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Amplifying Precognition
Four Experiments with Roulette[1]

Wilfried Kugel[2]

Abstract – The starting point of our investigation is the well-known fact that subjects asked to produce random decisions are not able to do so, but do show characteristic patterns in their choices. This behavior influences the results of statistical experiments in extra-sensory perception (ESP) (here, precognition). A computer program using a model of *Information Theory* was prepared to recognize such patterns and match them with the outcome of the subjects' precognition trials. The program was able to make its own bets on certain trials when the appropriate statistical criteria were met. The program's bets were not necessarily the same as the subjects' bets. Four precognition studies were completed between 1980 and 1999. To motivate the subjects, the experiments were performed as roulette games. Comparing the subjects' hit rates with those of the program, the program performed considerably better in "amplifying" precognition. The overall score of the amplifying program resulted in a highly significant z-value of +3.27 (p = 0.0006), where the subjects scored below chance.

Keywords: precognition – psychokinesis – roulette – parapsychological research

Verstärkung der Präkognition
Vier Experimente mit Roulette

Zusammenfassung – Ausgangspunkt der Untersuchung ist die bekannte Tatsache, dass Probanden, die gebeten werden, zufällige Entscheidungen zu treffen, dazu nicht in der Lage sind,

1 This study was presented in 1999 at "The Parapsychological Association 42nd Annual Convention" at the Stanford University in Palo Alto (USA). An extended German report of this study will be published in the *Zeitschrift für Parapsychologie und Grenzgebiete der Psychologie* (forthcoming).

2 Dr. Wilfried Kugel (born 1949) obtained his diploma in physics in 1978; 1977–1980 spokesman of the research project „Biocommunication" at the Institute for Applied Statistics of the Department of Computer Science of the Technical University Berlin; 1987 Dr. phil.; 1989–1991 scientific assistant at the Heinrich-Heine-Institute (Düsseldorf); 1997–2000 head of the Guest Research Project "Predictability of Stochastic Events" at the Institute for Experimental Physics of the Free University of Berlin. Kugel is a member of the Parapsychological Association; author of books on Hanns Heinz Ewers (1992, 2013), Erik Jan Hanussen (1998) and the 1933 Reichstag Fire (with A. Bahar, 2001, 2013). In 1987/88 and 2012/13 he was supervising the reconstruction of the style-forming classic silent movie *The Student of Prague* (Berlin 1913 by H. H. Ewers).

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sondern charakteristische Muster in ihrer Auswahl zeigen. Dieses Verhalten beeinflusst die Ergebnisse statistischer ESP-Experimente (hier: Präkognition). Anhand eines informationstheoretischen Modells wurde ein Computerprogramm erstellt, um solche Muster zu erkennen und mit dem Ergebnis der Präkognitionsversuchsdurchgängen (*trials*) der Versuchspersonen abzugleichen. Das Programm konnte auf bestimmte *trials* selbst wetten, wenn die entsprechenden statistischen Kriterien erfüllt waren. Die Programmwetten mussten nicht mit den Wetten der Versuchspersonen übereinstimmen. Vier Präkognitionsstudien wurden zwischen 1980 und 1999 abgeschlossen. Um die Probanden zu motivieren, wurden die Experimente als Roulette-Spiele durchgeführt. Vergleicht man die Trefferquote der Probanden mit der des Programms, so hat das Programm eine wesentlich bessere Leistung erbracht und die Präkognition „verstärkt". Die Gesamtpunktzahl des Verstärkungsprogramms ergab einen hoch-signifikanten z-Wert von 3,27 (p = 0,0006), während die Probanden unter der Zufallserwartung lagen.

Schlüsselbegriffe: Präkognition – Psychokinese – Roulette – parapsychologische Forschung

Preface 2018

Reports of prophecy have been available since classical antiquity. These phenomena have been studied scientifically since the 19th century. The term "precognition" first appeared in the 17th century, but did not come into common use until the introduction of statistical-investigation methods by Joseph Banks Rhine in the 1930s. A meta-analysis of forced-choice precognition experiments from 1935 to 1987 can be found in Honorton and Ferrari (1989). An overview of 75 years of experimental research in precognition was published by Radin in 2011.

From 1980 to 1999, I conducted four series of forced-choice experiments on precognition, all designed as a game of roulette. I was able to develop an intelligent algorithm that could filter out psi-mediated information from the subjects' bets and thus develop an amplifier for precognition.

In all experiments reported here, the randomness of the target sequences was checked with several statistical test methods. There was no significant deviation from the statistical expectation. Thus, psychokinesis (PK) effects can be excluded.

Since I worked mostly with unselected subjects,[3] I have no doubt that every human being has, to some degree, the capacity for precognition. Other researchers have performed new experiments since 2000 and thereby increased the evidence for precognition.

