclusions about the various theories of ESP on the basis of these results.

REFERENCES

Baddeley, A.D. 'The psychology of memory', Harper and Row, London, 1976.

Blackmore, S.J. 'Correlations between ESP and memory', E.J.P., 1980, 3, 127-147. (a)

Blackmore, S.J. 'Extrasensory perception as a cognitive process', unpublished Ph.D. thesis, University of Surrey, 1980. (b)

Blackmore, S.J. 'Errors and confusions in ESP', to be printed in E.J.P., 1981, 4, issue 1.

Brown, J. 'Recall and recognition', Wiley, London, 1976.

Carington, W. 'Telepathy: An outline of its facts, theory and implications', Methuen, London, 1945.

Gambale, J. 'Word frequency and association strength in memory-ESP interaction: A failure to replicate', J.o.P., 1976, 4, 339-340. (abstract)

Gregg, V. 'Word frequency, recognition and recall', in Brown, J. (ed) 'Recall and recognition', Wiley, London, 1976.

Haber, R.N. 'Nature of the effect of set on perception', Psychological Review, 1966, 335-351.

Haber, R.N. and Hershenson, J.'The psychology of visual perception', Holt, Rinehart and Winston, New York, 1973.

Herriott, P. 'Attributes of memory', Methuen, London, 1974.

Kanthamani,H. and Rao, H.H. 'A study of the memory-ESP relationship using linguistic forms', in Morris, J.D. et al (eds) 'Research in Parapsychology 1974', Scarecrow Press, Metuchen, N.J., 1975, 150-157.

Kanthamani, H. and Rao, K.R. 'Imagery, concreteness and meaningfulness of target words in relation to psi scoring', J.o.P., 1979, 43. (abstract)

MacFarland, J.D. and George, R.W. 'Extrasensory perception of normal and distorted symbols', J.o.P., 1937, 1, 93-101.

Murphy, G. 'Dr Rhine and the mind's eye', American Scholar, 1938, 7, 189-200.

Neisser, U., 'Cognitive psychology', Appleton-Century-Crofts, New

York, 1967.

O'Brien, D.P. 'Recall and recognition processes in a memory-ESP paired- associate task', unpublished. Paper presented at the SEPPA conference, January 1976 (Abstract in J.o.P., 40, 57-58).

Paivio, A. 'Imagery and verbal processes', Holt, Rinehart and Winston, New York, 1971.

Paivio, A. 'Imagery in recall and recognition', in Brown J. (ed) 'Recall and recognition', Wiley, London, 1976.

Price, H.H. 'Haunting and the "Psychic Ether" hypothesis', Proceedings S.P.R., 1939, 45, 307-343.

Rao, K.R., Morrison, M. and Davis, J.W. 'Paired associates recall and ESP: A study of memory and psi-missing', J.o.P., 1977, 41, 165-189.

Rhine, J.B. 'Extra-sensory Perception', Boston Society for Psychical Research and Faber, London, 1935.

Rhine, J.B. 'History of experimental studies', in. Wolman, B. (ed) 'Handbook of Parapsychology', Van Nostrand, New York, 1977.

Rhine, L.E. 'Some stimulus variations in extrasensory perception with child subjects', J.o.P., 1937, 1, 102-113.

Rhine, J.B. and Pratt, J.G. 'A review of the Pearce-Pratt distance series of ESP tests', J.o.P., 1954, 18, 165-177.

Roll, W.G. 'The psi field', Paper presented at the Seventh Annual Convention of the Parapsychological Association, Oxford University,

September 1964.

Roll, W.G. 'ESP and Memory', International Journal of Neuropsychiatry, 1966, 2, 505-512.

Sargent, C.L. 'Interactions between visual imagery and psi', J.S.P.R., 1978, 49, 805-823.

Stanford, R.G. 'Response bias and the correctness of ESP test responses', J.o.P., 1967, 31, 280-289.

Stanford, R.G. 'Toward reinterpreting psi events', J.A.S.P.R., 1978, 72, 197-214.

Van Busschbach, J.G. 'An investigation of ESP between teacher and pupils in American schools', J.o.P., 1956, 20, 71-80.

Van Busschbach, J.G. 'An investigation of ESP in first and second grades in American schools', J.o.P., 1961, 25, 161-174.

Van de Castle, R.L. 'An exploratory study of some variables relating to individual ESP performance', J.o.P., 1953, 17, 61-72.

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