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PK-EXPERIMENTS WITH THE GERMAN LOTTOGAME

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INTRODUCTION

In the german lottogame each Saturday night at about 10 o'clock 6 winning numbers (and a so called "Zusatzzahl", which is of no importance for the investigation reported below) are chosen from the numbers 1 - 49 by an apparatus which is completely automatic and very carefully constructed. The lotto-apparatus is located at Frankfurt; the selection of the winning numbers is broadcasted by T.V. The participants in the game fill in forms to indicate their 6 guesses (see figure 1). For each such combination of 6 numbers

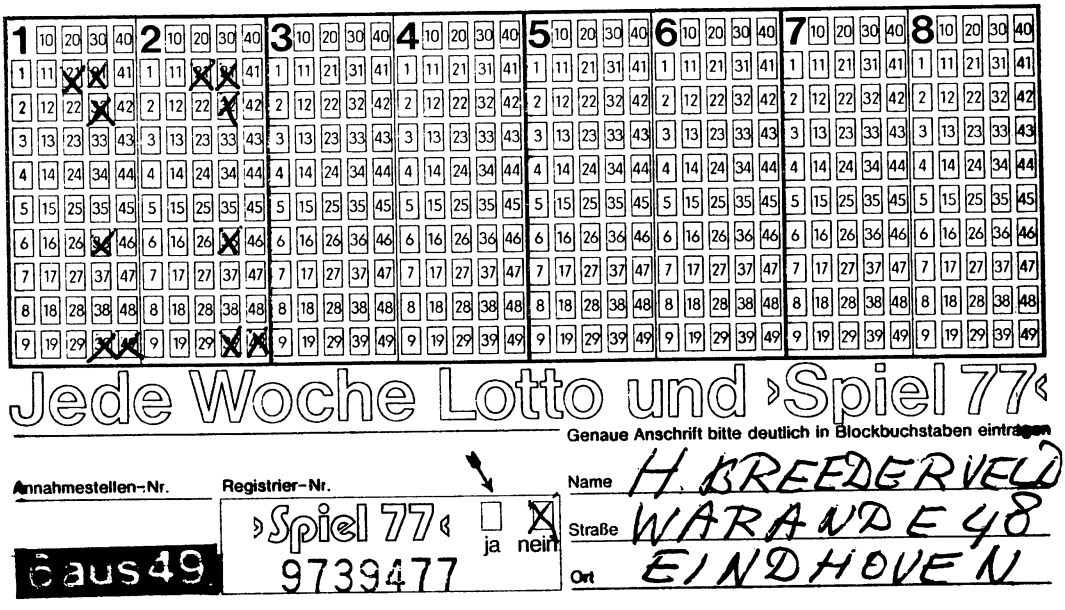

FIGURE 1

they pay DM 0.50 ($1=DM 2.00). If from the 6 numbers indicated three are correct, about DM 4 is received; 4 hits yield about DM 50, 5 hits about DM 5000, 5 hits and "Zusatzzahl" about DM 100 000 and 6 hits may even yield DM 1 500 000.

The present experiment has been devised in order to obtain support for the following hypotheses:

1. The observer creates his own environment, the hypothesis of the subjective universe.
2. Consequently, the observer can, at least in principle, influence anything in a direct way, that is to say, without using the normal tools of physics and chemistry. In the language of classical parapsychology this performance is called psychokinesis.
3. The situation at the moment of observation is crucial for success or failure of a PK-experiment.
4. Hypnosis, combined with suggestions of high scoring leads to success in PK-experimentation.

On microscale, the principle of the subjective universe has been recognized by Wheeler and Feynmann[1], who discovered that radiation of light is not possible when the emitted photon (light particle) cannot be absorbed elsewhere: No radiation without absorption. So emission of light is not a process connected with only one particle (atom, molecule, ion) but a relation between two particles: The essence of the phenomenon light is transfer of energy from the emitting particle to the absorbing particle (which may be called the observer). The same idea can be found in the so called bootstrap model[2], of which the essential feature is that every particle consists of all other particles.

On macroscale, the principle has been discovered much earlier: It is the cornerstone of buddhist and idealistic philosophy. In the latter case, the observer is not one particle, but a highly complex composition of a tremendous amount of molecules, ions, atoms and free radicals: A human being. But here too, the same principle seems to hold: Emission (signals from the outer world) only occur when absorption is possible. Thus, these signals depend on the structure of the observer, or: The observer creates his own environment, or, still better: The observer is his own environment, the observer and his environment form a consistent one-ness[3]. Although this way of thinking is still somewhat alien to most of us, its application to parapsychological phenomena gives much deeper insight into these phenomena and may lead to interesting experimentation[4,5,6].

Applied to the lotto-experiment this means that the whole lottobusiness has its origin in the observer, so that he can, at least unconsciously,

determine which numbers are selected each week. A much heard objection to this reasoning is: But what about other people with contradictory intentions and desires? The answer must be this: There are no individual people with contradictory intentions, there is a completely consistent one-ness. The observer is his fellow people, the others are the observer. Now it appears that, under ordinary conditions, the observer has very little conscious control over the selection of the winning numbers. These numbers seem a.o. to be determined by unconscious preferences. A striking example: Only 111 hits in 1123 weeks for the number 13, which, at least in western Europe, symbolizes misfortune; MCE: 137.3; P one-tailed = 0.01. The selected numbers seem further to be related to occurrences that have some significance for the observer. The following story may serve as an illustration of this principle:

> On Sunday, 9 - 9 - 1973, H.B. carried out a PK-experiment with a die. The first group of 100 trials yielded 19 hits, the second group only 9. In the afternoon, H.B. and his wife (Rinia G., Kleine Berg 17, Eindhoven), went to a wedding party, Argonautenlaan 9a, Eindhoven. Before, they had some misunderstandings, in the course of which Rinia remarked:"You are mentally ill, you have to see a psychiatrist". Indeed, H.B. did feel very uncomfortable and thought: "Perhaps she is right, maybe something like paranoid schizofrenia". Hereafter he got the idea that the german lottogame would produce next Saturday winning numbers ending on 7 and 9. 33 Combinations out of the 10 numbers ending on 7 and 9 were sent to Germany. There were 15 combinations with 3 hits and 5 combinations with 4 hits, the winning numbers being 19, 39, 49, 37, 47, 22. The probability that 5 or 6 of the winning numbers fall into a predetermined group of 10 numbers is only 0.0007.

On careful consideration of this case and others, it is seen that they follow a certain pattern: There occurs something that stirs the observer, and somewhat later some aspects of these events are reproduced in the outer world as a kind of remembrance in material form: Seeing the numbers ending on 7 and 9 as winning numbers in the lottogame is almost the same as remembering those strange events connected with numbers ending on 7 and 9. As the authors' preference for certain numbers is not very great and the numbers associated with events that are of importance for the observer follow a more or less random pattern, the frequencies of the winning numbers do not deviate much from mean chance expectation (MCE). If, however, the observer is manipulated in a way that causes strong preferences for certain numbers, significant deviations from MCE are to be expected.

In the authors' opinion, a method to induce preferences for certain numbers may be found in applying hypnosis combined with verbal suggestions. In the literature there is some support for the hypothesis that hypnosis is a favourable condition for parapsychological experimentation[7].

EXPERIMENTAL PART

a. Design of the experiment

As target numbers 21, 31, 32, 36, 39, 49 were chosen. At the moment the experiment was started (at the end of 1975), these numbers had, up till then, the highest frequencies. As may be easily understood, this choice was made in view of the financial aspects of the lotto-research. Weekly, 2 combinations of the numbers mentioned above were sent to Germany. The costs of the experiment, which were only very modest (about DM 1 weekly) were borne by 5 or 6 members of the Synchronicity Research Unit; prizes were shared by the same people. As an observer, H.B. was chosen; the hypnotist was in most cases Rinia and sometimes Mr. J.C. Jacobs.

To induce hypnosis, H.B. was ordered to stare at a candle flame and given suggestions of tiredness and relaxation. Then he was told that he would, after some minutes, be awakened to observe the selection of the winning lotto numbers and that these numbers would be 21, 31, 32, 36, 39, 49. After the observation of the lotto numbers H.B. was ordered to close his eyes again and he was told that the tiredness disappeared from his feet, his legs, etc., that he could open his eyes and that now he was back in his normal state of awareness. In most cases, hypnosis was not very deep and H.B. was aware of what was going on in the (living) room where the experiment was carried out. Sometimes, however, H.B. was asleep.

The first, exploratory, series consisted of 10 experiments (planned beforehand). 5 Experiments were run as described above (observation always by T.V.), the others consisted of observation of the winning lotto numbers under ordinary conditions: Sometimes H.B., used T.V., in other cases the numbers were brought to his notice by other people or by a newspaper (on Monday). The sequence of the experiments (observation under hypnosis or not under hypnosis) could not be planned beforehand. It depended on the circumstances; the experiments with H.B. under hypnosis could only be carried out when the observer happened to be at home with not too many people around.

The statistical analysis (planned beforehand) comprised: P two-tailed for both conditions and P difference,one-tailed. By the latter P-value the hypothesis that the hypnosis sessions would give better results than observation under normal conditions, can be tested.

b. Results

First series: H.B. under hypnosis : 5 hits;MCE:3.7

H.B. not under hypnosis: 3 hits;MCE:3.7

The encouraging result of this experiment induced us to carry out 4 replications, which are summarized in table 1, together with the results of the exploratory series.

TABLE 1

no.of series	number of hits		$P_{two-tailed}$		$P_{diff.}$
	hypnosis	not hypnosis	hypnosis	not hypnosis	
1	5	3	-	-	-
2	4	1	-	-	-
3	5	0	-	-	0.02
4	4	3	-	-	-
5	7	2	-	-	0.02
Total	25	9 (MCE:18.4)	-	0.02	0.002

Twice three of the target-numbers appeared together; fortunately, that happened while H.B. was under hypnosis.

DISCUSSION

Inspection of the data in table 1 reveals some interesting features. In the first place, there is an impressive difference between the number of hits for the hypnosis condition and that for the not-hypnosis condition (16 hits;P diff.=0.002). On interpreting this difference, it must, however, be borne in mind that the number of replication studies had not been planned beforehand. So it seems reasonable to correct for optimal stopping by multiplying the P diff. with a factor 5, which gives the still interesting P diff.=0.01, thus supporting hypothesis 1, 2 and 3.

Closer inspection of the data shows a second interesting aspect: The psi-missing that occurred under the not hypnosis condition contributed more to the success of the experiment than the psi-hitting under the hypnosis condition. Consequently, our results do not (yet) support hypothesis 4. To obtain more information with respect to the interesting question: "Is hypnosis a psi-conducive state", more replications will be carried out.

The phenomenon that the success of a parapsychological experiment is more due to psi-missing under baseline conditions then to psi-hitting under the supposed psi-conducive circumstances has also been observed by Honorton[8], McCollam and Honorton[9] and by Jackson, Franzoi and Schmeidler[10].

The present authors agree with Jackson c.s. that there may be a tendency to shape one's results, unconsciously, so as to conform with what is desired: Better results under the psi-conducive conditions then on the baseline runs. And this can be accomplished by psi-hitting under the psi-conducive conditions but also by psi-missing on the baseline runs.

ABSTRACT

An experiment has been carried out to obtain support for the following hypotheses:

1. The observer creates his own environment.
2. Consequently, the observer can influence anything in a direct way (PK).
3. The situation at the moment of observation is crucial for success or failure of a PK-experiment.
4. Hypnosis, combined with suggestions of high scoring leads to success in PK-experimentation.

The experiment consisted of observation of the winning numbers of the german lottogame under two different observation conditions: Hypnosis and not hypnosis. 6 Numbers were chosen as targets, and the authors expected that under the hypnosis condition the target numbers would have a higher frequency than under the not-hypnosis condition. This expectation was confirmed (P diff.= 0.01, corrected for optimal stopping).