Beginning in the 1990s, parapsychologists have carried out research into an unconscious form of precognition termed „presentiment". Using experimental techniques well-established

3 Technical details are provided in the extended German version. See footnote 1.

in psychophysiology, subjects have been found to physiologically anticipate stimuli to which they were randomly exposed. A historical review of presentiment experiments can be found at Lobach (2009). In 2011, psychologist Daryl Bem published a meta-analysis on recent precognition experiments.

Critics of the concept of precognition argue that there is no plausible mechanism for it, and it seems contradicted by well-substantiated theories in physics; the *Theory of Relativity* (Einstein, 1914, 1949), as well as the *Quantum Theory* (Feynman, 1949), theoretically allows the relativity of causality. No experimental evidence has been found for either theoretical model in physics yet.

There has been a lot of speculation about the concept of "Quantum Correlation" or "Einstein-Rosen-Podolsky (EPR) Correlation" (Einstein et al., 1935) as an explanatory model of psi phenomena. An interpretation of Quantum Correlation with the help of "Feynman Diagrams" was first proposed by Hans Reichenbach in 1956.

Introduction

People have long dreamed of finding a method to predict the outcome in games of chance.[4] Several attempts have been made to amplify subjects' possible precognition abilities in game situations. In the 1950s, Milan Ryzl (1971) performed experiments to predict the winning numbers in a lottery and developed a complicated statistical method to amplify a subject's performance. In the 1960s, Robert Brier (1970) together with the publisher of the newsletter *Rouge et Noir*, Walter V. Tyminski, performed some experiments at the Casino in a US hotel (Brier & Tyminski, 1970) to try to amplify the performance of subjects with the help of a statistical method. Both claim to have won money with the help of their methods.

Under the non-ESP hypothesis,[5] the outcome of a game of chance is completely random, no matter what strategy the subject applies. For precognition to be effective, future events must correspond to the subject's behavior in the presence and past. In the case of roulette, random events should be detectable in the subject's response behavior. If the subject acts in a way that is completely strategy dominated, it can be assumed a priori that no precognition is involved.

Since a betting game is a highly motivating test situation for subjects and it could be promising to filter the information output at the subject's side with the help of statistical methods, the author developed a computer program that can perform real-time calculations during a roulette game and may also be able to amplify precognitive information in a betting situation.

4 French aristocrats' gambling passions and the arising questions led Blaise Pascal (1623–1662) and Pierre Fermat (1601–1665) to found the *Theory of Probability*.

5 ESP = extra-sensory-perception.

The mathematical formalism developed with the help of *Information-Theory*-methods was first introduced by the author at the 1978 PA convention in St. Louis, Missouri (Kugel, 1979). The results of two series of experiments (A: 1980, B: 1981–1984) were reported in the 1990/1991 volume of the *European Journal of Parapsychology* (Kugel, 1992). This current paper reports the results of two further studies (C: 1992, D: 1997–1999).

Response Patterns

Hans Reichenbach (1935) stated that mathematically naive subjects would not be able to produce a random series of alternative symbols taken from a set. This hypothesis was confirmed in several psychological investigations (see Tune, 1964). In test situations, subjects show preferences and aversions when forced to make random decisions. Subjects avoid repetitions of the same choice (Mittenecker, 1958). Reinforcing the response (feedback) leads them to behave in the opposite way; most of them prefer to repeat the same choice. Every sequence of the subject's responses shows a well-proportioned structure, as characteristic for the individual as a fingerprint and determined by an individual strategy. If the subject's decisions are the output of an information receiver, transmitted information cannot manifest itself when the subject's behavior is completely guided by a non-variable, pre-formed pattern. In other words, the receiver has no oscillator circuit.

Quantitative and qualitative ESP experiments (Tenhaeff, 1976) have demonstrated that correct readings and high hit scores seem to depend on subjects' individual habits or reasoning in their personality structure. Habits manifesting themselves in the form of response patterns in statistical ESP experiments have been investigated by several experimenters (Goodfellow, 1938; Kugel, 1977; Martin & Stribic, 1938a, 1938b; Mischo, 1972; Morris, 1971; Stanford, 1967).

Measuring Response Patterns

Every hypothesis about response patterns is a hypothesis about relative frequencies of such patterns in a response series. In real-time experiments *Information Theory* provides a powerful tool to calculate values representing the strength of strategy application.

A functional *U*, which is always non-negative and increases with the divergence between two sets of probabilities or relative frequencies, was defined. This *U*-value is independent of the number of trials; it rises and falls with the actual divergence between two sets and can be used to measure patterns in the subject's response series with respect to a given reference. It can easily be calculated in real time (for details see: Kugel, 1979).

