OBJECTIVE

The objective of this report is to provide an annotated bibliography of the document set that was generated by the Cognitive Sciences Program under contract to the government from 1972 to date.*

Bibliography

* The document constitutes partial fulfillment of the deliverable under Subtask 1 of the FY95 SETA Task 2545-230.

INTRODUCTION

The Cognitive Sciences Program was initiated by SRI International in 1972 under contract to the Federal government to determine whether anomalous mental phenomena (i.e., extra sensory perception and psychokinesis) existed and the degree to which such phenomena might be applicable to problems of national interest.

Over the years, the terminology has evolved; however, in this document we will use the following definitions:*

- Anomalous Cognition (AC)—the acquisition, by mental means alone, of information that is secured by distance, time, or shielding.
- Anomalous Perturbation (AP)—the influence, by mental means alone, of physically isolated and secured matter.
- Anomalous Mental Phenomena (AMP)—the combination of AC and AP.
- Basic Research—Research that is primarily oriented to understanding the mechanisms of AMP.
- Applied Research—Research that is primarily oriented to increasing the magnitude of the effects.

For the first 13 years of the project at SRI International, there was no research mandate. Any research that was conducted was to examine foreign claims or was conducted on an *ad hoc* basis. To illustrate the point, out of a total budget of $11.3 M spanning 17 years, $5.0 M was identified for research and only $700 K was allocated during the first 13-years. The majority of the research funding ($4.3 M) was allocated under a single contract that began in FY 1986 and lasted through 1989. The temporal distribution of the documents in this annotated bibliography reflect this temporal distribution of resources.

Rather than simply list the documents chronologically, they are presented in the context of the overall view of applied and basic research. In addition, the emphasis is on anomalous cognition, however, anomalous perturbation and search are presented in their own sections.

Infrastructure for Research

An outline for basic and applied research is shown in Figure 1. Regardless of the ultimate use of anomalous cognition, success intimately depends on the skill of the receiver. This applied research problem is indicated as Receiver Selection and T raining. In other words, how do we identify individuals who possess a native AC skill, and is it possible to increase that skill by training?

* Please see the Glossary at the end of this document for a complete definition of terms that may be found in the document set.

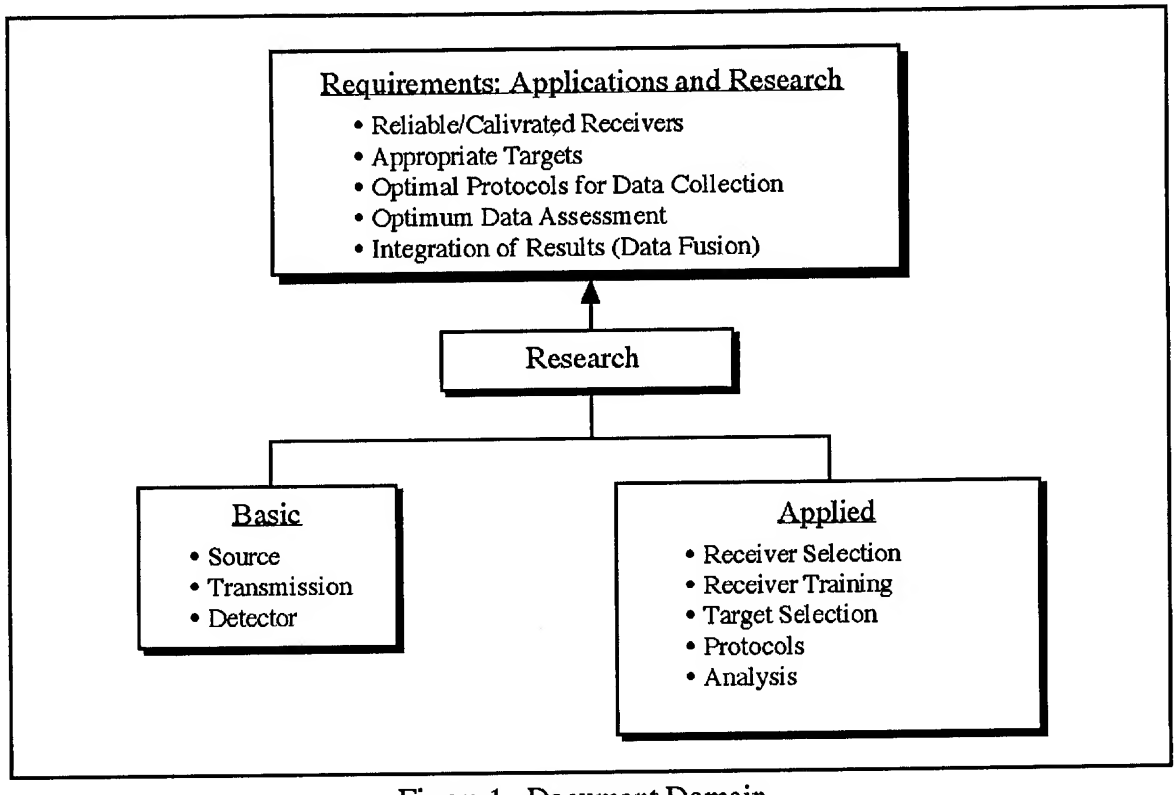

Figure 1. Document Domain

It follows naturally from these questions to address what are the ideal target systems for laboratory investigations and for potential applications. Figure 1 also shows that "what are the ideal protocols to illicit the best possible functioning" is an appropriate topic under applied research. Determining the level of AC functioning requires a sensitive analytical technique.