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PSI-MISSING OF ONLY CHILDREN: A DEMONSTRATION OF AN EXPERIMENTER EFFECT

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INTRODUCTION

For the past two years our research unit has carried out an experiment on the possible relationship between birth order and ESP ability. In fact it was a modified replication of the experiments of Green.

Green found that in a simple card guessing task first borns obtained the highest scores, only children the lowest and later borns inbetween scores (1). These results were confirmed in a study by Eastman, at the New York City College, in 1966 (2). So it looked like a promising field of research. If a relationship between birth order and ESP ability exists, we would have a characteristic at our disposal rather easy to be determined, with which scoring directions can be predicted. Unfortunately, for some unknown reasons the study of birth order effects in parapsychology remained restricted to the above mentioned studies. As far as we know we were the first to take up the study of birth order effects again. Not only the encouraging results of Green and Eastman led us to these investigations, but also the idea that the results could be a consequence of the experimenters' expectancies.

We therefore designed our experiment in such a way that the expectancy effect could also be studied.

We expected scoring directions as found by Green. In order to study the expectancy effect we formed another group of experimenters, whom we tried to convince of the fact that first borns would obtain lowest ESP scores, only children highest and later borns in-between scores. Thus we hoped that an expectancy opposite to ours was induced.

Each experimenter group tested 150 subjects; the minimum age for

a subject was 15 years. The subjects' ESP tasks consisted of guessing 30 random numbers, from the range 1 to 6, in a precognitive setting.

An analysis of variance on the collected data did neither yield significant main effects nor interactions (3).
Conclusion: again another failure to replicate a promising effect.

But yet, although the differences were non-significant, the only children did obtain the lowest scores. Sixteen only children participated, with a total number of 480 trials. They obtained 74 hits where MCE(=mean chance expectation)=80.

Already before the experiment proper it seemed to us that the hypothesis of a psi-missing tendency of the only child was a reasonable one. Generally, in his childhood the only child will be confronted with a more sheltered family environment than children with siblings. The extreme care which the parents are free to lavish on it can easily create a high anxiety for everything it is not familiar with.

In the parapsychological literature several studies on the relationship between anxiety and ESP ability have been reported upon. Although the results are rather puzzling, as usual, one can note that a higher degree of anxiety is likely to lead to psi-missing. From this we inferred a justification for carrying out an experiment to explore the supposed psi-missing tendencies of only children.

In advance it was planned to test fifteen only children. The ESP task consisted of guessing 30 randomnumbers, from the range 1 to 6. For each subject there were 20 of such target sets. So each subject made 600 trials, in one session. Subjects guessed for separate target sets, in order to avoid the stacking effect.

The target sets were prepared in advance by a research-associate not otherwise involved in this experiment. The random numbers of which the target sets were composed, were obtained from the Fisher-Yates Random Number Table (4). Entry points were made in a standardized way, by throwing dice. Each target set was put between black cardboard sheets and placed in an opaque envelope. The subjects were asked to obtain as many direct hits as possible, but they were also told that there were some indications that they would not score above chance level.

After completion of a set the hits were counted by the experimenter. Subjects were tested either by H. Breederveld or by J.C. Jacobs. The data analysis, planned in advance, comprised P-overall, one tailed for psi-missing, and P-one tailed for psi-missing per subject, P-values being determined by means of the Critical Ratio's. For each subject MCE was 100 hits. The three lowest scoring subjects obtained resp. 78, 84 and 85 hits, with resp. P=0.008, P=0.04 and P=0.05. Overall MCE was 1500 hits. Together, all the subjects obtained 1435 hits,

which gives P=0.03 (3).

These results support the psi-missing hypothesis.

A FOLLOW-UP EXPERIMENT WITH ONLY CHILDREN

Although not confirmed by a sharp P-value, the data of the exploratory experiment with only schildren point in the direction of psi-missing.

However, ad hoc analysis of the data of this experiment suggested to us the rejection of the psi-missing tendency of the only children, in favour of an experimenter effect.

Eight subjects were tested by Breederveld and they obtained 8 hits above MCE, while seven subjects tested by Jacobs obtained 73 hits below MCE. This difference of 81 hits gives P=0.02 (two tailed).

But why did Breederveld's subjects score above MCE, and Jacobs' subjects below ?

It must be mentioned that Breederveld was strongly motivated to obtain positive deviations from his subjects. Being an only child himself, he very much dislikes the idea that only children would show psi-missing tendencies. This could imply that some of his private experiments, in which he serves as subject himself, are doomed to fail, particularly from financial point of view. On the other hand, Jacobs (not being an only child) likes the low scoring only children, as they in some sense could save the birth order study, which he initiated. In brief, both experimenters were motivated to obtain subjects scores as these actually emerged from the exploratory experiment with only children. Of course, this conclusion followed from a post hoc analysis; therefore it was decided to run a follow-up experiment to confirm the effect of the experimenters' motivation on the scoring direction of only children.

It was planned that a total number of 30 only children would be tested, 15 by Breederveld and 15 by Jacobs.

When a subject was tested by one of the experimenters, the other experimenter was absent.

Subjects were tested only when they could be regarded as real only children, that is, when they satisfied the following requirements:

- S(ubject) must have been an only child for all his life. During his childhood (up to the age of 15 years) there must never have been other children in his family (for instance: illegitimate children, foster children, etc.)
- S must have exceeded the age of 14 years
- S's parents must not have been divorced or otherwise separated permanently during his childhood
- S must have been educated in his family environment

The subject's ESP task, a clairvoyance setting, was the same as his task in the exploratory experiment: each subject made 600 trials, in one session. A trial consisted of guessing a random number from the range 1 to 6. For each subject there were 20 target sets of 30 random numbers each. The sets were prepared in advance by a research-associate not otherwise involved in the experiment. The random numbers of which the target sets were composed, were generated by a white noise based random number generator, coupled to a P800 mini-computer system. This generator has been tested for nonrandomness effects in advance; 1,000,000 numbers have been generated. These numbers were tested for nonrandomness by a chisquare and the Barton and David Multiple Runs Test (5). No significant deviations from theoretical randomness have been observed.

After completion of a set of 30 trials by the subject, the experimenter counted the hits, and the test continued with the next set.

Subjects guessed for separate target sets to guard against a stacking effect.

Before the actual test, the subjects received instructions from a pre-recorded audiotape, the instructions being read by the experimenter the particular subject was tested by.

The texts of the instructions read by the experimenters were identical. It was hoped that except for differences due to unintentional intonation characteristics of the experimenters, each subject thus would receive the same basic instructions. The subjects task was explained in the instructions, and he was told that there were some indications from earlier experiments that only children tend to score below chance level. This has been done to give the subject some information on the experiment and on results already obtained with other subjects.

As we at this stage of parapsychological knowledge know practically nothing about the expectancy effect, nothing substantial can be said about the effect of this negative scoring direction suggestion.

The data analysis, planned in advance, consisted of:

- P one tailed, for psi-missing per subject
- P one tailed, overall for psi-missing
- Pdif, one tailed, for Breederveld's subjects scoring high, and Jacobs' subjects scoring low.

These P-values being determined by means of Critical Ratio's. In addition the results of the follow-up experiment will be pooled with the results of the exploratory experiment. In doing so, we must realize that these pooled results have to be corrected for optimal stopping. Usually in parapsychology, this correction factor is taken to be 5, although it does not follow from a theoretical framework.

Pooling the results was planned in advance.

The results of the follow-up are given in tables 1 and 2. The lowest scoring subject obtained 85 hits, MCE=100. This yields P=0.05 (one tailed). This subject was tested by Jacobs. Together, the thirty subjects obtained 3057 hits, MCE=3000. So, overall score of the only children was above MCE; the hypothesis that only children show psi-missing tendencies must be rejected.

The subjects tested by Jacobs obtained 1486 hits, MCE=1500, while the subjects tested by Breederveld obtained 1571 hits, MCE=1500. This is a difference of 85 hits in the hypothesized direction, which gives CRdif=1.70 and P=0.04 (one tailed).

This seems to be a confirmation of the hypothesis of the experimenter effect.

When the results are pooled with the results of the exploratory experiment one finds:

- total number of hits : 4492 ; MCE=4500 CR=0.13 (nonsign.)
- total number of hits obtained by Breederveld's subjects : 2379 ; MCE=2300
- total number of hits obtained by Jacobs' subjects : 2113 ; MCE=2200

The difference between hits obtained by Breederveld's subjects and Jacobs' subjects is 166 hits. This yields CRdif=2.72, and P=0.003 (one tailed). Corrected for optimal stopping this latter P is 0.015.

CONCLUSIONS

From the data it emerges that one can reject the hypothesis that only children are psi-missers. Instead of this hypothesis one has to accept that an experimenter effect caused a differential score in the subjects' ESP performance.

These findings support current thoughts of the experimenters influence on the outcome of parapsychological experiments, as has been reviewed recently by White (6) and Kennedy and Taddonio (7).

It seems that there exist some reproducible effects of the experimenters' motivations, wishes and expectancies upon the subjects' ESP performance.

In our opinions, it would be too far fetched to speculate on the possible mechanism of these effects, at this stage of parapsychological knowledge.

Still more replications are needed before we can attack the challenging problem of the underlying mechanism.

TABLE 1

Individual and overall results of the only children

	Experimenter		hits	dev.	CR	P
	HB	JJ				
S 1		x	115	+ 15		
S 2		x	118	+ 18		
S 3		x	95	- 5	-0.54	-
S 4	x		104	+ 4		
S 5	x		91	- 9	-0.98	-
S 6	x		112	+ 12		
S 7		x	97	- 3	-0.33	-
S 8	x		100	0		
S 9	x		108	+ 8		
S10	x		110	+ 10		
S11	x		111	+ 11		
S12	x		118	+ 18		
S13	x		105	+ 5		
S14	x		89	- 11	-1.20	0.12
S15		x	105	+ 5		
S16		x	93	- 7	-0.77	-
S17		x	96	- 4	-0.44	-
S18		x	90	- 10	-1.10	0.14
S19		x	105	+ 5		
S20		x	106	+ 6		
S21		x	96	- 4	-0.44	-
S22		x	96	- 4	-0.44	-
S23		x	88	- 12	-1.31	0.10
S24		x	85	- 15	-1.64	0.05
S25		x	101	+ 1		
S26	x		104	+ 4		
S27	x		106	+ 6		
S28	x		111	+ 11		
S29	x		101	+ 1		
S30	x		101	+ 1		
Overall			3057	+ 57		

TABLE 2

Overall results of subjects tested by Breederveld, and overall results of subjects tested by Jacobs

Experimenter	hits	dev.	
Breederveld	1571	+71	CRdif.=1.70
Jacobs	1486	-14	Pdif. =0.04

ABSTRACT

Earlier research suggested that only children tend to show psi-missing effects (P=0.03). However, a post hoc analysis of the data indicated that the effect could probably be better explained by the effects of the experimenters' motivations on the scoring direction of the only borns. A follow-up experiment with thirty subjects confirmed the effects of the experimenters' motivations on the ESP performance of only children (P=0.015), and led to the rejection of the psi-missing hypothesis.

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CHARACTERISTICS OF SUBLIMINAL PERCEPTION FOUND FIRST IN ESP

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An individual may perceive a stimulus which is of a strength or of a duration insufficient to cause him to be conscious of its perception (Goldiamond, 1958). The process is termed subliminal perception, and the term subception has been used for subliminal perception which is manifested by an autonomic response such as a galvanic skin reflex (Lazarus & McLeary, 1951). In the present article, subception is used interchangeably with subliminal perception without distinction between the terms.