Three applications of the *U* measure on the two alternatives case (binary choice) were used:

1. Frequencies (transition probabilities of the Order 0)

   In a decision situation, every subject tends to prefer or avoid one of the alternatives. In the extreme case of a strong response strategy, only one alternative is chosen. The measure U_a detects the favoring/avoiding of alternatives.

2. Frequencies of equal and unequal pairs (transition probabilities of the Order 1)

   Investigating the alternation of choice, one finds that the subjects usually alternate much more than expected by chance. They avoid repeating the same choice. The measure U_b detects whether more pairs of unequal responses (repetition avoidances) or pairs of equal responses (repetitions) appear.

3. Feedback response

Positive feedback can be seen as a reward which encourages the subject to repeat that choice. However, feedback is an external stimulus which contradicts the internal stimulus for repetition avoidance. Feedback has two different effects. On the one hand, a feedback-triggered response is a strategy which interferes with the subject's psi-mediated choice. On the other hand, a feedback response weakens the dominant strategy of repetition avoidance. This double effect may well explain the controversy over whether or not feedback increases psi performance. The measure U_c detects whether or not the subjects respond to feedback.

Implementation into a Program

In a betting situation, three values can be measured for every single trial *j*: the subject's prediction (1 or 2 with regard to the colors *noir* or *rouge*), the subject's wager based on this prediction, and the color of the random number (1, 2 or 0) generated after the subject's bet. After a certain number of trials, enough values have accumulated to calculate the three above-mentioned *U*-values using the data from all previous trials (1...*j*) with the help of a computer program. For the actual trial *j*, it can be determined whether or not the *U*-values are rising or falling compared to the preceding trial (*j*-1):

$$U_a\,(j) > U_a\,(j\text{-}1) \;\text{ or }\; U_a\,(j) \leq U_a\,(j\text{-}1)$$

$$U_b\,(j) > U_b\,(j\text{-}1) \;\text{ or }\; U_b\,(j) \leq U_b\,(j\text{-}1)$$

$$U_c\,(j) > U_c\,(j\text{-}1) \;\text{ or }\; U_c\,(j) \leq U_c\,(j\text{-}1)$$

This leads to $2^3 = 8$ different possible strategies. For each of the eight strategies, the number of corresponding hits (positive sign) and misses (negative sign) weighted with the related (square[6] of) subject's wager were stored in the program's session memory.

For the forthcoming trial (*j+1*), we can now calculate both alternatives of changes in the *U*-values with respect to both predictions one could make.[7] One can then decide which of the possible two predictions represents the better strategy with regard to the effectiveness of all strategies applied by the subject during the previous trials. The program's prediction for the forthcoming trial does *not* consider the subject's prediction for the forthcoming trial, but acts completely independently only on the basis of the data of the previous trials.

Dynamic software filters were applied to suppress random fluctuation in the program versions from series B on. The filters suppressed predictions when not all values were defined (for instance during the build-up of statistics in the beginning of the session) or when some values were (nearly) equal.

Chain of Events in a Session

initialization
↓
* statistics for alternative 1 (*U*-values)
↓
statistics for alternative 2 (*U*-values)
↓
selection on the basis of the more efficient strategy
↓
filter
↓
strategy-values stability control, termination at instability
↓
generation of program's bet, if possible
↓

6 The wager can be seen as a variable indicating how sure the subject was about the single prediction. The square of the wager was used to amplify the differences between wagers from trial to trial.

7 A total of the three *U*-values was calculated for every trial in program version 1 (study A). The program then always predicted the color for which $U(j+1) \leq U(j)$.When not enough data for calculation were available for the first trials, the program simply took the same choice as the subject. The three *U*-values were handled separately from program version 2 (study B) on.

subject's bet (game action)
↓
input of subject's bet and wager
↓
control for input errors
↓
update of program variables
↓
program's bet, if possible (game action)
↓
throw (game action)
↓
input of throw
↓
control for input errors
↓
update of program variables
↓
partial initialization – continue at *↑

Termination Conditions

The only termination condition for study A was the completion of 20 sessions of 50 trials each. Termination conditions for the session in study B consisted of: program errors, input errors by the experimenter, a session time longer than 1 hour, the real game performed faster than the computer could calculate, unstable strategy values, an uncomfortable situation in the casino, or the subject's request to stop "(optional stopping). Since we were only conducting a study in the casino, no limits for either the number of trials or for the program's predictions were set. The only termination condition for study C was the completion of 500 program prognoses.

For study D, termination condition was the completion of 2,000 program prognoses. Other conditions established before the start of the series of experiments were: Only the first 28 trials of single sessions should contribute to the result; the time for a single session should not exceed 45 minutes; the subjects could terminate the session whenever they wanted. These conditions should avoid decline effects.