Basic research as illustrated in Figure 1, demonstrates our use of an engineering communication metaphor. That is, like other human sensory systems, we posit that there is a source of energy/information, a propagation mechanism, and a detector system (i.e. the human). The minimum this allows is to assign all the current research problems into one of these three categories. For example, much of the field focuses upon the psychology of the receiver. Under the engineering metaphor, psychological effects can be considered as affecting "detector efficiency." Recognizing these categories has allowed us to design experiments that more easily separate physical properties from psychological ones and has allowed us to test their relative contribution.

Caveats

For each category in Figure 1, we provide a definition of the major problem and what we have learned from the research that was associated with it. Neither of these descriptions are meant to be definitive; rather, they should be considered as providing a context for the documents in this annotated bibliography and as a guide to reading the associated reports. An attempt was made to include all technically relevant documents. All documents from the sponsor's tasking that are not discussed below, were deemed not critical for the project review. The documents that were marked "destroyed" or were classified will be accounted for at a later date in our McLean offices.

There appeared to be a few errors in the original bibliography. For e xample, a few titles were incorrect and some author orders was wrong, but they have been corrected in this document. In a few cases, documents were replaced with later versions, and those instances are marked within the body of this report. Documents marked as [***] were not present in the original bibliography, but are important enough to included here.

All documents annotated in this report are now on file with the sponsor.

ANNOTATED BIBLIOGRAPHY

Applied Research

We begin with the documents that are a product of our applied research, because they represent the vast majority. Please refer to Figure 1 for a graphical representation of the applied topics

Receiver Selection

Research and applications need high-quality receivers. The problem is to identify them within the general population or within specific special populations. Three approaches have been used:

(1) Medical profiles

(2) Psychological and/or personality profiles.

146. Humphrey, B. S., Saunders, D. R., Lantz, N. D. (1986). Screening and Selec tion of Personnel: The Personality Assessment System (PAS). [Replacement Document]

This report describes the Personality system in detail and its ability as a predictor of good performing receivers. The report also includes and application of the Myers-Brigs Type Indicator self report instrument.

203. Lantz, N. D., Kiernan, R. J. (1986). Neuropsychological Assessment of Participants in Psychoenergetic Tasks.

Dr. Kiernan is a clinical Neuropsychiatrist. He used clinical testing techniques to examine primarily frontal lobe contribution to successful receivers. In addition, Dr. Kiernan provides a commentary on the PAS.

*** May, E. C., Luke, W. L. W., and James, C. L. (1994). Phenomenological Research and Analysis. Final Report. Science Applications International Corporation, Menlo Park, CA. 13-16.

This is the final technical report for 1994. The Q-sort is an empirically derived instrument to examine personalities that have been used successfully for 30 years. This provides a status report on the Q-sort's ability to screen for receivers.

(3) Correlations with other phenomena.

(4) Behavioral profiles.

Conclusion

Identifying talented receivers remains problematical. Although the numbers are small, the medical profiles of receivers are essentially normal without any discernible spread among them. Some of the psychological/personality measures produce significant results, but it appears that these correlations are likely to be artifacts of the collection methodology. The

cognition ability appears to be static within a given receiver and, like other human activities, there is considerable variability across receivers.

Target Selection

Analogous to other sensory systems, perhaps AC is more acute on some targets than others. In an application setting, is it a good policy to accept all possible tasking, or are there certain tasks that should not be attempted? In the laboratory, proper target selection may improve the level of AC functioning, and in applications it may improve the efficiency of resource allocation.

243. May, E. C. and Trask, V. V. (1989). Forced-Choice Viewing. Final Report, Project 1291. SRI International, Menlo Park, CA.

Guessing binary target is one of the most difficult AC tasks. This report describes a cross-country, 50 trial experiment that was monitored by two government representatives. A 76% hitting rate was achieved.

*** May, E. C., Spottiswoode, S. J. S., and James, C. L. (1994). Shannon Entropy as an Intrinsic Target Property: Toward a Reductionist Model. In May, E. C., Luke, W. L. W., and James, C. L. (1994). Phenomenological Research and Analysis. Final Report. Science Applications International Corporation, Menlo Park, CA.

A reviewed and edited version of this paper has been accepted for publication in the *Journal of Parapsychology*. It is suggested that the gradient of Shannon's entropy may be an intrinsic target property and that the quality of AC may proportional to it.

*** May, E. C., Spottiswoode, S. J. P. and James, C. L. (1994). Managing the Target-pool Bandwidth: Possible Noise Reduction for Anomalous Cognition Experiments. *The Journal of Parapsychology,* Vol. 58, 303-313.

This published paper describes what was learned about target selection from the experiments conducted in 1992 and 1993. That is, a compromise between forced-choice guessing, where the receiver knows all possibilities, and open-ended material, where the targets are completely unrestricted on content, can reduce response noise.

Conclusions

It has been known for some time that the results from targets that are symbols, such as simple geometric figures or alphabet letters, are an order of magnitude smaller than they are when the targets are photographs or video clips which are relatively unrestricted with regard to content. We have found, however, that the "noise" (i.e., incorrect elements in responses) increases as the number of potential differentiable cognitive elements increase in the target pool.