It may be possible that subliminal perception can occur without being complete enough to permit the subject's selection of the subliminally perceived target from other potential targets. The occurrence of incomplete or partial subception can be determined by comparing the deviation in a test in which the subject attempts to obtain a high score with the deviation in a test in which his purpose is to produce a low score. This is because, as will be later shown, the size of the deviation, without regard to sign, is expected to be less in low aim than in high aim if (1) there are more than two targets, and (2) if the act of subception is complete enough to permit identification of the subliminally perceived target from the other potential targets. Deviations of equal size in high and low aim would suggest that the subliminal perception was only partial.

The concept of partial perception was first applied by Thouless (1935) to explain the equality of high- and low-aim deviations in tests of extrasensory perception. The need for an explanation of the equality of these deviations can be illustrated by a test with five targets as follows. By chance alone, the target would be called incorrectly in 4/5 of the trials and correctly identified 1/5 of the time. A low-aim act of perception to call the target incorrectly would increase the chance of an incorrect call from 4/5 to 1 (an increase of 1/5), whereas a high-aim act of perception would increase the chance of a correct call from 1/5 to 1 (an increase of 4/5). Because of this, the ratio of the effects of low and high aim is 1/5 to 4/5, or ¼. Therefore, rather than low aim

producing a deviation equal to the deviation in high aim, it would be expected to cause an excess of misses that would be only ¼ as great as the excess of hits produced by high aim.

The concept of partial perception is based on the fact that, with more than two targets, less knowledge of a target is sufficient for its avoidance than is necessary for its selection. If, for example, the distinguishing characteristics of a target in a five-target test need be only one fourth as completely perceived to miscall it by one of the other four targets in low aim than it must be perceived to name it correctly in high aim, it would be four times as easy to produce a miss as a hit, and the deviation in low aim would be equal in magnitude to the deviation in high aim. On this basis, if (in a test of ESP or of subliminal perception with more than two targets) the deviations in high and low aim are of equal magnitude, the extrasensory perception or the subliminal perception, as the case may be, is suggested to have been partial.

Partial subception may also be shown by a positive deviation of near hits which would indicate that the subject subceived the target only well enough to identify it almost correctly.

METHOD

In order to determine whether partial subception occurs, targets consisting of from 8 to 12 randomly arranged solid circles were tachistoscopically projected upon a screen for 1/125 second. This was accomplished with the use of unframed transparent slides bearing dots, and with a slide projector equipped with a shuttered lens. The target image occupied a 1 m x 1 m area on a white screen at a distance of 2 m from the subject. The projected image of each dot on the screen had a diameter of 3 cm.

Each of 24 subjects, both male and female college students, participated in a high-aim run and a low-aim run with the five targets. As each run consisted of 25 trials, there were 600 trials of high aim and the same number of low-aim trials, both with five targets. In addition to these two runs with five targets, each subject participated in a high-aim run and a low-aim run of 25 trials with two targets consisting of 11 and 12 solid circles, respectively. The four runs were given in a different order for each of the 24 subjects, so that all of the 24 possible permutations were represented. All four runs for the subject were performed in a single session.

Only one slide was prepared for each of the five targets but,

since the experimenter blindly placed the slide in the projector without knowing which of its two sides was front or which of its four edges was up, there were eight possible projections of each slide. Before each trial, the slides were mixed in a container and one of them was blindly selected to serve as the target. Although randomization of the slides based on a table of random digits would have been a more rigorous methodology, tests of the order of the targets provide no evidence that their randomization was inadequate.

Before his test, the subject was given a basic knowledge of the rudiments of the experiment as well as a few practice trials. For each trial the subject was alerted by the experimenter's spoken word before the target was projected, and after each trial the subject was informed whether or not his call was correct. Two experimenters were present at each session, one performing the test and the other recording the data.

RESULTS AND DISCUSSION

Evidence of Partial Subception Based on Hits

The results with respect to hits are presented in Table 1, with a call of the correct number of circles on the target counted as a hit whether in high or in low aim.

TABEL 1

Hits in High- and Low-aim Tests of Subliminal Perception With Five and Two Targets

Targets	Aim	Hits	Deviation	t[a]
Five	High	166	+46	5.92
Five	Low	87	-33	3.09
Two	High	353	+53	3.52
Two	Low	288	-12	0.84

[a] For each of the tests, except for the test of low aim with two targets, $t(23)$, $P < .001$ one tailed. A one-tailed test is used as the deviations are in the expected directions.

The lack of a significant deviation in the test of low aim with two targets is attributed to the subject sometimes decreasing his attention to the target in low aim so that he would be more likely to miscall it. This reduced the frequency of subception of the target in low aim and, thereby, the frequency with which this knowledge could be used to miscall it. In a test of the difference between the deviations in high and low aim with five targets without regard to sign, $t(23) = .11$, $P < .9$. The fact that, although both deviations differed significantly from mean chance expectation, the size of the deviation in low aim was not significantly less than the size of the deviation in high aim suggests the occurrence of partial subception, as explained above.

Evidence of Partial Subception Based on Near Hits

As an independent test of partial subception, the trials with five targets in both high and low aim were analyzed to determine by how many circles the target was missed. An example of a miss by one circle is calling a ten-circle target by 9 or 11 circles. The results with respect to both hits and misses are presented in Table 2.

TABLE 2

Hits and Misses in High- and Low-aim Subliminal Perception With Five Targets

Categories	High aim					Low aim			
	Exp. freq.	Obs. freq.	Dev.	% dev.	t[a]	Obs. freq.	Dev.	% dev.	t[a]
Hits	120	166	+46	+38%	5.92	87	-33	-28%	3.09
Misses by 1	192	332	+140	+73%	8.68	101	-91	-53%	4.95
Misses by 2	144	72	-72	-50%	7.05	165	+21	+15%	1.55
Misses by 3	96	24	-72	-75%	9.59	140	+44	+46%	2.92
Misses by 4	48	6	-42	-88%	14.10	107	+59	+123%	4.04
Total	600	600	0			600	0		

[a] For each of the categories, $t(23)$, $P < .001$ one tailed, except for that of misses by two circles in low aim where $P \propto .07$ and that of misses by three circles in low aim where $P \propto .003$. A one-tailed test is used as the deviations are in the expected directions.

In high aim, the significant positive deviation of near hits, i.e., misses by one circle, in the presence of a significant negative deviation of misses by more than one circle, indicates the occurrence of partial subception in which, when the subject did not have enough subliminal perception of the target to call it correctly, he subceived the target well enough to miss it by only one circle.

Frequency of Subliminal Perception

The number of trials in which subception hitting occurred in the present experiment can be estimated by the sum of the positive deviation of target hits and the positive deviation of near hits, i.e., misses by one. Any partial subception hitting resulting in increases of misses by more than one is not included as the negative deviation of these calls (see Table 2) makes its determination questionable. As a result, the amount of partial subception may be underestimated. From the data in Table 2, it can be seen that with five targets the deviation of target hits of +46 and the deviation of near hits (misses by one) of +140 indicate that 46/(46 +140) or 25% of the 186 subliminal perceptions were successful.

In low aim with five targets, the number of trials in which subliminal perception occurred can be estimated by the sum of the negative deviation of target hits and the negative deviation of misses by one. From the data in Table 2, it can be seen that this amounts to 124 and that subliminal perception is estimated to have occurred in 124:600 or 21% of the trials. The lower frequency of subliminal perception in low aim than in high aim, which was also evidenced in the tests with two targets (Table 1), is attributed to the subject's intent in low aim to miscall the target which sometimes caused him to pay less attention to the target than he did in high aim. Because of this, high aim is a better test of subliminal perception.

Frequency of Partial Subception

In tests with more than two targets, the frequency of partial subceptions resulting in hits in high aim when the number of high- and low-aim trials are equal can be estimated by the following formula:

partial subceptions resulting in high-aim hits = negative deviation in low aim - (positive deviation in high aim)/(number of targets - 1).

The formula is based on the rationale presented earlier from which it is apparent that an excess of the deviation in low aim beyond

the deviation in high aim, with the latter being corrected for the fewer acts of perception it represents, may be due to incomplete perception of the target. When it is applied to the data with five targets, it yields a value of approximately 21.5 partial subceptions. Thus, of the 46 successful subceptions, 21.5 or 47% are estimated to be partial and 24.5 or 53% to be complete.

Application of the formula to the published data of a previous experiment with five targets (Nash & Nash, 1963), where high aim had a deviation of +91 and low aim a deviation of -57, yields an estimated value of 39 or 43% of the 91 successful subceptions being partial and 57% being complete. These values are close to the results of those in the present experiment, $\chi^2(1) = .19$, $P > .3$.

In the earlier experiment, successful subception occurred in 91 of the 222 trials, i.e., 41%, whereas in the present experiment it occurred in 46 of the 600 trials, i.e., 8%. The greater frequency of successful subception in the previous experiment is attributable to the use in that experiment of a longer exposure time of .01 sec and to the use in that experiment of geometrically shaped targets that were easier to differentiate than targets varying in number of circles.

Subception Missing

It can be seen from the percentage deviations in Table 2 that, in high aim with five targets, there was a greater tendency to miss the target by one circle than to call it correctly. A chi-square test of the numbers of subjects in the high- and low-aim tests with respect to a greater or a lesser percentage deviation on misses by one than on target hits is presented in Table 3.

TABLE 3

Subjects With a Greater or Lesser Percentage Deviation of Misses by One Than of Target Hits[a]

	Greater % deviation of misses by one	Greater % deviation of targets	Total
High aim	19	5	24
Low aim	6	17	23
Total	25	22	47

[a] Corrected for continuity, $\chi^2(1) = 13.15$, $P < .001$.

The significant χ^2 value indicates that the subjects, although calling the target more frequently in the desired direction than expected by chance (see Table 2), also called it with extrachance frequency in a direction opposite to the declared intent. Furthermore, of the 21 subjects with a positive deviation of target hits in their high-aim run with five targets, 16 had a higher percentage deviation of misses by one than of target hits; $z = 2.40$, $P < .017$ two tailed. These findings indicate that the perception of the tachistoscopically presented targets was subliminal, i.e., unconscious. If the perception had been supraliminal, i.e., conscious, the subjects would not have called the targets in a direction opposite to the declared intent to a significant degree.

Apparently the subjects were unconsciously ambivalent toward subliminal perception and engaged in subception hitting in some of the trials of the run and in subception missing, i.e., target avoidance, in other trials of the same run. It should be realized that subception missing requires subliminal perception of the target in order to avoid it, just as subception hitting requires subliminal perception of the target to call it correctly. It should also be kept in mind that subception hits and misses are not the same as hits and misses occurring during subception. The former are extrachance hits and misses and are due to subliminal perception, whereas the latter may be chance results. That subception hitting exceeded subception missing, however, is shown by the deviation of target hits being in the intended direction both in high and in low aim (see Table 2).

In an attempt to identify more closely the length of the experimental unit within which both subception hitting and subception missing occurred, a similar analysis was made of the half-run by separating the run into two halves of 12 trials each with the middle trial omitted. Of the 47 half-runs which had a positive deviation of target hits, 31 had a higher percentage deviation of misses by one than of target hits; $z = 2.19$, $P < .03$ two tailed. This indicates that subception hitting and subception missing occurred within the same half-run of 12 trials.

Although scoring in an opposite direction to the conscious intent has not heretofore been reported in subliminal perception, it is characteristic of many experiments in extrasensory perception where it is called psi missing (Rhine, 1952). Psi missing cannot be attributed to absence of psi as that would cause chance expectancy results. Instead it results from the use of psi to unintentionally produce an extrachance negative deviation. Similarly, subception missing is not caused by an absence of subliminal perception

but to the use of subliminal perception to call the targets in a direction opposite to the conscious intent. Psi missing has been attributed both to consistent error on the part of the subject resulting from tension and to his unconscious desire to miscall the target. Either or both of these factors may have been the cause of the subception missing in this experiment.

Chronological Changes Between Runs

In order to determine possible chronological changes in subliminal perception between the runs, the results are listed for the four runs in Table 4.