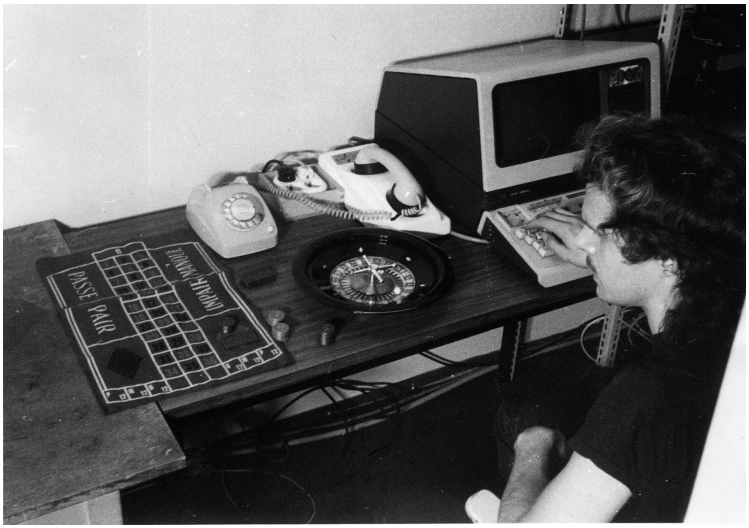

Fig. 1: Study A at the Technical University Berlin in 1980

The Experiments

Study A (Technical University Berlin, 1980)

This study was performed at the Technical University Berlin psi lab. The results were first published in the project's annual research report (Kugel, 1980).

The author introduced a computer program (version 1, in FORTRAN) to predict even chances in a roulette game using the *U*-values as predictor variables in September 1980. A toy roulette device[8] was used. The program was run via telephone modem on a CD CYBER 172 of the Technical University Berlin computer center. Twenty subjects were tested, only one session per subject was allowed, and each session consisted of 50 trials. The subject could bet any (hypothetical) wager on rouge or noir. The program had to build up its statistics during the first trials of a session; it simply made the same predictions as the subject.[9] After the variables were defined, the program

8 The roulette wheel had no manufacturer listed other than "Made in Italy"; the wheel was approximately 12 inches (30 cm) in diameter.

9 This method was used because the same number of predictions was needed for the subjects and the program. (There was no subject's bet without a corresponding program's bet.) Those trials in which the program placed the same bet as the subject should not be included in the analysis. However, we had

started to calculate its own prediction (not taking the subject's actual bet into account) and made its bet after the subject had done so. The program always did bet the same wager as the subject, no matter whether its prediction differed from the subject's prediction or not. Then the experimenter threw the ball. When a "0" appeared, the ball had to be thrown once more.[10]

There were two hypotheses:

H_1: The program's hit score will be higher than the subject's in the majority of sessions.

H_2: The program's winnings[11] will be higher than the subject's in the majority of sessions.

The program performed better than the subjects in 13 sessions, and both obtained an equal number of hits in one session. The subjects performed better than the program (H_1: p=0.084, one-tailed) in only 6 cases. The program's (hypothetical) winnings were higher than those of the subjects (H_2: p=0.058, one-tailed) in 14 out of 20 sessions. Though the hypotheses could not be accepted, the results looked promising.

Study B (Berlin Casino, 1981–1984)[12]

Programable pocket computers became available in Germany in 1981. A shorter version of the original program was developed (version 2, in BASIC) for the Sharp PC 1211 (with 1.4K memory). It was very difficult to fit the program into the very small memory, so only the most important calculations could be made. The actual decision about the prediction (on the basis of the three U-values) had to be made by the experimenter during the session. The computer took about 90 seconds to calculate one trial. Because of this long calculation time, the game at the casino table

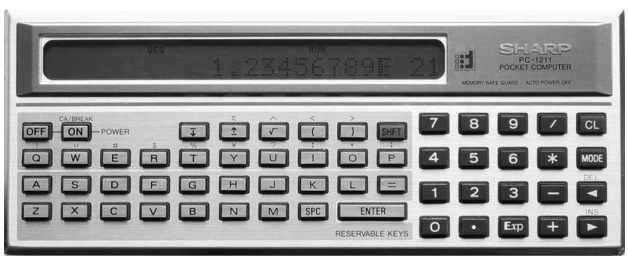

Fig. 2: Sharp PC 1211, used in study B in 1981

to do so in this experiment because it was fixed in the methodological set-up prior to the experiments (to make the statistics easier). The hypothesis only stated that the program would have more hits in the majority of sessions. Under this hypothesis it does not matter if subject and program make the same bet for a while because the difference between the program's and the subject's hits in these cases equals 0.

10 In the test series B to D, the game use of the subject was halved in each case if an "0" fell, as usual in the casino. These trials were scored as misses.