Resent results suggest that the quality of AC is statistically proportional to the gradient of Shannon's entropy for photographs or video targets. We hypothesize that this result would extend to gradients of thermodynamic entropy for physical targets because of the relationship between Shannon and thermodynamic entropy and because of a number of results in the application data set. That is, accelerators, directed energy systems and explosions appear to be easily-sensed.

Protocols

What is the optimum methodology to collect AC data? That is, what is the "set and setting for sessions?" How long and how often should sessions be, and what is the best way to indicate the target? What psychological state is best for the receiver? How should we guard against the inadvertent leakage of non-AC information into responses or protect against fraud? In the laboratory, we require strict adherence to the standards of behavioral science such a double blinds throughout. Yet with applications in which it is critical to obtain an answer, what is the degree to which "front loading" helps and how should this non-AC information be tracked in the output. Analysis of data and controls are also protocol issues, but we consider them as a separate item under the analysis section, below.

84. May, E. C. and Hecker, M. H. L. (1982). Audiolinguistic Correlations with the Quality of Remote Viewing Sessions. Final Report, Project 3279-5, SRI International, Menlo Park, CA.

    To date, there appears to be no *a priori* indicator of remote viewing quality. Dr. Hecker is a specialist in audio analysis, and he applied his techniques to a series of trials with one receiver. Linguistic style of this receiver predicted performance to a statistically significant degree.

230. Lantz, N. D. (1989). The Effects of Hypnosis on Remote Viewing Quality. Final Report, Project 1291. SRI International, Menlo Park, CA.

    We used various methodological approaches to hypnosis to improve the quality of remote viewing. Dr. Lantz, a clinical psychologist, gives probable explanations for why the technique is not useful.

*** Lantz, N. D., Luke, W. L. W. and May, E. C. (1994). Target and sender dependencies in the Anomalous Cognition Experiments. *The Journal of Parapsychology,* Vol. 58. 285-302.

    The published paper describes the primary AC experiment that was conducted in 1992 and 1993. Significant AC was observed. The report concludes that a sender is not a required element in a successful AC protocol.

Conclusions

Although we have not studied all protocol issues systematically, we have evolved to an operating environment that is productive. As guidelines, we believe that for receivers two AC sessions per day lasting no more than an hour each is near the upper limit. For short periods of time this pace may be maintained about every other day. Altered states of consciousness such as dreaming or hypnosis appear not to increases AC-quality.

Analysis

How to determine, in a statistically valid way, whether an information-transfer anomaly (i.e., AC or RV) exists is the basis of the analysis problem. Although simply put, the analysis of AC data in the laboratory is a complex issue. For example, what constitutes a control depends upon the question under study. After seeing an example of AC that has high visual correspondence with the intended ta rget, the natural question is, "What is the probability that the receiver would respond that way given there were no target?" While

compelling, that question is impossible to answer in any specific instance and can only be addressed on the average. In laboratory studies, we ask a different question, "Given a response, what is the probability that it matches the intended target?" This can be answered with statistical rigor because the random element, which is necessary in a statistical analysis of this type, is the initial target choice rather than the response, which cannot be assumed to be random.

In the application environment, the analysis problem is compounded in that often the details of the intended target are not known. For example, how should the analysis proceed when the target is the whereabouts of a crashed commercial jet liner?

120. May, E. C. (1983). A Remote Viewing evaluation Protocol. Final Report (Revised). SRI International, Menlo Park, CA.

    The analysis technique described here is a pre cursor to the application of fuzzy sets. A score is computed from relevance weighting factors of target and response "concepts" and a judge's blind assessment.

162. May, E. C., Humphrey, B. S., and Matthews, C. (1985). A Figure of Merit Analysis for Free-Response Material," Proceedings of Presented Papers, The Parapsychological Association 28th Annual Convention, Tufts, University, Medford, MA. 335-372.

    The figure-of-merit technique is commonly used within the program at SRI. The technique is defined for crisp sets in this paper. Later, the definition of figure of merit was extended to include fuzzy sets.

178. Humphrey, B. S. (1986). Remote Viewing Evaluation Techniques. Final Report A-4, Project 1291. SRI International, Menlo Park, Ca.

    Ms. Humphrey describes crisp and fuzzy sets and how they have or can be applied to the analysis of remote viewing.

227. May, E. C. and Humphrey, B. S. (1988). Applications of Fuzzy Sets to Remote Viewing Analysis. Final Report, Objective F, Task 1, Project 1291. SRI International, Menlo Park, CA.

    This is published in the peer-reviewed technical journal (*Journal of Parapsychology*, Vol. 54, September 1990, 193-228—included in the document set). Fuzzy set concepts are applied to visual correspondence between targets and responses in remote viewing experiments.

260. Luke, W. L. W., Frivold, T. J., May, E. C., and Trask, V. V. (1989). A Prototype Analysis System for Special Remote Viewing Tasks. Final Report, Task 6.0.3, Project 1291. SRI International, Menlo Park, CA.

    The fuzzy set analysis is extended by incorporating an adaptive learning technique. A receiver-dependent historical response set might be an *a priori* predictor of remote viewing performance.

*** Spottiswoode, S. J. S. (1987). Investigating the Semantics of Remote Perception with Similarity Estimates and Multidimensional Scaling. Final Report to the Cognitive Sciences Program, SRI International.