TABLE 4

Subliminal Perception in the Four Runs

Variable	Run				Total	
	1	2	3	4	Exp. freq.	Dev.
1. Target hits in high aim with 5 targets[a]	+11	+7	+14	+14	120	+46
2. Target hits in low aim with 5 targets	-11	-11	-6	-5	120	-33
3. Target hits in high aim with 2 targets	+8	+24	+12	+9	300	+53
4. Target hits in low aim with 2 targets	-11	+8	+4	-13	300	-12
5. Target hits in the four tests[b]	+41	+34	+28	+41	840	+144
6. Misses by one in high aim, 5 targets	+26	+38	+41	+35	192	+140
7. % dev. misses by one - % dev. target hits in high aim, 5 targets[c]	18%	56%	39%	26%		35%

[a]Variable 1 represents the amount of subception hitting in high aim with five targets.

[b]Variable 5 is the sum of variables 1-4 with the signs reversed in the low-aim tests, and represents the amount of subception hitting in the experiment as a whole.

[c]Variable 7 is an index of the amount of subception missing in high aim with five targets.

of the run and an incline in the fifth section. In a test of the difference between the average number of target hits in the 1st and 5th sections and the average number of target hits in the 2nd and 4th sections, $t(23) = 2.40$, $P = .025$. A decline of target hits during the run with an incline in the last section of the run is characteristic of ESP where it is called terminal salience. The effect has been attributed to differences in the subject's motivation as he proceeds through the run (Schmeidler, 1944). Terminal salience in subliminal perception may have the same cause, the subject's stress in this difficult task increasing as the run progresses, until near the end of the run when he realizes that it will soon be over.

The index of subception missing (variable 7) has an inverted U curve, which is opposite to the U curve of the target hits (variable 1). The opposite changes of subception hitting and subception missing during the run suggests that psi hitting and psi missing may also undergo opposite changes during the run.

Absence of Hit Clustering

Neither the target hits nor the near hits had a tendency to occur in clusters within the run, as is indicated by application of the method described by Stevens (1939). In high aim with five targets, the expected number of clusters of target hits was 124.4 and the observed number was 117. $z = 1.57$, $P > .1$. The deviation of clusters of target hits in low aim and the deviation of clusters of misses by one both in high aim and in low aim were even lower and less significant. The absence of hit clustering in this subception experiment is similar to the situation in tests of psi where hit clustering was not found to occur (Pratt, 1947).

Intermingling of Subception Hits and Subception Misses

The facts that subception hitting and subception missing occurred in the same half-run of 12 trials and that subception hits did not occur in clusters within the run indicate that trials in which subliminal perception is used to make a hit may be intermingled with trials in which subliminal perception is employed to produce a miss. This suggests that in ESP tests trials in which ESP is used to call the target correctly may be intermingled with trials in which ESP is employed to avoid the target. If this is the case, the frequency of ESP may be greater than is generally indicated by measuring either the psi hitting or the psi missing alone or by measuring both of them in the same experiment but each in only one part of it.

There are no significant differences between the four runs with respect to any of the variables, and no indication of facilitation or habituation of subliminal perception during the subject's session of four runs.

Terminal Salience in the Run

In order to determine possible chronological changes in subliminal perception within the run, the results are listed in Table 5 for the five sections of the run, each section consisting of five trials.

TABLE 5

Subliminal Perception in the Five Sections of the Run

Variable[a]	Section 1	2	3	4	5	Total Exp. freq.	Dev.
1. Target hits in high aim with 5 targets	+22	+10	+3	-2	+13	120	+46
2. Target hits in low aim with 5 targets	-8	-2	-10	-4	-9	120	-33
3. Target hits in high aim with 2 targets	+15	+5	+12	+10	+11	300	+53
4. Target hits in low aim with 2 targets	-9	-9	+7	-3	+2	300	-12
5. Target hits in the four tests	+54	+26	+18	+15	+31	840	+144
6. Misses by one in high aim, 5 targets	+17.6	+27.6	+36.6	+30.6	+27.6	192	+140
7. % dev. misses by one - % dev. target hits in high aim, 5 targets	-46%	+30%	+83%	+88%	+18%		+35%

[a] The variables have the same meanings as in Table 4.

Table 5 shows that, in high aim with five targets (variable 1), there is a decline in target hits throughout the first four sections

CONCLUSIONS

The occurrence of partial subception is suggested both by the equality of deviation in high and low aim and by the extrachance positive deviation of near hits. Equality of deviation in high and low aim, terminal salience, unconscious target avoidance, and absence of hit clustering, all of which were first observed as expressions of ESP, are shown by the results of this experiment to also occur in subliminal perception.

ABSTRACT

Targets consisting of from 8 to 12 solid circles were tachistoscopically presented as subliminal stimuli to 24 subjects in tests of high and low aim. Each subject was also similarly tested in high and low aim tests with two targets consisting of 11 and 12 circles. The occurrence of partial subliminal perception was manifested both by the equality of deviation in high and low aim and by the positive deviation of near hits (misses by one). The results also indicate the presence of four characteristics in subliminal perception that were first found in ESP, viz. equality of deviation in high and low aim, terminal salience, unconscious target avoidance, and absence of hit clustering.

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NOTE OF THE EDITOR

Dr. Carrol B. Nash has recently published the book "Science and Psi - ESP and PK". The book is a comprehensive survey of a wide range of paranormal phenomena. Particular attention is paid to the scientific nature of parapsychological research and detailed explication of experimental methods is provided. Review questions follow after each chapter and there are extensive indices.
299 pages. Charles C. Thomas, Springfield, Ill.. $ 16.95.

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PROPENSITY THEORY AND PSYCHOKINESIS

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1. INTRODUCTION

As is well known to students of parapsychology attempts have been made by some authors to encompass psi phenomena within the framework of quantum mechanics (QM, for short) (see, for instance, Oteri (ed.), 1975). As early as 1956, Chari (1956), reviewing interpretations of basic concepts, such as "causality", "indeterminism", "complimentarity", etc., in the light of quantum physics, recognized that QM speculations might offer a positive contribution to parapsychology as suggestions and analogies. However he also warned the reader not to take for granted that QM per se could account for the existence and display of psi:

> "My contention is that the philosophical implications of quantum mechanics are not so clear that we can grant that modern physics has already gone a long way in the direction of parapsychology. There are analogies; but one cannot be too sure of their interpretations" (Chari, 1956, p. 167, author's italics).

After twenty years this remark seems to be still valid, even though too often forgotten. Recently, in fact we have seen a revival of the so-called von Neumann-Wigner interpretation (von Neumann, 1955, Wigner, 1963, 1965), on the basis of which, together with some other ad hoc hypotheses, "explanation" of psi phenomena have been put forward (Sarfatti, 1974; Walker, 1974, 1975). There is no doubt that such proposals must be weighed up with full attention (at least they may stimulate further interest in foundation problems of QM), but what is doubtful is whether a philosophical interpretation of the QM formalism could soundly explain the intimate features of psi phenomena. This subject will be discussed in Section 2, in order to clear up some misunderstandings about it.

Even the main topic of this paper is inspired by an interpretation of the measurement problem in QM. Such an interpretation, opposite to the von Neumann-Wigner one, was put forward by Popper in 1957

(Popper, 1957, 1959, 1967). This approach is founded on Popper's own interpretation of probability in terms of the propensity concept, and its aim lies just in the effort to take the "observer" out of QM. Popper's theory will be outlined in Section 3, which may be skipped by the reader familiar with the subject.

It should be clear that the purpose of this paper is not to arrive at the ultimate truth about psi phenomena, nor does it even give any indications about which mechanisms are involved, on the basis of the propensity theory. In Section 4, I limit myself to suggesting this theory as a contribution to putting PK within a methodological framework. In particular, such an approach provides physical meaning, at a phenomenological level, to the formalism of the mathematical model proposed by Schmidt (1975).

2. ON PSI OBSERVATIONAL THEORY

As mentioned in the Introduction, some of the so-called "observational" theories (the term, taken from Schouten (1977), indicates, in a broad sense, those theories in which the observer plays an essential role) are strongly influenced by the von Neumann-Wigner interpretation of the measurement in QM. The reader not acquainted with the context may read the clear survey by Bohm and Hiley (1976), here I limit myself to adding some further remarks.

Schmidt (1976) is attracted by this point of view, in which - let us recall - it is up to the observer to make "nature" decide on the final state of the system (micro-object plus macroscopic apparatus). He argues:

> "We might tentatively assume (somewhat naively, in view of the noncausal aspects of PK) that a present PK effort can only affect random processes of which the outcome is not yet decided. (We could even try to define physical reality by the requirement that the state of a physically real system cannot be changed by PK efforts)" (Schmidt, 1976, p. 272, italics mine).

Quite paradoxically, on this view PK is no longer defined as the action of mind on (real) physical system, but, on the contrary, physical reality is operationally defined by PK. But one may object that, for instance, flying furnishings in "poltergeist" cases or PK-bent spoons are both physically real systems and changed by PK efforts, and, moreover, they are not random processes.

Schmidt continues:

> "From this viewpoint the comparison of PK on random processes before or after they have been macroscopically recorded (i.e., the comparison between conventional PK and PK on pre-recorded

> targets) seems particularly interesting. If the described interpretation of quantum theory is right, then the PK effort after the recording should be equally successful, because at this stage nature has not yet reached a decision on the outcome" (Schmidt, 1976, pp. 273-274, italics mine).

At this point, let us introduce the "Schrödinger's cat paradox" into Schmidt's considerations. To point out antinomies in the QM measurement problem, Schrödinger in 1935 proposed the following Gedankenexperiment (Schrödinger's arguments are reported in Jauch, 1968). Let us suppose we have, in an isolated chamber, a physical system composed of a cat, a bottle of cyanide, and a radioactive atom. When the atom decays a device breaks the bottle and the pitiable kitten dies. QM, in the "orthodox" interpretation, says that one half-life later the system is in a state described by a superposition containing equal parts of the living and dead cat. Only when an observer looks into the chamber (i.e., performs a "measurement") is it possible to know whether the cat is dead or alive. According to the von Neumann-Wigner interpretation, there should be no inconsistency. The two states "living cat" and "dead cat" are actually coexistent: it is the consciousness of the observer which brings about the life or the death of the cat. But the macroscopic world is deterministic both in QM and in classical mechanics. That is, in reality, our cat is either alive or dead, apart from whether it was "observed" or not. The paradox lies just in the fact that microscopic indeterminacy (we can state only the probability of decay) should imply indeterminacy in macroscopic objects too (until nobody has looked, the cat is a bit alive and a bit dead).

If one limits himself to conventional PK, there are no problems: a PK subject, by his volitional control, could be able to affect the radioactive decay (random process) in order to kill or to save (let us hope) the cat. But if one leans on the von Neumann-Wigner argument to explain PK effects on pre-recorded targets, then one must be aware of the logical consequences.

First, let us notice that, conceptually, the cat operates just like a measurement apparatus for the radioactive decay, that is to say, like a recording medium for a random process. Then, what happens if the PK effort is made after the random process has been macroscopically recorded, i.e., when the cat, in reality, is. e.g., dead? If the effort is to be equally successful, ought the cat to return to life?

Moreover, further riddles arise if one supposes a second PK subject influencing the first one, and so on. The argument follows closely the so-called von Neumann endless regression: the atoms of the

observer's body are governed by QM, therefore, in principle, the observer may be assumed to be a measuring apparatus. As a consequence, a second observer should be required to observe the first one (i.e., to collapse the state vector), and so on indefinitely up to the Ultimate Observer-Participator! Turning to the cat Gedankenexperiment, let us suppose that a first PK subject had (sadistically) caused the cat to die, and a second PK subject is not acquainted with this. For the latter, the former plays the role of a pre-recorded, but not yet "observed", target. Thus, the effort of the first observer might be changed by the second one, etc. and so the cat ought to die and return to life indefinitely.