11 Winnings = monetary prizes (toy money).

12 This study was sponsored by a private person.

ran faster than the calculation time, and the session had to be terminated in some sessions. Several program versions (2–4) for the Sharp PC 1211 were developed. A Sharp PC 1500 (with 10K memory) has been used since 1982. The calculation time could be lowered to seven seconds. Program version 5 was developed for this computer.

The subjects received money for their bets (300 DM, later 600 DM[13]) from the experimenter. They had no financial risk because they could not lose any of their own money. They also received half of the session's net win from the experimenter. The subjects could bet any sum on even chances, and the experimenter fed all the data into the computer. When the program made predictions, the experimenter made this bet *after the subject had placed the bet*, thereby reducing the program's influence on the subject.

Thirty-nine sessions were performed with five selected subjects in the Berlin casino from 1981 to 1984. The program could not make any predictions in five sessions. The program and subject had the same number of hits in six of the remaining 34 sessions. The program performed better than the subjects in 15 of the remaining 28 sessions, which is near chance. The total number of the program's hits were significantly raised above chance expectation.

Study C (Berlin, 1992)

Study C was performed at the author's home in 1992. A computer program (Version 6) which simulated the roulette game on the screen was developed for the PC. A true-random-number generator was constructed using a radioactive uranium source. Fifty-four sessions with about 50 subjects were performed. The subjects could bet any (virtual) wager on rouge or noir. The program made its bet only after the subject had done so. There was only one hypothesis – that the hit score of the 500 program prognoses would be significantly higher than chance expectation. This hypothesis was confirmed.

The hardware used in series D was of very poor quality because of a lack of funding. The program consisted of a number of modules programed in QBASIC, TBASIC, C and FORTRAN77. There were several technical problems during the experiments, but the random-number-generator functioned well.

13 The amount of money the subjects could play with had to be raised because not enough games could be performed to use all predictions of the program with only 300 DM in some sessions. Those sessions were terminated before the subject went bankrupt.

Study D (Freie Universität Berlin, 1997–1999)[14]

Study D was designed to confirm the results of the previous three studies with much better equipment and under far better conditions. This study was performed at the physics department of the Freie Universität Berlin. Program version 7 was developed in Borland C++ for *Windows 95*.

Two thousand program prognoses, more than in all three previous studies together, were generated. This required 389 sessions and a total of 10,641 single trials. The main hypothesis was that the hit score of the 2,000 program prognoses would be significantly higher than chance expectation. This hypothesis was confirmed. A second computer system was set up for this study; the hardware and software were identical to the main system. This second system received the very same input from the subjects as the first system via a radio mouse and an infrared keyboard. It was equipped with its own Geiger-Müller counter, which was turned 180 degrees with reference to the Geiger-Müller counter in the first system. The second system received different energy quanta from the source, resulting in a different random-number string. The subjects, who only saw the screen of the first system, got no feedback from the second system. The second system represented a situation with false feedback (since the subjects only received feedback from the first system). No significant deviations from chance expectation could be observed in the second system. The program prognoses running in the second system did not reach an above-chance result. There was no sign of a cor-

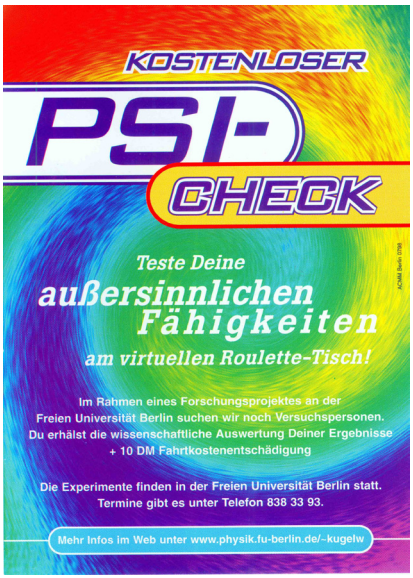

Fig. 3: Flyer of study D in 1997–1999 at the Freie Universität Berlin

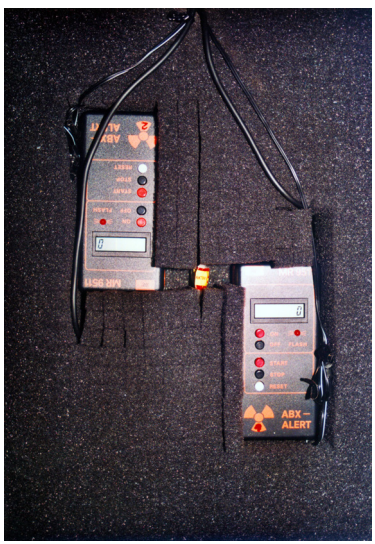

Fig. 4: Radioactive source (uranium oxide) with two 180° shifted Geiger-Müller counters

14 Study D was funded by the Freiburg Institut für Grenzgebiete der Psychologie und Psychohygiene (IGPP).

relation between the two random series in the two systems, and the target series did not show any deviation from chance. There was some evidence that there was no PK influence in series D.