Mr. Spottiswoode applies multidimensional scaling to remote viewing analysis. In photographic targets, he found weak evidence for the existence of underlying semantic dimensions of predominately man-made scenes versus predominately natural scenes and the presence versus the absence of land-water interfaces.

Conclusions

The analysis of choice for laboratory experiments is the rank-order method. In this technique, a target pack, from which the target will be randomly selected, is constructed prior to the experiment. Usually great care is exercised to include targets within a pack to be as different from one another as possible and that the random number generator meets all accepted criteria for being random. For a single response, an independent analyst who is blind to the experimental details, rank orders the targets within a pack from the one that best matches the given response, second best, and so one through the pack. Under the null hypothesis, the average rank after many such trials should be (N+1)/2, where *N* is the number of targets in the pack. Typically N=5 in our studies so the expected average rank is 3. Our best receivers generally produce average ranks of approximately 2.

We have also explored a variety of other methods including concept analysis—reducing a response to conceptual elements, rating scales, and an elaborate application of fuzzy set procedures.

In the application environment, we have developed a variety of approaches that rely upon historical responses to similar situations or invoke pre- and post-session calibrations where the target material is completely known. One method has incorporated an adaptive fuzzy set approach; however, these methods have not yet been tested in the field.

Basic Research

Research that is primarily directed to understanding the mechanisms of AC is called basic. In this section we follow the engineering metaphor as illustrated in Figure 1.

Source

What is the source of the energy/information that is available to AC-receivers? Some in the parapsychological research community believe we are dealing with non-physical parameters and that traditional science must be signif icantly modified to account for AC phenomena. Our approach is more conservative. We assume that AC will eventually be explained by the known laws of nature, or perhaps small modifications to them. There is no known transfer of information without a concomitant transfer of energy. Our research assumes that is must be true for AC as well.

*** May, E. C., Spottiswoode, S. J. S., and James, C. L. (1984). Shannon Entropy as an Intrinsic Target Property: Toward a Reductionist Model. In May, E. C., Luke, W. L. W., and James, C. L. (1994). Phenomenological Research and Analysis. Final Report. Science Applications International Corporation, Menlo Park, CA. [Note: This document is also listed under Target Selection above. The concept applies to both areas of the research infrastructure.]

A reviewed and edited version of this paper has been accepted for publication in the Journal of Parapsychology. It is suggested that the gradient of Shannon's entropy may be an intrinsic target property and that the quality of AC may proportional to it.

Conclusions

Out latest results suggest that the gradient of Shannon's entropy is, or is related to, the source for AC. Considerably more research is required to validate this finding, but to our knowledge, this is the first physical variable that is exclusively related to the target that produces reliable correlations with the quality of AC.

Transmission

How does the information propagate from the source to the receiver? What is the carrier for the information? Since there is compelling evidence for precognition (i.e., a statistical leakage of information from the future), the transmission is required to be a 4-space mechanism.

207a. May, E. C. and Lantz, N. D. (1987). Feedback and Precognition Dependent Remote Viewing Experiments. Final Report-Objective F, Tasks 1a and 1b. Project 1291. SRI International, Menlo Park, CA.

An experiment to contrast real-time versus precognitive remote viewing is presented in addition to a feedback experiment using a tachistoscope. The first ex periment did not yield significant evidence for remote viewing, but the second one showed strong evidence.

207b. May, E. C., Lantz, N. D. and Piantineda, T. (1994). Feedback Considerations in Anomalous Cognition Experiments. *Journal of Parapsychology.*

The second experiment has been accepted for publication in the peer-reviewed technical journal, *Journal of Parapsychology.* [This version has been included in the document set as a replacement for 192.]

Conclusions

Very little has been explored in this domain; thus, it is premature to comment other than to say that special 4-dimensional geometries have been examined in hopes to reduce the 4-space distance from source to detector to zero.

Detector

What are the physiological mechanisms for the detection of AC information? We generally have proposed that AC is detected by an additional sensorial system. We expect to find neurological structures that behave similarly to the known ones for other senses (e.g., receptor neurons that are sigmoidal in their response, etc.).

13. Targ, R. May, E. C. and Puthoff, H. E., Galin, D. and Ornstein, R. (1976). Sensing of Remote EM Sources (Psychological Correlates). Final Report, Project 4540. SRI International, Menlo Park, CA.

This report describes in detail three experiments with a single receiver that demonstrate that the central nervous system (i.e., the brain) responds to sensorially isolated stimuli. This was a joint effort between SRI International and the Langly Porter Neuropsychiatric Institute, San Francisco, CA.

13a. May, E. C., Targ, E., and Puthoff, H. E. (1977). Possible EEG Correlates to Remote Stimuli Under Conditions of Sensory Shielding. Proceeding of Electro/77 Special Session (IEEE): The State of the Art in Psychic Research. New York, NY.

May et. al present their analysis of the SRI/Langly Porter experiments. They acknowledge that there appears to be significant changes of alpha production concomitant with remote stimuli; however, they advise caution in that the sign of the changes are not consistent and the effects occurs under different EEG leads.

229. May, E. C., Luke, W. L. W., and Frivold, T. J. (1988). Neurophysiological Correlates to Remote Viewing. Final Report--Objective D, Task 1, Project 1291. SRI International, Menlo Park, CA.