Partly similar objections about the assumption that all future observers are able to influence the outcome of past PK efforts are raised by Schouten (1977).

Of course, somebody might claim the "scientific" explanation of the Lazarus miracle by the above considerations; but I would prefer to leave this way of looking at PK, which seems to raise the QM paradoxes to the second power, and not to eliminate them. Clearly, revealing my perplexities, I am only concerned about the advocated linkage between PK and a peculiar interpretation of QM. But, of course, I do not exclude a priori the possibility that bio-chemical processes may be influenced by consciousness; and, in no way, do I want to deny the significance of such a new experimental approach as exploring PK with pre-recorded targets.

3. BRIEF REVIEW OF THE PROPENSITY INTERPRETATION OF PROBABILITY

Probability theory is a formal calculus, in which a formal equation such as $p(a,b)=r$, with $0<r<1$ may be read "the probability of a given b is equal to r". The meaning of the symbols is left open to a number of interpretations. These Popper (1967) classifies as subjective or objective. In the former, $p(a,b)$ is regarded as someone's degree of belief in the hypothesis a given the information b. Among the objective interpretations Popper distinguishes: i) the "classical" interpretation (Laplace, De Moivre), where $p(a,b)$ is interpreted as the proportion of equally possible cases compatible with the event b which are also favourable to the event a. ii) The frequency, or statistical interpretation (von Mises, Venn), where $p(a,b)$ is the relative frequency of the event a in a sequence defined by the condition b. iii) The propensity interpretation. (For a historical and epistemological inquiry into probability, the reader is referred also to Hacking, 1975).

In the propensity interpretation $p(a,b)$ is something like the

strength of the propensity, or tendency, for the event a to occur in a repeatable experimental arrangement b. Writes Popper:

> "A statement about propensities may be compared with a statement about the strength of an electric field. We can test this statement only if we introduce a test body and measure the effect of the field upon this body. But the statement which we test speaks about the field rather than about the body. It speaks about certain dispositional properties of the field. And just as we can consider the field as physically real, so we can consider the propensities as physically real". (Popper, 1957, p. 68, author's italics).

For instance, the probability of a fair die showing a certain face when thrown by a tossing device is regarded as a physical property of the "experimental arrangement" i.e., the complex of the die, the tossing device, the horizontal surface on which the die lands, the gravitational field in the region of the toss, and so on) to yield outcomes with certain frequencies, if tosses are repeated a great number of times. Therefore probability is no longer regarded as a property of the sequence of throws as in the frequency interpretation. Experimental sequences have to be performed solely to test propensity statements, i.e., to measure the strength of the "propensity field".

From this viewpoint Popper looks at QM. In Popper's opinion, QM is a probabilistic theory like, e.g., classical statistical mechanics, dealing with problems of a statistical character. Moreover, quantum riddles are closely linked with problems of probability theory in general. In accordance with this position, Popper interprets the reduction of the state vector quite naturally as a feature inherent in every probabilistic theory. He writes:

> "Assume that we tossed a penny (...) The probability of each of its possible states equals 1/2. As long as we don't look at the result of our toss, we can still say that the probability will be 1/2. If we bend down and look, it suddenly "changes": one probability becomes 1, the other 0. Was there a quantum jump, owing to our looking? Was the penny influenced by our observation? Obviously not (the penny is a "classical" particle). Not even the probability (or propensity) was influenced. There is no more involved here, or in any reduction of the wave packet, than the trivial principle: if our information contains the result of an experiment, then the probability of this result, relative to this information (regarded as part of the experiment's specification), will always trivially be $p(a,a)=1$". (Popper, 1967, p. 37, author's italics).

It should be noted that this view of the statistical character of QM is shared by several other writers (see Ballentine's (1970) review on this subject). In a "purely" statistical (i.e., frequency) interpretation, however, the state vector represents only a statistical ensemble of similarly prepared systems, but does not provide a complete and exhaustive description of an individual system. With the propensity interpretation, on the contrary, a quantum state has meaning even for an individual system: the state vector - in Popper's opinion - should determine, in fact, the propensity of the states of the micro-system.

Popper's claim to resolve the foundation problems of QM was widely criticized (see, e.g., Bub's (1975) rebuttal; but see also Maxwell (1973), who developes an interpretation of QM inspired by the propensity notion); however, such an approach, restricted to the interpretation of probability, has been adopted by some philosophers, although from a different point of view (see Kyburg (1974) and references therein). Among others, Mellor (1974) takes propensities as a probabilistic generalization of - let us call it - "deterministic" dispositional properties ascribable to objects per se, e.g., dice or coins. In attributing a "deterministic" disposition to an object (solubility to a piece of salt), we are asserting that the object is such that, under relevant test conditions (if the salt is put in water) it displays an appropriate response behaviour (it dissolves). Analogously, in attributing a propensity (e.g., "unbiasedness") to a coin, we are asserting that the coin is such that, if tossed a great number of times (the difference from the former case lies just at this point), displays the propensity of showing head or tail with frequency = 1/2. In the following such a standpoint will be adopted.

Of course, the above exposition is incomplete, however, I hope to have conveyed the main concepts to the reader, particularly insofar as they are essenstial for the discussions in the next section.

4. THE PROPENSITY CONCEPT AS APPLIED TO PK TESTS

Considering propensities as physical properties on a par with any other ones, e.g. mass, specific gravity, elasticity, etc., we are going in the direction of a unified logical account of PK. In fact, PK-bent keys and PK increased scoring rates in statistical experiments are no longer two qualitatively different forms of PK manifestations. The difference lies in the physical property submitted to PK efforts. In the above examples, PK may be regarded as affecting either "deterministic" or statistical dispositional

properties respectively.

Let us consider, now, Rhine's test with dice. From the experimental results, we may hypothesize that PK can influence the natural direction of movement of dice, or else, that it could somehow bias the dice, e.g., shifting the center of gravity, when they are thrown. The first hypothesis is the most intuitively reasonable, to be sure, but, in a strict sense, only a variation in the chance expectancy is testable. From the available results, therefore, we may draw legitimately the sole conclusion that what is changed is the propensity of the dice. When experiments are carried out with electronic equipment, as. e.g., by Schmidt (1976) one can argue in a rather similar way. From the propensity viewpoint, statistical dispositions are ascribable to output signals, that is to say that, e.g., a lamp displays the propensity of lighting with a present frequency. When I say the propensity of output signals, or the "output propensity", I mean at present no more than that a lamp, or an earphone, or some other device, can display a statistical disposition, (e.g., it lights or clicks with a certain frequency) when activated by a suitable apparatus. Notice that I have deliberately avoided reference to the distinction by PK between ontic and epistemic randomness (Schmidt, 1969a, 1969b; Donald and Martin, 1976), because it seems to me too early claimed. It is clear, however, that my considerations may be restricted to "truly" random targets, if such be desired.

With the above premises, let us see how the propensity approach fits in the mathematical framework of Schmidt's (1975) model in a quite natural way. What Schmidt calls the "strength of psi sources", that is the "ability" of PK subjects to change the "conventional probabilities", may be physically interpreted as something like a force acting on physical dispositional (although statistical) properties.

The hypothesis that PK effects essentially the propensity of output signals leads, as a consequence, to the independence of the subject's scoring rate from the internal structure of the electronic device and from the time when the targets were generated, that is, from the space-time separation between the "psi-source" and the random generator (Schmidt, 1965). The electronic apparatus, in fact, has solely the function of creating the conditions in order that the output propensity, before and during PK efforts, could display itself. In this connection, experiments might be performed in order to test whether the PK ability of subjects is dependent either on the output probability (i.e., the value of the target propensity) or on the kind of events. This can be carried out <u>via</u> a mechanism of the type shown in Fig. 4

of Schmidt (1976), by which it is possible to enhance or reduce the target propensity, that is, to vary the hit probability (Schmidt, 1975). This procedure would be similar to one in which targets of different materials are submitted to Geller-type efforts, to assess whether PK depends on the degree of "deterministic" dispositions, such as rigidity, electrical conductivity, etc. Eventually, subjects might be tested as to the effect of their PK on "deterministic" versus statistical dispositions of targets.

With regard to the repeated retroactive PK (RRPK) effect (i.e., an addition effect for repeated PK efforts on the same target) (Schmidt, 1975; Houtkooper, 1977; Schouten, 1977), one may conceive an experiment in which one tests whether one or more subjects could produce - let us call it - a "permanent" change on the output propensity, at different values of the outcome probability. That is, one should search out, if it exists, a critical value of the outcome probability above (or below) which the effort of the first observation imprints a permanent alteration on the physical property, the propensity, of the system.

Clearly, looking at PK in terms of propensity implies no abandonment of future researches at deeper levels. The change in rigidity of Geller bent articles may be investigated, postulating some more basic mechanisms, such as, e.g., a loosing of molecular or atomic bonds. In a similar way it would be perfectly valid to ascribe propensities on the basis of microscopic physical properties. But, at present, PK is detectable only at a macroscopic phenomenological level, and it is doubtful in what manner it comes into play. The tension between the attempt to conceive PK in terms of microphysics and the admission that PK is only phenomenologically observable is revealed also by Schmidt, when he states:

> "A systematic search for the basic microscopic psi principle, however, appears to be impractical at present because we cannot yet observe psi in simple microscopic systems, and thus the gap between theory and experiment becomes too wide". (Schmidt, 1975, p. 302).

Therefore, at this stage, quite apart from the ultimate success or failure of my attempt to introduce the propensity idea into the theoretical discussion on PK, I believe it useful particularly to focus attention upon the scattered, often conflicting, available data, by gathering them together within a single comprehensive view, at least, at a phenomenological level.

ABSTRACT

This paper deals with PK from an epistemological perspective and, as such, becomes part of the theoretical debate about psi phenomena. First, the alleged linkage between PK and the von Neumann-Wigner interpretation of quantum mechanics is critically discussed. After that, the "propensity theory" of probability is suggested in connection with PK statistical experiments. According to this viewpoint, probability is regarded as a physical property of an individual object. Finally, it is shown that this approach could provide a sound basis to a physical interpretation of Schmidt's mathematical model of psi.

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THE CONCEPT OF EXTRASENSORY "NOISE"

D. Scott Rogo

Within recent years, some parapsychologists have begun to discuss ESP in terms of communication theory (Morris, 1975; Ely, 1971). In this respect, we might label ESP as a "signal" and any factor disrupting its entry into the conscious mind of the percipient as "noise". Admittedly, not all parapsychologists accept this view, although until recently much experimental work was guided by some form of this basically psychobiological model. Stanford (1978), for instance, has argued that ESP may not be an information-processing channel at all, but only a "dispositional" system. That is, an individual uses psi not with the goal of consciously gathering finite bits of information about another individual or objective event, but only to collect need-relevant data on which to base unconsciously-mediated behavior. It is hard to see, however, how Stanford's conformance-behavior model can explain the fact that many cases of spontaneous ESP focus on trivial events which have no need-relevance to the percipient. This is especially true of, for instance, precognitive dreaming (L.E. Rhine, 1967). So at the present time, the information-processing model is still a cogent and viable explanation for psi events. Therefore, there is no reason not to theorize ESP as a type of "signal" competing against background noise as it tries to gain access to the mind.

During the course of this presentation, I would like to examine the problem of noise factors from a unique angle. Instead of concentrating on physical sources of noise, such as psycho-physiological or sensory noise inputs, which might disrupt an ESP channel between an experimental subject and the agent and/or target, I would like to focus on the idea that ESP experiments might also be contaminated by extrasensory sources of noise as well.