Results

Random Numbers

A cheap toy roulette device was used in series A. Surprisingly, the randomness of this device appeared to be very good. Series B was performed in a Berlin casino where real roulette devices, which were officially controlled, were used. A radioactive source (Uranium 238, contained in natural uranium-oxide) was used as a random source in series C and D.

The time interval between two events (peaks) of the decay process varied randomly. Thirty-eight successive intervals between peaks were measured by a PC. The first interval was always deleted for security reasons (possible start-up oscillation).The longest of the remaining 37 intervals was determined. The ordinal number of this longest interval (between 1 and 37) minus 1 determined the actual random number (between 0 and 36). Different hardware (Geiger-Müller counters) and different software were used in series C and D respectively. Random numbers were reduced to 1, 2, and 0 for random analysis.

Target frequencies and target transition frequencies from lag 1 up to lag 4 were compared to chance expectation in all 4 series, and no significant deviations from chance expectation could be observed. All four random-number generators worked perfectly.

Overall precognition results for the subjects

Subjects scored collectively slightly below chance in all four studies. (There was no hypothesis with respect to these scores.)

series	trials	hits	expectation	z-score	probability (one-tailed)
A	900	446	450	-0,48	n.s.
B	945	456	459,7	-0,24	n.s.
C	2.324	1.119	1.130,6	-0,48	n.s.
D	10.641	5.158	5.176,7	-0,36	n.s.
Total	**14.810**	**7.779**	**7.217,5**	**-0,68**	**n.s.**

Overall precognition results for the program's prognoses

The prognosis module scored above chance in all four studies. (These scores were the main hypotheses for series C and D.)

series	trials	hits	expectation	z-score	probability (one-tailed)
A	900	459	450	+0,6	n.s.
B	313	169	152,3	+1,89	0,029
C	500	264	243,2	+1,86	0,031
D	2.000	1.022	973	+2,19	0,014
Total	**3.713**	**1.914**	**1.818,5**	**+3,27**	**0,0006**

Overall precognition results for the subjects were synchronous with the program's prognoses.

The subjects scored collectively below chance synchronously with the program prognoses in all four studies. (There was no hypothesis with respect to these scores.)

series	trials	hits	expectation	z-score	probability (one-tailed)
A	900	446	450	-0,27	n.s.
B	313	152	152,3	-0,03	n.s.
C	500	228	243,2	-1,36	n.s.
D	2.000	942	973	-1,39	n.s.
Total	**3.713**	**1.763**	**1.818,5**	**-1,53**	**n.s.**

The *a-priori* probabilities for a hit were: 1/2 (without Zero) for series A and 18/37 (with Zero) for series B, C, and D.

Discussion

This report covers all roulette experiments ever carried out by the author. All original data and programs have been stored and are available. The experiments at the Technical University Berlin had to be terminated because the research project was closed in 1981. The casino sessions were terminated because the subjects became increasingly bored by the uncomfortable

situation in the casino, which could be regarded as a form of optional stopping.[15] The results were promising enough to perform more research. Two further studies confirmed the previous results. Subjects scored collectively slightly below chance in all four studies performed so far, whereas the program prognosis scored above chance and even significantly above in the last three studies. These results indicate that a reproducible effect had been found. The algorithm implemented in the program was able to detect an influence of the target information on the subject's behavior structures. The program was able to use these detected structures to generate its own predictions, which appeared to be much more effective than the subject's predictions. Under the assumption that the results reported were not caused by chance, which is very improbable, one could interpret the phenomenon observed as a strong indication for an information transfer from the future into the past. Even if this information is not consciously available to the subjects, it can be detected by a computer program.

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15 Optional stopping means the premature termination of an experiment before the number of planned trials has been reached.

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Ausführliche deutsche Zusammenfassung

Ziel der geplanten experimentellen Untersuchungen zur Präkognition war im Rahmen einer umfangreichen Replikationsstudie der Nachweis, dass sich Informationen aus der Zukunft in die Vergangenheit übertragen und in Verhaltensänderungen der Versuchspersonen manifestieren können. Mit Hilfe eines Computerprogramms, das diese Verhaltensänderungen detektieren und bewerten kann, sollten eventuelle präkognitive Informationen verstärkt werden, so dass eine Prognose von – nach heutigem Wissen – stochastischen Prozessen möglich wird.