This is the first of a series of experiments to search for central nervous system neuromagnetic response to isolated stimuli. The first of two protocols was based on a Hungarian experiment involving classical conditioning. The second was more like a replication of SRI's 1977 EEG studies—13a, above.

266. May, E. C. Luke, W. L. W., Trask, V. V. and Frivold. T. J. (1990). Observation of Neuromagnetic Fields in Response to Remote Stimuli. The Proceedings of the Presented Papers of the Parapsychological Association 33rd Annual Convention, National 4-H Center, Chevy Chase, MD.

This represents the best description of the magnetoencephalograph studies. It claims that an alpha rhythm phase shift occurs from a remote and isolated stimulus.

*** May, E. C. and Luke, W. L. W (1992). Phenomenological Research and Analysis. Final Report. Science Applications International Corporation, Menlo Park, CA

This is the final technical report for 1992. After a careful attempt at replicating the magnetoencephalograph results, it was discovered that a subtle design error accounted for the earlier results. The technical flaw involved measuring instantaneous phase in a noisy environment during too short a time interval.

*** May, E. C.. Luke, W. L. W, and James, C. L. (1994). Phenomenological Research and Analysis. Final Report. Science Applications International Corporation, Menlo Park, CA

Capitalizing upon all the earlier central nervous system studies, SAIC initiated an EEG experiment to search for an event-related desynchronization to isolated stimuli. While there was significant evidence for AC, the preliminary analysis on one of 4 leads does not appear to demonstrate a central nervous system response.

Conclusions

During the 1972-1976 period, we found significant alpha blocking in a fe w receivers that was concomitant with an isolated visual stimulus. Although the experiments were conducted carefully, the results were weak and the number of receivers was small. This line of investigation was abandon until 1987 at which time a multi-year effort was initiated using magnetoencephalography to measure central nervous system (CNS) magnetic responses to isolated visual stimuli. Early results were especially encouraging, but later replications revealed a subtle statistical artifact that accounted for the earlier results.

Each replication attempt yields suggestions for the next experiment. Our most recent study posited that since external stimuli, cognitive thought, or conscious attempts at moving a

body part all interrupt alpha rhythm (i.e., called event-related desychronization—ERD), that it is reasonable to assume that AC stimuli will also invoke an ERD. In 1993-4, we conducted a series of experiments that used matched filters that were derived from direct stimuli to search for ERDs in the C NS record resulting from AC stimuli. The analysis is not yet complete but the preliminary results do not show occipital ERDs, but we have been able to suggest a lower limit for occipital ERDs. We collected EEG data at other scalp locations but that data has yet to be analyzed.

Remote Perturbation

Large Scale

Is it possible to affect physical/biological objects, by mental means alone, in such a way that statistical analysis is not required to observe the effects? Examples include stopping the hearts of animals, levitation by Saints in India, and materialization and dematerialization of objects.

59. Hubbard, G. S. and May, E. C. (1981). Macro-Remote Action: A Survey and Evaluation. Final Report, Project 3279-3, SRI International, Menlo Park, CA.

    Hubbard and May provide a list of parameters that must be true based on a survey of all large-scale remote perturbation effects they could find in the English language literature to date. They conclude that it is highly likely that these reported effects are not examples of anomalous mental phenomena.

*** May, E. C. and Vilenskaya, L. (1994). Overview of Current Parapsychology Research in the Former Soviet Union. *Subtle Energies*, Vol. 3., No. 3, 45-67.

*** Vilenskaya, L. and May, E. C. (1995). Anomalous Mental Phenomena Research in Russia and the Former Soviet Union: A Follow Up. *Subtle Energies*, Vol. 4. No. 3, 231-250.

    These two published papers describe what the authors found during three trips to various laboratories in Russia. Some of the experiments, esp ecially the ones on the central nervous system and on the behavior of laboratory animals are particularly interesting and well constructed.

200. Hubbard, G. S. and Issacs, J. D. (1986). An Experiment to Examine the Possible Existence of Remote Action Effects in Piezoelectric Strain Gauges. Final Report—Objective E, Task 8, Project 1291. SRI International, Menlo Park, CA.

    A design, protocol, and construction details for an attempt to replicate earlier findings is presented. It was claimed that individuals can inelastically deform piezoelectric strain gauges. Positive results were obtain in a pilot study.

224. Hubbard, G. S., Bentley, P. P., Pasturel, P. K. and Isaacs, J. D. (1987). A Remote Action Experiment with a Piezoelectric Transducer. Final Report—Objective H, Tasks 3 and 3a. Project 1291, SRI International, Menlo Park, CA.

    This is a definitive formal study that displays the extensive number of things that can mimic remote action. It is a clear demonstration of the level of effort that is necessary to properly conduct such experiments. In the final analysis, no effects were seen that could be called examples of large scale remote action.

217. May, E. C. Spottiswoode, S. J. P., Piantanida, T. and Walker E. H. (1987). A Quantum Measurement Experiment with a Single Photon Interferometer. SRI International, Menlo Park, CA.

248. Walker, E. H., May, E. C., Spottiswoode, S. J. P. and Piantanida, T. (1988). Testing Schrödinger's Paradox with a Michelson Interferometer. *Physica B*, Vol. 151, 339-348. [Replacement for the original 248.]

This experiment demonstrates that consciousness is not a necessary condition for the collapse of the quantum mechanical state vector—the claim which sometimes appears in the physics and parapsychological literature.