The fact that ESP impressions somehow ultimately gain access to the brain indicates that a complicated psychophysiological transaction takes place at some point during the ESP process. As L.E. Rhine has suggested (1953), ESP-based information is probably first assimilated unconsciously and must then somehow "fight" its way into waking consciousness. There can be little doubt that ESP

is basically an unconscious process, since ESP impressions usually enter consciousness through such unconsciously constructed "mediating vehicles" (Tyrrel, 1947) as dreams, intuitions, hallucinations, etc., (L.E. Rhine, 1953). It seems fairly clear that ESP impressions must go through some sort of information processing before entering consciousness. Memory might serve as one type of vehicle for this processing (Irwin, 1978). Some parapsychologists have also suggested that the mind might possess a built-in censor which actively discourages ESP from reaching consciousness (L.E. Rhine, 1966) unless the impression has sufficient signal strength to break through a morass of competing and more pertinent sensory (and extrasensory) stimuli being simultaneously processed. In other words, one might say that ESP is usually "drowned out" before it can enter consciousness, although even at an unconscious level this information can still influence our objective behavior (Stanford, 1974).

According to this general psychobiological model, psi is processed within the organism similar to the way in which sensory stimuli are processed. The existence of some sort of "filtering system" in the mind or brain which determines what information is to be processed into consciousness and what is to be rejected has long been suspected by cognitive psychologists. Their theories and evidence may therefore help us to understand why ESP impressions so rarely come to our direct attention during the course of our daily lives.

The first, and admittedly crude, formalization of this type of "filter theory" was made by Broadbent (1958), who originally suggested that the nervous system is a "single communication channel of limited capacity". He went on to speculate that in-coming sensory stimuli must bottleneck as they compete for attention, allowing only a few perceptions to be processed into waking recognition. From this premise, Broadbent argued that to prevent sensory overloading, all in-coming sensory stimuli must pass a selective filter. The assimilation of any bit of sensory data into consciousness is given priority, according to Broadbent, on the basis of intensity, pitch, and localization. He further argued that the likelihood of any piece of information being selected for assimilation is related to such factors as physical intensity and length of time since the class of events was sampled. Finally, direct processing may be delayed for a few moments in short-term memory until the classification of events to which it belongs is selected for recognition.

Broadbent was ultimately able to experimentally verify his filter theory through several (basically auditory) perceptual experiments. However, the results of subsequent research both by himself and others caused this basic filter theory to be substantially revised.

Most notably, some psychologists eventually theorized that some form of selection occurs before the final neural filtering of specific information. (See Moray, 1969a,b). Broadbent had originally suggested that non-relevant sensory stimuli are disregarded in favor of more pertinent stimuli. Ultimately, though, it was theorized that irrelevant material is not excluded but merely attenuated (Treisman, 1960).

The concept of nervous system filtering might also apply to the way ESP information is processed as it attempts to enter consciousness. Being a signal of low amplitude, it can hardly compete with high priority sensory experiences which occupy our day to day consideration and to which our attention is usually directed. It is perhaps significant that those states of awareness which, by their nature, attenuate sensory and somatic noise factors--such as relaxation, sensory isolation, etc.--seem to facilitate the detection of psi signals (Braud, 1975; Honorton, 1974). This idea (that ESP must fight its way through competing sensory noise) lies at the heart of the "altered states of consciousness" paradigm which has given rise to much fruitful research in parapsychology over the last decade. Honorton, for example, has suggested that ESP signals are most easily detected when the subject's mental processes are directed inwardly and are focused away from external preoccupations. The success of many "altered states" studies would tend to indicate that a shift towards internal focusing blocks off the noise caused by sensory or even biological (i.e. internal noise) distractions. The theory that ESP signals must overcome some sort of psychophysiological filter before entering consciousness can also explain some very well known factors about psi: i.e., its latency in entering consciousness both during experimental work (Soal and Bateman, 1954), and spontaneous cases (Sidgwick, et.al., 1894) and its relationship to memory-recall (Parker, 1976). In these instances, it looks as though ESP information is being stored before conditions prevail which would allow for its entry into consciousness.

My primary reason for outlining the concept of sensory filtering--and some form of filtering is generally accepted in cognitive psychology (i.e., Dewsberry, 1975)--is to show that ESP information processing probably undergoes a similar form of censoring. As indicated above, ESP information has to compete with high-priority sensory stimuli as it strives for attention. But it may have to compete against extrasensory signals as well. This is what I have labelled the concept of extrasensory noise. Simply put, this concept can be stated in the form of a working hypothesis:

During any given experimental ESP task, the target (and its identification) is only one of several competing extrasensory signals

available to or impinging on the percipient's mind. These signals may compete for his attention. The success of the experiment will be determined by the ability of the percipient to isolate the experimental ESP signal and give it higher priority than any competing ESP channels (the "noise"). Failure can produce either non-significant scoring or displacement effects due to the recognition and assimilation of an incorrect signal. Increasing the signal of the target will increase the likelihood of a correct assimilation.

It is naive to assume that, during any given ESP experiment, the only open ESP channel is that between the percipient and the agent or target. There could be several complicating factors affecting the channel itself (Osis and Carlson, 1972). Several researchers have argued that ESP is not a discrete channel magically conjured into existence as we carry out our ESP tests. ESP may be an ever-occurring network of communications going on below the threshold of conscious recognition. This has been suggested by such researchers as H.H. Price, Hereward Carrington, Whately Carington, G.N.M. Tyrrell, Henry Bergson, and many others. Any one of these additional channels could conceivably disorient an experimental ESP subject as he tries to latch onto the selected target used for a specific session or trial.

In retrospect, evidence that extrasensory noise factors can contaminate an ESP experiment can be drawn by perusing some of the early experimental work published in the field. Take classic card-guessing tests for example. In his work with Basil Shackleton and Gloria Stewart, Soal uncovered a phenomenon that can be interpreted as a form of extrasensory noise. During his initial experiments, both subjects may have been confused by precognitive noise which led them to call one card ahead (+1 displacement) or clairvoyant noise which led them to call one card behind (-1 displacement). Although some of Soals's results may have been the product of experimenter fraud (Markwick, 1978), the displacement effect was also independently detected (at least with Shackleton) by an independent investigator (Parsons, 1947). A similar effect has also been isolated by Tart (1977). From a parapsychological standpoint, one might say that this type of systematic displacement occurs not when the ESP channel is necessarily clogged by competing ESP signals, but when the agent latches onto the incorrect ESP channel and subconsciously mistakes it for the more pertinent one.

However, the most relevant evidence which supports the concept of extrasensory noise comes from free-response experiments. Many researchers who have conducted free-response experiments have run into all sorts of displacement effects. For example, there are

many striking cases on record reporting how dream-ESP subjects failed to"pick up" the target being sent to them telepathically, but focused-in on peripheral activities in which the agent was engaged at the time (Ullman, Krippner and Vaughan, 1973). A case in point will be cited shortly. Some researchers engaged in ESP-ganzfeld research have reported that their subjects sometimes by-passed the primary target, only to focus on alternate targets in the target pool (Stanford and Neylon, 1975; Rogo, 1976b). This type of displacement effect was also very well known to the pioneers of psychical research. They noted that, on rare occasions, mediumistic communications procured by a sitter would be totally unevidential, but extremely applicable to the notetaker! This was especially true of Mrs. Leonard (Smith, 1964).

Unfortunately, no one has to date attempted to make any sense out of these displacement effects. However, upon closer examination, I feel that it is possible to find some meaning in them. First, though, let me cite representative cases of what might best be called "extrasensory noise" displacement. While these examples are only anecdotal in nature, I feel that they are so striking that we can reject the idea that they were the product of chance.

One form of extrasensory noise displacement occurred during a series of ganzfeld experiments which I have reported on elsewhere (Rogo, 1976a). Although the total series was not significant, we did observe several striking hits during the course of the project. The most impressive one was a -1 displacement effect. One evening we ran two sessions nearly back to back. Viewmaster reels were being used as targets. For the first session, the target had been entitled "UFOs" and depicted outer-space scenes, space ships, planets, etc. This target had been sent to the subject for a randomly determined 5 minute "sending period" during the course of a 35 minute session, but the subject reported no qualitative impressions which resembled the target at all. Shortly after the conclusion of the session, another subject was tested. The same agent was employed. The target chosen for this session was "Tropical Fish". However, at the exact moment the agent began sending this target, the subject latched onto the previous target and reported that he saw "wide spaciousness like 2001...expansion, lots of stars, in specific pattern...like space-ship, controls...in capsule in space. Stars, wheel in from like computer games...moon story, craters. I'm on the moon with one or two other people. Looking at earth." At exactly the end of the sending period, the subject suddenly stopped reporting space images and went on to other, non-related associations. The effect was startling.

Another case of extrasensory noise occurred during a precognitive-ganzfeld pilot study I ran at the Maimonides Medical Center's

Division of Parapsychology and Psychophysics (Rogo, 1977). Again, two experiments had been run one after the other. For the first test, the target ultimately chosen was a picture of an erupting Hawaiian volcano. During the session, the subject successfully described the target and reported visualizing, "a desert scene with mountain in background. Looks like a red glow or faint foundry on side of mountain. Not a volcano, but Vulcan--Norse God who forged and Loki, the mischevious God". The subject run during the next session elicited no mentation which described his own target, but seemed to respond to the previous one. He reported, "Have imagery of fire coming out of a mountain top and get feeling of Hawaii". In both these instances, the extrasensory noise emanated from either the previous target or our preoccupation with it.

Now it might be suggested that these results were due to sensory cuing from either the experimenter or from the initial subjects. This, however, could not have occurred. The subjects were not run exactly one after another, but only after short breaks. The subjects whose reports I've quoted here only arrived at the lab after the previous subject had left. The only cuing, therefore, would have had to come from me; and I certainly did not inform them how the previous subjects had fared! The research assistants who aided in these projects had practically no contact with the subjects, and any interactions they did have were always in my presence so they could not have cued the subjects without my knowledge.

Another form of displacement may occur during a GESP test when the agent himself sets up an ESP channel which competes with the target's. An agent might, on occasion, be quite able to psychically misdirect his percipient by setting up--quite unintentionally--a higher priority ESP signal. Krippner has reported, for instance, how a dream-ESP subject during the original Maimonides studies by-passed his target during one session, but focused directly onto information directly pertinent to a very stressful personal life-situation in which the agent was involved (Krippner, 1975). During another Maimonides dream-ESP study, the subject by-passed his designated target in order to describe what the agent was reading during the experiment at a time when he wasn't concentrating on the target (Ullman, Krippner, and Vaughan, 1973).

Yet another type of extrasensory noise may occur when two percipients are simultaneously used during a free-response study. Two experimenters have independently noted that subjects participating in group ESP tests in which pictorial targets are used will sometimes by-pass the actual target and latch onto what a fellow-subject in close physical proximity to him is drawing (Hardy, Koestler and Harvie, 1973; Warcollier, 1938). In these instances, extrasensory noise may

have occurred when the ESP signal from the experimental target only took second place to an unintentional signal emanating from the drawings made by a fellow subject. There may well be a better psychological and emotional bond between two people taking an ESP test than between the experimenter and the subject, and this could easily encourage the manifestation of extrasensory noise.

So just what are these anecdotes telling us? Perhaps quite a lot. By examing them in further depth, it is possible to find specific reasons why these displacements occurred. The anecdotes I cited from the Maimonides dream-ESP studies aptly demonstrate that an experimental subject will sometimes by-pass the target when the agent's own mind is too preoccupied with a more meaningful train of thought. Extrasensory noise may also occur when an agent fails to readjust to a new target. For example, take the first example I cited from my own ganzfeld research. I do not think it coincidental that the agent's hobby was science-fiction and he was therefore keenly interested in the "UFO" reel, while quite uninterested in the "Tropical Fish" reel. He probably failed to adjust to the new target and was, at some level of mind, still preoccupied with the first series of pictures. A similar psychological phenomenon may have occurred during my precognitive-ganzfeld studies. I have a particular fascination for volcanos, and my interest in the target may have psychically infected my second subject that day.