Der präkognitiv zu erfassende stochastische Prozess wurde von einer radioaktiven Quelle gesteuert. Ein eventueller psychokinetischer Einfluss der Versuchspersonen auf das Präparat sollte durch den Aufbau eines zweiten, synchron arbeitenden, aber völlig getrennten Computersystems gemessen werden, dessen Zufallszahlengenerator ebenfalls vom gleichen Präparat getriggert wurde. Bei einer psychokinetischen Beeinflussung des Präparats könnte sich ein Zusammenhang zwischen den zwei an sich völlig unabhängigen Zufallsfolgen ergeben. Die Versuche liefen folgendermaßen ab:

Ein Computersystem 1 präsentiert (auf dem Monitor) eine grafische Oberfläche in Form eines Roulette-Tisches. Gesetzt werden kann nur Rot oder Schwarz („einfache Chance" = binäre Alternative). Die Versuchsperson trifft ihre Wahl (*response*), indem sie eine Farbe und eine fiktive Geldsumme (Wichtung) setzt. Das System generiert danach eine Zufallszahl, die in Abhängigkeit vom radioaktiven Zerfalls eines Präparates entsteht, der bezüglich des zeitlichen Abstands der ausgesandten und von einem Zählrohr 1 detektierten Teilchen zufällig (und vom Menschen – auf physikalisch bekanntem Weg – nicht zu beeinflussen) ist. Danach vergleicht das System *target* und *response* und gibt der Versuchsperson Feedback in Form eines (fiktiven) Gewinns oder Verlusts.

Während des Versuchs läuft simultan ein Programm, welches die Struktur der *response*-Folge nach acht verschiedenen Mustern auswertet und diese Muster nach ihrem Spielerfolg ordnet. Unter bestimmten Bedingungen, das heißt, nur wenn sich die verschiedenen Muster bezüglich des Spielerfolgs der Versuchsperson genügend stark unterscheiden lassen und eine der acht berechneten Varianten der Strategie der Versuchsperson bezüglich des nächsten *trials* einen besonderen Erfolg verspricht, gibt das Programm selbst eine Prognose ab, die dem aktuellen Satz der Versuchsperson entsprechen oder widersprechen kann. (Um die Versuchsperson nicht zu sehr zu beeinflussen, wird die Prognose des Programms erst jeweils nach dem Satz der Versuchsperson angezeigt.)

Auf einem Computersystem 2 lief parallel und zeitlich synchron ein völlig gleiches Programmsystem, das ebenfalls von Maus und Tastatur des Systems 1 gesteuert wird, jedoch über Zählrohr 2 eigene Zufallszahlen generiert, getriggert von derselben radioaktiven Quelle wie bei System 1. (Da die räumliche Verteilung der vom Präparat ausgestrahlten Teilchen ebenfalls zufällig ist, generiert Zählrohr 2 völlig andere Impulse als Zählrohr 1.) Die Anzeige (grafische Oberfläche) des Computersystems 2 war deaktiviert (Monitor aus).

Es wurden 10.641 Einzelversuche durchgeführt (Präkognition, Trefferwahrscheinlichkeit 18/37). Die Trefferzahl der insgesamt 389 Versuchspersonen (5,158) lag etwas unter dem statistischen Erwartungswert (z=-0,36 n. s.). Dies war *jedoch nicht* als Hypothese gestellt.

Es wurden 2.000 Prognosen des Prognose-Moduls generiert. Die Trefferquote des Prognosemoduls lag entsprechend der Haupthypothese signifikant über dem Erwartungswert (z = 2,19, p = 0,014). Zusammen mit den Ergebnissen der drei früheren Versuchsreihen beträgt die Wahrscheinlichkeit dafür, dass die hohe Trefferquote des Prognose-Moduls insgesamt durch Zufall verursacht wurde jetzt ca. 1/2.000 (z = 2,87). Man kann damit wohl davon ausgehen, dass ein reproduzierbarer Effekt vorliegt.

Simultan zu den Prognosen des Prognose-Moduls erzielten die Versuchspersonen selbst unterdurchschnittlich wenige Treffer (z = - 1,39 n. s.).

Die Zufallsgeneratoren beider Versuchs-Systeme funktionierten einwandfrei. Für eine Korrelation der beiden simultan erzeugten Zufallsfolgen der Systeme 1 und 2 und damit für PK konnten keine Anzeichen festgestellt werden. Das Ergebnis deutet also darauf hin, dass es sich um reine Präkognition handelt und Psychokinese nicht wirksam war.

Da die Versuchsreihe D eine Replikationsstudie war, fällt die große Konsistenz der Daten bei allen vier bisher durchgeführten Versuchsreihen auf:

Das Prognosemodul traf bei allen Versuchsreihen immer mehr, als vom Zufall her erwartet, insgesamt signifikant über dem Erwartungswert. Simultan dazu lag die Trefferquote der Versuchspersonen immer deutlich unter dem Erwartungswert. Die gesamte direkte Trefferquote der Versuchspersonen lag bei allen Versuchen immer etwas unter dem Erwartungswert.