Conclusions

Based on these studies and on the knowledge of the vast number of ways to mimic large-scale remote perturbations, the claim for such effects on mechanical systems cannot be validated. Because of some of the recent work in Russia, the case for these effects on biological target systems is still open.

Statistical

Beginning with so-called PK experiments with dice in the 1930-50s it has been claimed in the literature that small statistical effects can result from the mental intention of subjects. In 1969, Dr. Helmut Schmidt used modern technology to address this question when radioactive or electronic noise devices were used as target systems. There is a vast literature now that suggest such effects are possible on a variety of target systems; however, the effects are all small and can only be observed after sophisticated statistical analyses.

42. May, E. C., Humphrey, B. S., and Hubbard, G. S. (1980). Electronic System Perturbation Techniques. Final Report, Project 8585. SRI International, Menlo Park, CA.

44. May, E. C. and Hubbard, G. S. (1980). Phase I: Hardware Construction and System Evaluation. Quarterly Reports 1&2, Project 8585. SRI International, Menlo Park, CA. [Note: 46 was a repeat of this report in error.]

47. May, E. C., Humphrey, B. S., and Hubbard, G. S. (1980). Phase II Test Plan. Quarterly Report 3, Project 8585. SRI International, Menlo Park, CA.

*** May, E. C. (1983). Psychokinesis Research at SRI. In *Proceedings: Symposium on Applications of Anomalous Phenomena.* November 30-December 1. Leesburgh, VA.

This conference proceedings version is an excellent summary of the SRI study of anomalous perturbation on a true random number generators. The study is characterized by state-of-the art engineering controls and methodology. The authors report significant effects that are consistent with other such experiments.

*** May, E. C., Utts, J. M. and Spottiswoode, S. J. P. (1995). Decision Augmentation Theory: Toward a Model of Anomalous Mental Phenomena. Accepted for publication in the Journal of Parapsychology.

*** May, E. C., Spottiswoode, S. J. P., and Utts, J. M. (1995). Applications of Decision Augmentation Theory. Accepted for publication in the Journal of Parapsychology.

These two papers represent a formal presentation of Decision Aug mentation Theory (DAT). DAT holds that statistical anomalous perturbation can be considered a form of anomalous cognition. That is, subjects in these experiments are "statistical opportunist" by initiating a trial to capture a locally deviant subset from an unperturbed parent population. In the second paper, the authors apply DAT to a variety of published data sets and find strong support for informational versus force-like mechanisms. These papers should be considered instead of documents 165 and 219.

169. Humphrey, B. S. and May, E. C. (1985). Bacterial Mutation Study. Final Report, Project 7408-10, SRI International, Menlo Park, CA.

In a triple-blind experiment, the authors asked subjects to attempt to modify the mutation rate of *Salmonella typhimurium.* They observed significant effects; however, the results were more consistent with an informational process than with a force-like mechanism.

188. May, E. C., Humphrey, B. S., and Pleass, C. M. (1986). Measuring Remote Action Influence on the Vertical Component of *dunaliella* Velocity. Interim Report—Objective E, Task 9, Project 1291. SRI International, Menlo Park CA.

218. May, E. C. and Pleass, C. M. (1987). A Remote Action Investigation with Marine Animals. Final Report—Objective E, Task 1, Project 1291, SRI Intentional, Menlo Park, CA.

These two documents describe an unsuccessful attempt to observe mental influence of living motile plant cells. The velocity was measured by Doppler lasers effects.

199a. Hubbard, G. S. and Braud, W. G. (1986). An Experiment to Test Apparent Remote Action (RA) Effects on Electrodermal Activity. Final Report—Objective E, Task 6, Project 1291. SRI International, Menlo Park, CA.

199b. Braud, W. G. and Schlitz, M. J. (1989). Possible Role of Intuitive Data Sorting in Electrodermal Biological Psychokinesis (Bio-PK). *The Journal of the American Society for Psychical Research.* Vol. 83, No. 4, 289-302.

These two reports describe experiments where humans were the target systems. The intent was to ask an isolated and remote agent to attempt to calm or arouse the target person. The state of arousal was monitored by measuring the electrodermal skin behavior. The authors report significant effects.

225a. Hubbard, G. S., Utts, J. M., and Braud, W. G. (1987). Experimental Protocol for Hemolysis: Confirmation Experiment. SRI International, Menlo Park, CA.

225b. Braud, W. G. (1990). Distant Mental Influence of Rate of Hemolysis of Human Red Blood Cells. *The Journal of the American Society for Psychical Research* . Vol. 84, No. 1, 1-24.

Braud observes significant effects when individuals were asked to modify the rate at which blood cells were being destroyed in a saline solution. In a later analysis May et al. show that anomalous perturbation better describes the data than does anomalous cognition—a situation which is not true for most other forms of statistical anomalous perturbation.

There is no correlation between quality of the study and study result, yet study quality significantly correlates with year of publication (i.e., methodology improves over time).

(2) Radin, D. I. and Nelson, R. D. (1989). Evidence for Consciousness-Related Anomalies in Random Physical Systems. *Foundations of Physics* , Vol. 19, No 12, 1499-1415. Radin and Nelson analyzed the complete literature of over 800 studies of consciousness-related anomalies in random physical systems. They found a combined effect of 9.8 σ with an single trial effect size of 0.0003. The found no correlation of study outcome with study quality as determined by a 16-point quality measure, and a sophisticated analyses showed that the estimated file drawer studies cannot reduce the result to non-significance.