It is also interesting to note that, to date, two independent researchers have reported that they failed to achieve success when they ran too many ganzfeld sessions in one day (Sondow, 1978; Habel, 1976). Could this failure have resulted from extrasensory noise generated by previous targets, against which the signal from the specific target chosen for each session could not compete?

The entire problem of displacement may actually be simply one of signal strength. In all the instances I cited, it seems as though the signal from the target could not compete against a stronger alternate ESP channel. In looking over the designs for free-response studies in general, it is fairly clear that few experimenters have tried to deliberately strengthen the signal of the experimental target in order to specifically combat these extrasensory noise factors. This oversight might explain the failure of some free-response studies. Certain strategies can be employed during the course of an experiment to increase signal strength, and these strategies may result in increased scoring rates on the part of the subjects involved.

I would like to illustrate this point by describing two series of ganzfeld tests run by two different teams of researchers. One of these series was successful, while the other was not. The reason

for the relative success and failure of these two experiments may have a direct bearing on the problem of signal strength.

For his first ganzfeld project, Honorton (Honorton and Harper, 1974) used a GESP design and achieved considerable success with it. However, Honorton and Harper discovered that their subjects were basically using clairvoyance, and not telepathy, while in the ganzfeld. Many of them, they noted, tended to describe their targets (randomly selected viewmaster reels) before the actual sending periods and before the agents knew what the targets even looked like. Now let's turn to another ganzfeld experiment. Another experimental team conducted a similar ganzfeld test using a pure clairvoyance (PC) design (Stanford and Neylon, 1975), yet failed to achieve the striking results which Honorton and Harper had obtained. Stanford and Neylon did, however, note that their subjects often displaced their ESP by describing alternate targets in the target pool.

The results of these two experiments pose an interesting paradox. Why did Honorton and Harper's subjects successfully use clairvoyance in a GESP design study, while Stanford and Neylon's subjects failed when their clairvoyance was specifically tested using a similar psi-induction procedure?

I think the solution to this puzzle lies in a suggestion first made by Tyrrell (1947). Tyrrell, like L.E. Rhine after him, believed that ESP is basically a percipient-activated process, but also felt that an agent in an ESP experiment can act as an "emotional landmark". That is, the agent's attention helps guide the percipient's ESP to the required task or target, while not actually being the source (telepathically) of the information. To put it another way, the agent's attention increases the target's signal strength and helps combat extrasensory noise from alternate targets or ESP contamination from any other source.

I ran into some impressive evidence that Tyrrell's concepts were basically correct during a long series of ganzfeld tests which I ran with a selected subject in 1975 (Rogo, 1976b,c) and to which I would now like to turn. The subject for these experiments was a young actress, Claudia Adams, who first came to my attention when she gave a remarkable performance during a conventional GESP-ganzfeld experiment I was running with unselected subjects. Afterwards, I carried out several additional tests with her in order to more fully explore her psi abilities. During her initial session, Claudia startled both me and her agent by describing in detail three specific scenes on a viewmaster reel at the very time the agent was focussing on them. However, after the session was over and I was transcribing the taped recording of her mentation, I

discovered that she had given a description of one of these scenes earlier in the session before the agent had looked at the reel. This result could only have been the result of clairvoyance. My subsequent tests with Claudia therefore used a PC design instead of a GESP procedure.

For the purpose of these tests, I prepared four large envelopes consisting of 4 magazine pictures per envelope. Each specific picture was placed in a smaller sealed envelope. For each session, one packet was randomly chosen, of which one picture became the target. Now, fourteen of these pictures had been cut out and prepared only a week before the series of tests began. The other two targets were ones which I have been using for some 7 years as experimental targets. I had found them originally in a magazine back in 1971 and had cut them out and saved them because of their striking quality. One was a remarkable color photograph of the famed Carlsbad Caverns in New Mexico which shows the iced-over grotto complete with dripping water and stalagmites. The other was a surrealistic painting of an outer-space scene, depicting human figures floating about a blackened sky with planets revolving in the distance.

Although an excellent subject when tested under GESP conditions, tests to eliminate telepathy and focus on Claudia's clairvoyance caused considerable displacement. She did not know that I was using a PC design for these tests, so her failure at them could not have been due to expectancy.

During her first clairvoyance session, Claudia by-passed the chosen target and gave a detailed description of the Carlsbad Caverns, and even described the dripping water and the stalagmites. During the very next session, she again by-passed her target and focussed on the outer-space scene and described, "an amoeba-like figure" floating in "black-space" with "planets in the background". These descriptions were given in such detail that, as I listened to them over an intercom which connected my room to Claudia's isolation booth, I was firmly convinced that the Carlsbad and outer-space scene targets were actually in the envelopes before me. I was totally astonished when, upon opening the envelopes, I found that alternate pictures had been the selected targets for these two sessions.

It became evident to me during a subsequent series of tests that Claudia used her ESP as a non-focussed "scanning" function. On several occasions she clearly described more than one target in the target pool. For these tests I had again used several packets containing four sealed pictures. However, these packets had been prepared by a colleague of mine and I had no idea of their contents

whatsoever. It would seem that, as a result, Claudia merely scanned the contents of the entire target packet and psychically assimilated information about 2 or even 3 of them.

As a result of these observations, I formulated a working hypothesis about how Claudia was using her psi abilities while subjected to the ganzfeld. My theory was that her ESP was a basically clairvoyant process which "scanned" the experimental environment for relevant information in an unfocussed manner, but which needed some sort of emotional landmark to help guide it. I therefore ran a third series of tests with her during which I reintroduced the use of an agent (myself) and reduced the duration of the ganzfeld session from 10-35 minutes to 7-10 minutes. Since Claudia had usually given her best results at the beginning of each session, I hoped that the short-duration of these tests would help keep her ESP from wandering from the primary target. What resulted was a series of short-duration ganzfeld tests rich in striking qualitative hits. Displacement ceased altogether. (Examples can be found in Rogo, 1976b).

My work with Claudia helped me to formulate the concept of extrasensory noise. In our first PC experiments, it seemed obvious to me that my own preoccupation with my two favorite pictures in the target pool caused me to inadvertently guide Claudia's ESP to them despite the fact that alternate pictures had been chosen for the sessions. In the second series of tests, the selected target for each session just did not have <u>any</u> signal strength which singled it out over the others in the target pack. Thus, Claudia used her ESP to scan over <u>all</u> the targets, assimilating bits and pieces of some of them in happenchance fashion. Reintroducing the use of an agent helped reduce extrasensory noise by setting up an "emotional landmark".

In conclusion, I think several specific predictions can be based on the extrasensory noise theory. As I indicated earlier, ESP signals might be assimilated into consciousness according to principles similar to those which govern the processing of sensory stimuli, such as pitch and intensity. For example, a free-response study which can be run alternately under either GESP or PC conditions should result in differential scoring between the two conditions. Secondly, a GESP design which employs only passive agent involvement should be less successful than an experiment in which the agent has an active role involvement. For instance, take Honorton and Harper's first ganzfeld experiment. The agent had no feedback as to what was being reported by the percipient and only passively looked at the viewmaster reel scenes sequentially. The extrasensory noise-emotional landmark theory would predict that a higher rate of success would

have been achieved had the agent's role been intensified. Supplying him with simultaneous feedback about the agent's mentation so he could intensify his concentration while sending would hypothetically increase the target's signal strength.

I might note at this time that something along these lines was employed during the Maimonides dream-ESP research. At one point in their experiments, Ullman and Krippner experimented with having the agent take a more vivid interaction with the nature of the target. During one experiment, the agent took a shower when the target showed a rainy scene. However, no mention in their report is made as to whether these experiments were any more successful than those which used a passive agent (Ullman, Krippner and Vaughan, 1973).

In this presentation, I have hoped to show that what we call "displacement-effects" are not happenchance anomalies, but meaningful phenomena. Many researchers currently involved in free-response and "internally-deployed states" studies have given their almost exclusive attention to the problems of attenuating sensory and psychophysiological noise. However, in our effort to make psi more reliable, future research should also take into account the possibility that extrasensory noise factors may be just as great, if not a greater problem.

ABSTRACT

Borrowing a model from communications theory, ESP can be interpreted as a signal which only rises into consciousness after competing against several sources of "noise". Many parapsychology experiments, especially "altered states" studies, are designed to attenuate physiological and sensory sources of noise which may be interfering with an experimental subject's ability to detect weak ESP signals. However, there exists some evidence that several sources of "extrasensory noise" might also potentially interfere with the detection of these signals. Signals from ESP targets may have to fight against "extrasensory noise" in the same way that sensory stimuli must compete in the nervous system before they are processed into consciousness by some sort of sensory filter. Extrasensory noise signals can explain the failure of some experimental designs, and can account for displacement effects. There are several potential sources of extrasensory noise, and the success of an experimental design may depend on its strategy to increase the target's signal strength over competing ESP signals emanating from these extraneous sources.

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ANALYSIS OF SPONTANEOUS CASES

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Spontaneous cases can be considered as the basis for experimental research in parapsychology. Throughout the centuries up to our time many persons have reported experiences, impressions of something happening to someone else which turned out to be correct and which struck them as being entirely different from normal everyday fantasies, worries and expectations. If this had not been so, then there would be no reason to carry out or to have started investigations in our field. As a counter-example, that studying vampires did not turn into a legitemate scientific endeavor is simply because no credible reports exist of vampire activities and people do not claim such experiences anymore. But as long as many people claim to have paranormal experiences, parapsychology is entitled to study these experiences, provided these studies are carried out applying the rules to which science currently adheres.

It has often been asserted, especially by those sceptical of the mere concept of psi, that first we have to proof the existence of psi phenomena, before psi becomes worthy of study. At first glance this sounds logical, but historically this is manifestly not the way that science normally operates. Without going into a discussion of what exactly proof of existence means and what would be required for such a proof, if such is possible at all, I would like to stress that such a requirement is seldom, if ever, applied in other branches of science. No psychiatrist or psychologist would demand that the existence of hallucinations be objectively demonstrated before taking them seriously and studying them. On the grounds demanded we would have to ban from psychology the study of the phenomena of imagery, thinking, and even those associated with awareness. Similarly we would have to discard the notion that a valid study might be made of the phenomenon of people falling in love, since to my knowledge it has never been experimentally proven that such a thing happens at all.

We may indeed criticize the use of subjectively derived ideas, such as 'hallucinations, imagery, thinking, awareness, falling in

love, ESP, etc., as valid concepts, especially when applied as explanatory of the observed behaviour. The utility of a particular concept at the level of scientific model building must be evaluated in each case by the usual criteria, regardless of the utility or function of the concept in normal human exchange. What we are clearly not justified in doing, however, is pointedly to refuse to examine some kinds of behaviour (like shown in spontaneous cases) merely because the popularly applied explanations or concepts are of unproven (or perhaps of even dubious) worth.

To study phenomena suggestive of ESP is justified if only on the grounds that people experience such phenomena, or at least attribute the label 'ESP' to some experiences they have.

Whether we are allowed to assume an ESP process, an unknown method of communication, as being responsible for these phenomena, belongs to the field of constructing working hypotheses and research strategy. We should distinguish clearly between the experiences people have, which they consider as clearly different from ordinary experiences, and the possible explanations for these experiences. It is the latter, the idea that perhaps some unknown process is responsible, on which the critics turn their scorn. So long, then, as we remain open to all possible explanations for these experiences, and some can be and are explained by proving that non-ESP factors have been the cause of them, we are entitled to study them. Furthermore, if we want to apply the ESP hypothesis in our research, there is nothing against it so long as we can show that applying this hypothesis is more fruitful for research than applying some other hypothesis. After all, if we are wrong here we will, in the end, pay for it by not being able to provide any substantial results.