Eine strukturelle Analyse aller vorliegenden Daten ließ erkennen, unter welchen Bedingungen die Abweichungen von der Zufallserwartung entstehen: Das Programm trifft immer dann signifikant über Zufallserwartung, wenn die Programmprognose der Prognose der Versuchsperson widerspricht. Geben Programm und Versuchsperson dieselbe Prognose ab, so ist nur eine leichte Erhöhung der Trefferquote festzustellen. Diese Aufspaltung ist vom Zufall her nicht zu erwarten und stellt einen Effekt dar, der bisher nicht beschrieben wurde.

Bei den Programmprognosen addieren sich die beiden Erhöhungen der Trefferquote. Bei den Prognosen der Versuchspersonen tritt natürlich in den Fällen, wenn die Programmprognose der Prognose der Versuchsperson widerspricht, (parallel zum Ergebnis des Prognoseprogramms) eine signifikant negative Abweichung der Trefferquote von der Zufallserwartung auf, da die Voraussagen von Programm und Versuchsperson bei 2 Alternativen komplementär sind. Geben Programm und Versuchsperson dieselbe Prognose ab, so ist bei beiden die gleiche leichte Erhöhung der Trefferquote festzustellen. Zusammengenommen liegt die Trefferquote der Versuchspersonen synchron zu allen Programmprognosen immer noch ziemlich stark unter der Zufallserwartung. Die Trefferquote der Versuchspersonen bei den Versuchen, wenn das Programm keine Prognosen abgibt, liegt über der Zufallserwartung. Insgesamt ergibt sich damit für die direkten Präkognitionsversuche der Versuchspersonen eine Trefferquote leicht unter der Zufallserwartung.

Ein weiterer Effekt konnte bei der Untersuchung der Zuordnungsmuster der Versuchspersonen bei der Versuchsreihe D festgestellt werden. Insgesamt erzeugten die Versuchspersonen Rate-Folgen mit starken Mustern: Die Häufigkeiten waren nicht gleichverteilt und es traten starke Sequenzen

1. Ordnung auf. Bei den 2.000 Versuchen synchron zu Programmprognosen war die Struktur der Folgen allerdings nahezu zufällig.

Das Prognoseprogramm wählte also eine Untergruppe der Versuche der Versuchspersonen aus, die fast eine Zufallsfolge war.

Beide Effekte, die Auswahl einer Untergruppe aus den Prognosen der Versuchspersonen, in der signifikante Abweichungen vom Erwartungswert auftreten, wenn Programmprognosen und Prognosen der Versuchspersonen unterschiedlich sind sowie die Eigenschaft dieser Untergruppe, eine Zufallsfolge aus einer nicht zufälligen Ratefolge zu sein, sind bemerkenswert. Dabei muss man sich auch vor Augen halten, dass das Prognose-Programm diese Auswahl traf, *bevor der Zufallszahlengenerator überhaupt die nächste Zufallszahl ermittelte*. Weiterhin sind die Programmprognosen völlig unabhängig davon, was die Versuchsperson als nächstes setzen wird.

Um festzustellen, ob der Effekt sich auch dann ergibt, wenn statt der Prognosen der Versuchspersonen Zufallszahlen verwendet werden, wurde die gesamte Versuchsreihe D in Echtzeit simuliert. Dazu wurden noch einmal 2.000 Prognosen geeriert, wozu 446 einzelne Sitzungen notwendig waren. Das Ergebnis war nicht signifikant. Der Effekt konnte hier nicht beobachtet werden. Weiterhin lief ja parallel zu den eigentlichen Versuchen ein zweites, gleiches Computersytem, das mit den gleichen Daten der Versuchsperson gefüttert wurde. Hier wurde nur eine andere Zufallsfolge generiert, über die die Versuchsperson kein Feedback bekam. Dies entspricht einer Situation mit falschem Feedback. Auch hier konnten keine signifikanten Abweichungen von der Zufallserwartung festgestellt werden.

Insgesamt muss festgestellt werden, dass der beschriebenen Effekt von den realen Versuchspersonen und deren Bewusstseinsprozessen im Zusammenhang mit einem richtigen Feedback abhängt. Das Feedback führt zu Verhaltensänderungen bei den Versuchspersonen. (Beim Roulette-Spiel z.B. erhöhen die Versuchspersonen oft den Einsatz auf dieselbe Farbe, wenn sie verloren haben.) Diese Verhaltensänderungen der Versuchspersonen scheinen aber nicht nur von vergangenen, sondern auch von zukünftigen Ereignissen abzuhängen. Anders kann man sich jedenfalls kaum vorstellen, wie es möglich sein sollte, dass das Prognose-Programm aus dem Verhalten der Versuchspersonen während der vergangenen Versuche Rückschlüsse auf ein Zufallsereignis ziehen kann, das in der Zukunft liegt.