(3) Bem, D. J. and Honorton, C. (1994). Does Psi Exist? Replicable Evidence for an Anomalous Process of Information Transfer. *Psychological Bulletin* , Vol. 115, No. 1, 4-18. Bem and Honorton analyzed the compete Ganzfeld literature and included 329 studies in their primary analysis. They found an overall effect of 2.89 σ leading to a trial effect size of 0.159±0.005. Their flaw and file drawer analysis was unable to reduce the result to non-significance.

(4) Radin, D. I. and Ferrari, D. C. (1991). Effects of Consciousness on the Fall of Dice: A Meta-Analysis. *Journal of Scientific Exploration,* Vol. 5, No. 1, 61-84. The authors examined the published data from 1935 to 1987 and found 148 studies from 52 different investigators, involving more than 2 million dice throws by 2,569 subjects. Their careful analysis of a balanced, homogeneous subset of 59 studies showed an overall effect 3.19σ for a single trial effect size of 0.0032±0.0012. As in the other meta-analysis, neither study quality or file drawer studies can reduce the result to non-significance.

Taken together, these analyses provide compelling evidence for a statistical anomaly. Or as Professor Lee Ross (Department of Psychology, Stanford University), who has been a leading critic of anomalous mental phenomena research, remarked in a seminar, "We must reject the null hypothesis."

Search

In general, Search-AC is the reverse process of standard anomalous cognition. Rather than specifying a target location and seeking a description, Search specifies the description and seeks the location. For example, suppose an aircraft is lost at sea. A forward-direction AC task would be to describe the details of the aircraft, perhaps the pilot as well. If accurate data were obtained in this way, it would not help in locating the pilot.* The Search approach to this example is to provide a photograph of the pilot and a description of the aircraft and ask, "Where is this material currently located?"

* By using a form of AC-triangulation, it might be possible to locate something relative to land marks. There are a few cases such as this in the Program Office.

60. May, E. C. and Puthoff, H. E. (1981). Feasibility Study on the Use of RV Detection Techniques to Determine Location of Targets. SRI International, Menlo Park, CA.

    This report describe the use of a sequential sampling to solve the 1-in-N problem. That is, given that a target is actually located in one of N possible locations, how may the correct location be specified? A sample data set from the published literature was used to demonstrate a 12 out of 12 hit rate in a 1-of-10 example.

174. Lantz, N. D. and May, E. C. (1986). Location of Target Material in Space and Time. Interim Report—Objective E, Task 2, Project 1291. SRI International, Menlo Park, CA.

    Using a hidden computer-generated 20×20 grid, the authors show that 8 of 27 participants were able to locate a hidden target square to a significant degree.

Conclusions

With computer-generated laboratory tasks and statistical averaging techniques, it appears possible to locate hidden targets. This result could be generalized to real-world problems by assigning each computer square to a real-world location. In a potential application, if by using computer-assisted search techniques, expended resources could be reduced by a few percent, the technique would contribute significantly. Generally speaking, however, what has been called dowsing in the literature is difficult to confirm in the laboratory. Although there are examples in the program office of spectacular hits with Search, the rate is generally lower than it is for forward direction AC. Information models suggests that this may be so because of a channel bandwidth limitation.

Replication of Foreign Experiments

Often spectacular claims are made in the foreign literature with regard to anomalous mental phenomena. These experiments are designed to provide a conceptual replication to determine the degree to which the claims can be supported.

173. Hubbard, G. S. and May, E. C. (1986). An Experiment to Explore Possible Anomalistic Behavior of a Phonon Detection System During a Remote Viewing Test. Interim Report—Objective E, Task 1, Project 1291. SRI International, Menlo Park, CA. [Note: This report was inadvertently entered twice on the Bibliography as 185.]

208. Hubbard, G. S., May, E. C., and Frivold, T. J. (1987). Possible Photon Production During A Remote Viewing Task: A Replication Experiment. Final Report—Objective E, Task 1, Project 1291. SRI International, Menlo Park, CA.

    These documents report on a replication attempt of a claim found in the People's Republic of China's journal *Nature*. The claim was the light is generated concomitantly with successful remote viewing. The study showed significant evidence for remote viewing, but no evidence of generated photons.

*** May, E. C. and Luke, W. L. W. (1993). Phenomenological Research and Analysis. Final Report. Science Applications International Corporation, Menlo Park, CA.

    Using sequential sampling as an aid to the binary search problem (i.e., one of two possible targets) is described as part of this final report. One experienced receiver produced significant results; however, the process was extremely inefficient, and in addition, the novice receivers did not produce significant results.

229. May, E. C., Luke, W. L. W., and Frivold, T. J. (1988). Neurophysiological Correlates to Remote Viewing. Final Report--Objective D, Task 1, Project 1291. SRI International, Menlo Park, CA. [Note: This document also appears under Detector above.]

This is the first of a series of experiments to search for central nervous system neuromagnetic response to isolated stimuli. The first of two protocols was based on a Hungarian experiment involving classical conditioning. The second was more like a replication of SRI's 1977 EEG studies—13a, above.