Hence I do not feel it meaningful to analyse spontaneous cases with the aim of constructing some proof as to the existence of ESP. Besides, I doubt whether the material lends itself to such a venture at all. Just as one can explain the (non) existence of hallucinations by assuming that all people reporting hallucinations merely do this to gain attention and to make themselves look more interesting, one can explain all spontaneous cases by assuming various sorts of factors causing them like the ones alluded to above, misinterpretations of what happened, distortions in reporting, etc.. The question is not whether these cases prove anything; the proper question is whether one of the above mentioned hypotheses is superior to the hypothesis that an ESP process has been involved in some of these cases. If, for instance, we find indications that reporting effects strongly influence the content of the reports, then we have to assume that such effects might explain the existence of spontaneous cases to a certain extent, and we could design an experiment to

confirm this hypothesis.

Some excellent studies have been carried out in which collections of spontaneous cases were analysed in order to provide testable hypotheses. Well known are the various reports by Louisa Rhine and Ian Stevenson. Still, I feel that this field is not yet exhausted, and that more thorough digging may turn up more data. With this aim in mind, to find working hypotheses for experimental research which best fit the data observed in spontaneous cases, I am at present carrying out a study analyzing such cases.

Since I do not myself possess a collection of spontaneous cases, I have turned to the oldest collection available: the 'Phantasms of the Living', written by Gurney, Myers and Podmore of the British SPR in 1886. The results of this analysis will be published in a forthcoming issue of the 'European Journal of Parapsychology'. Here I want to detail how the analysis is approached and what rules were applied when scoring the cases.

The analysis

In most studies on spontaneous cases common trends have been found but in nearly all instances it is still uncertain whether these trends reflect some property of the assumed ESP process or whether they are better explained by assuming the influence of non-ESP factors. This uncertainty is undoubtedly one of the reasons why results of analyses of spontaneous cases are mostly neglected by experimental researchers, at least in the sense that very few experimental studies have been carried out aimed at testing hypotheses resulting from analyses of spontaneous cases.

The most important of these trends concern the finding of higher frequencies for female percipients versus male percipients, a higher number of cases between near relatives and a dominance of serious events like accidents and death as compared to more pleasant and positive events. One of the aims of the present study is to find out whether various non-ESP factors should be held responsible for these observed effects, and if not, what hypotheses we can derive from them as regards the properties of the ESP process. Furthermore, I will study the correlation between a variety of variables such as sex of percipient, relationship between percipient and target person, type of experience, time of day, etc..In short, first I will analyze which variables prove to be related and what the interactions between these variables are. Secondly, I will try to interpret these data and to construct hypotheses fitting these data optimally, as that they may be tested in experimental research.

Scoring the cases

The data of the cases were scored in the following categories and according to the stated rules. In all categories, except category 1, 'unknown' has been scored as 1.

Category 1: Number of case as given in the 'Phantasms'.

Category 2: Sex of percipient. Male 2, Female 3, Male for collective case 4, Female for collective case 5. In collective cases I take as the percipient the principle character in the story. If there was not clearly one person who figures as most important I took the person whose experience was best corroborated, if this also failed to discriminate between possible percipients I took the first percipient mentioned.

Category 3: Age of the percipient. Less than 20 years 2, between 20 and 30 years 3, etc..

Category 4: Family situation of percipient. Married 2, Married and having children 3, Married but no children 4, Not married, widows, single 5, Not relevant (in the case of children) 6. If the percipient was married but no information was available as regards their having children I scored a 2.

Category 5: Sex of target person. Male 2, Female 3, Not relevant (clairvoyance) or more target persons 4, Percipient is target person (precognition) 5.

Category 6: Age of target person. Scoring according to category 3.

Category 7: Family situation of target person. Scoring according to category 4.

Category 8: Relationship between percipient and target person. First named person percipient, second target person. Husband-wife 2, Wife-husband 3, Father-son 4, Son-father 5, Father-daughter 6, Daughter-father 7, Mother-son 8, Son-mother 9, Mother-daughter 10, Daughter-mother 11, Brothers or sisters 12, Other family relationships 13, Friends or acquaintances 14, Strangers 15. If possible it might be advisable to split up friends and acquaintances into two different groups.

Category 9: Type of experience. Intuitions 2, Dreams 3, Waking experience visual 4, Waking experience auditory 5, Waking experience combined visual and auditory 6, Waking experience somatic, including automatic script, spontaneously calling a name, tactile experiences 7, Other waking experiences 8, Not classifiable 9. As regards the frequently met situation that someone wakes up suddenly at night and 'sees' or 'hears' something apparently paranormal (often in borderland cases) I rated it as a dream, unless the percipient stated

explicitly, and not just by implication, that he or she had been awake for a while before the experience happened.

Category 10: Action taken by the percipient. Yes 2, No 3, Irrelevant 4. Action is only scored 2 if the percipient undertook some action directed towards the target person himself before learning of the event (for instance by writing a letter, went out for information).

Category 11: Conviction, that is the percipient felt that the experience had a paranormal character before the event became known. Yes 2, No 3. If action was taken, conviction was scored 2. For rating conviction I applied L. Rhine's criteria that conviction can be assumed when the percipient shows in his or her actions that the experience had some special meaning. For instance, when the percipient took actions not directed towards the target person, like checking the premises, writing down the dream immediately, waking up people to tell them the dream, noting the time of the experience. In such a case I scored 2.

Category 12: Identification of target person. Yes 2, No 3. Yes but in a clearly symbolic way 4. In the case of multiple target persons, for instance two persons marrying, 2 was given when at least one of the persons directly involved in the event was correctly identified.

Category 13: Identification of the event. Yes 2, No 3, Yes but in a symbolic way 4. For applied criteria see next category.

Category 14: Number of details given in the experience. Score is number of details plus one (because number 1 is reserved for unknown). If the percipient had just an impression that something was wrong, the event is considered not identified and the number of details is zero. If the experience is 'something happened, I 'saw' a lot of blood', the event is rated as being identified (accident), and one detail is scored (a lot of blood). If the experience was 'X has drowned', the event is rated as being correctly identified and one detail is scored (way of dying). If the experience was 'X is seriously ill', then the event is identified, but no details are scored. If the percipient felt that he was needed in a certain place the event is considered as being not identified and one detail is scored (the location). If the percipient heard his name called and it turned out that the target person had an accident and actually called the name, then this is scored as event not identified and one detail. This is the only instance were I made the scoring of the number of details given in the experience depend on the actual events. In all above mentioned examples it is assumed that the identification of the event matched the real events, otherwise event not identified would have been scored.

Category 15: Number of correct details. Number of details given in the experience which turned out to be correct plus 1.

Category 16: Time of day. Night (12pm - 8am) 2, Morning (8am - noon) 3, ,Afternoon (noon - 6pm) 4, Evening (6pm - 12pm) 5.

Category 17: Month of year. Winter (December - February) 2, Spring (March - May) 3, Summer (June - August) 4, Autumn (September - November) 5.

Category 18: Percipient being alone when having the experience. Yes 2, No 3. If the percipient was in a public place like a train, bus, theatre, etc., not alone is scored. When sleeping with another person in the same room not alone is likewise scored.

Category 19: Number of witnesses to the experience. Score is number of witnesses plus one. A witness is any person, other than the percipient, who either before the event became known, or in some telepathy cases where this is unavoidable by nature at the time the event became known, learned of the experience from the percipient and from whom a testimony was published in the 'Phantasms'. This includes also cases where for instance the percipient wrote down a dream in a diary, which was inspected and confirmed by one of the investigators.

Category 20: Experience indoors or outdoors. Indoors 2, Outdoors 3. Indoors includes all cases where the percipient was in a building, vehicle, etc.. Outdoors all cases where the percipient was in the open air. A person having an experience when sitting in the entrance of his tent would be considered being outdoors.

Category 21: Seriousness of event. Death or dying at the moment of experience 2, Serious illness or accident 3, Slight injuries, grief, someone else than target person died 4, Serious material damage 5, Slight material damage 6, Trivial 7, Positive and negative 8, Positive 9. When dying 2 is scored when the person died within 48 hours of the experience, otherwise 3 is rated. Serious illness and accidents is scored when the target person was confined to hospital or had to keep to bed for a long period. In cases were a serious accident threatened but was avoided at the last moment, I counted the event as serious accident. Serious material damage includes for instance building on fire, substantial financial loss, etc.. Slight material damage might be a broken window, wheel running off the carriage, etc.. Trivial includes all cases where I could not find any serious aspect in the event, like an unexpected meeting or citing of a special line in a poem. Positive and negative are those cases where both aspects are inherent to the event, for instance the birth of a child. As positive events I rated for instance marriage, getting good news or safe arrivals.

Category 22: Target person focussing on percipient. Yes 2, No 3.

Focussing was only rated yes if there was an explicit statement in the report that the target person's attention had focussed on the percipient at the time of the event.

Category 23: Any reason for the percipient to direct his or her attention towards the target person. Yes 2, No 3. Yes is given when for instance in a death case the percipient knew that the target person was seriously ill, or knew that the target person was involved in a military action. In the case that both percipient and target person are together at the time of the event, a 3 is given unless there is reason to assume that the percipient might have expected the event to happen to the target person. If the percipient knew that the target person was ill, but had hardly any relationship to the target person and did not know the fatal character of the illness, a 3 is scored. However, in a similar situation between friends or near relatives a 2 is given, since then we may assume that the percipient was worried.

Category 24: Number of witnesses of the event. If only the reporter of the case, whether percipient, target person or someone else claims to be the witness, a 2 is given. Both percipient and target person witness 3, Independent witness or witnesses 4. Independent witnesses include either a testimony by any other than percipient or target person that the event took place according to the description in the report, or a statement by one of the investigators that objective proof was obtained, for instance in the form of a death announcement in a paper, that the event took place as reported.

Category 25: Time between experience and event, whether forward or backward. Less than one hour 2, One to six hours 3, Six to twenty four hours 4, One to two days 5, Two to seven days 6, One to two weeks 7, Two to four weeks 8, Within half a year 9, Half to one year 10, One to two years 11, Two to five years 12, Five to ten years 13, Ten to twenty years 14, Over 20 years 15. In psychometry cases it is assumed that the sitter is the source of the information, and hence 2 is scored. Cases in the 'Phantasms' are limited to cases where the time between experience and event does not exceed 24 hours, hence this category is rather useless for this investigation. It should however be included when the collection contains precognition cases as well.

Category 26: Time between event and reporting. Same scoring as for category 25. If the case has been published before (in a book, journal, paper), the time is taken between time of event and time of first publication.

Category 27: Who sent in the report. Percipient 2, Target person 3, Family member of either percipient or target person 4, Other 5.

Category 28: Length of report. Length is expressed in the length

of the first original report as printed in the 'Phantasms' in centimeters. When the collection consists of written letters it might be useful to apply number of words here.

Category 29: How improbable can the main event, not including details, be considered. If we can assume that the event has a probability of occurrence of less than one time a year, then 2 is scored. All other events having a higher probability get score 3. The probabilities are naturally scored on a subjective basis, but in most cases that posed no problem at all. Nearly all death cases will be scored 2, since I assume that even in those years the average number of death incidents in the family has been lower than one a year. However, in the case of acquaintances such a case would be scored 3. Slight accidents are also mostly scored 3, unless they had a very bizarre character.

Category 30: Feelings of the percipient associated with the experience. Worried, concerned 2, Scared, depressed, repulsed, 3 Pain, hurt 4, Positive 5. Feelings were only scored when it is explicitly stated in the report that the percipient experienced such feelings.

Category 31: Particulars concerning the percipient. Ill at the time of the experience 2, Had an alleged paranormal experience more than once 3, More spontaneous cases in the family of the percipient, but in which the percipient was someone else 4, The percipient had a paranormal experience more than once and about the same type of event 5.

Category 32: Distance between target person and percipient. Both staying in the same city, town or village 2, Both being in the same country but not in the same city, town or village 3, Both being in different countries 4.

Suggested additional category: Time between experience and the moment the percipient learned of the event. These data might be applied for testing hypotheses following from the observational theories.