Scientific Oversight Committee Protocols and Other Reviews

Beginning in FY 1986, the Cognitive Sciences Program has enlisted the aid of a Scientific Oversight Committee. They perform three functions: (1) Review all formal protocols prior to their implementation. No experimentation could begin without the SOC's approving these protocols. (2) Exercise unannounced "drop-in" privileges to observe experiments in progress. (3) Review the final reports as they would if they were reviewing technical articles for publication. All comments were appen ded to the final report to the sponsors. The SOC was to assure the sponsor that the highest possible scientific experimentation was being conducted.

7. Puthoff, H. E., Targ, R. and May, E. C. (1978). Psychoenergetic Research: Suggested Approaches. SRI International, Menlo Park, CA.

This presentation pre-dates the SOC, but it does contain an overview of what was known and unknown about anomalous mental phenomena at the time.

19. Puthoff, H. E., Targ, R. and May, E. C. (1979). Experimental Psi Research: Implications for Physics. Presented at the 145th National Meeting of the American Association for the Advancement of Science. Houston, TX. [Note: This document covers the information in #20. Document #21 was an error in the Bibliography.]

This presentation to the AAAS provides a state-of-the-moment assessment of the physics implications of the anomalous mental phenomena research at SRI International. Included is a description of a remote viewing experiment conducted under 170 m of sea water and an experim ent that shows that small, film-can sized objects and 1 mm micro-dot targets do no inhibit the acquisition of AC data.

189. May, E. C. (1986). Enhancing Human Performance Investigations. Final Technical Report, Project 1291. SRI International, Menlo Park, CA

Although this document summarizes many of the ones presented elsewhere in the Bibliography, it contains the unedited comments of the SOC for the research conducted in 1986.

205. May, E. C. (1987). Enhancing Human Performance Investigations. Final Tec hnical Report, Project 1291. SRI International, Menlo Park, CA

Although this document summarizes many of the ones presented elsewhere in the Bibliography, it contains the unedited comments of the SOC for the research conducted in 1987.

232. May, E. C. (1988). Enhancing Human Performance Investigations. Final Technical Report, Project 1291. SRI International, Menlo Park, CA

Although this document summarizes many of the ones presented elsewhere in the Bibliography, it contains the unedited comments of the SOC for the research

conducted in 1988.

197a. May, E. C. and Lantz, N. D. (1991). Target and Sender Dependencies in Anomalous Cognition. Presented to the Scientific Oversight Committee. Science Applications International Corporation, Menlo Park, CA. [Note: This replaces the original #197.]

There are numerous protocol plans for the SOC. This 1991 experiment is a quintessential example of the detail that was required.

197b. Cognitive Sciences Staff (1991). Protocols for the Use of Human Subjects. Approved by the Institutional Review Board. Science Applications International Corporation, Menlo Park, CA.

Beginning in FY 1986, we were required to obtain Human-Use approval in accordance with HHS guidelines. This document is just one example of the type of description and release forms that are required by federal regulations.

Conclusions

Since 1985, the research has enjoyed significant scientific oversight and guidance. As a result, the research quality has improved. The membership of the SOC was selected, in part, for their open-minded skepticism about the phenomena. To date, while many of them believe we have made a substantial case for the existence of an information transfer anomaly, this opinion is not unanimous. The membership is in complete agreement, however, that the research, both basic and applied, is conducted in accordance with the strict standards set by the scientific community.

GLOSSARY

Not all the terms defined below are germane to this report, but they are included here for completeness. In a typical anomalous mental phenomena (AMP) task, we define:

- Anomalous Cognition (AC)—A form of information transfer in which all know sensorial stimuli are absent. That is some individuals are able to gain access to information by an as yet unknown process. This is also known as Remote Viewing (RV) and Clairvoyance.
- Agent—An individual who attempts to influence a target system by mental means alone.
- Analyst—An individual who provides a quantitative measure of AC. This individual usually is blind to experimental conditions and the intended target.
- Anomalous Perturbation (AP)—A form of interaction with matter in which all known physical mechanisms are absent. That is, some individuals are able to influence matter by an as yet unknown process. This is also known as Psychokinesis (PK).
- Beacon—An individual who, while receiving direct sensorial stimuli from an intended target, acts as a focus of attention for the receiver in AC experiments.
- Compute Assisted Search (CAS)—The use of computer-generated options which are linked to real-world objects in a Search task.
- Feedback—After a response has been secured, information about he intended target is displayed to the receiver or agent.
- Monitor—An individual who monitors and AMP session to facilitate data collection.
- Noise—Incorrect elements in an AC response.
- Protocol—A template for conducting a structured data collection session.
- Receiver—An individual who attempts to perceive by AC and report information about a sensorially isolated target. A Receiver is also known as a Subject or Percipient.
- Response—Material that is produced during an AC session.
- Search—The inverse of AC. That is, given a known target, determine its location. This is also known as Dowsing.
- Sender—An individual who, while receiving direct sensorial stimuli from an intended target, acts as a putative transmitter of that information to the receiver in AC experiments.
- Session—A time interval during which AMP data are collected.
- Specialty—A given receiver's ability to be particularly successful with a given class of targets (e.g., people as opposed to buildings).
- Target—An item that is the focus of an AMP task (e.g., person, place, thing, event).
- Target Designation—A method by which a specific target, against the backdrop of all other possible targets, is identified to the receiver (e.g., geographical coordinates).
- Trial—The smallest unit of data to be analyzed.

Fax Transmittal Cover Sheet

SG1I **To:** [redacted] - ORD

From: Edwin C. May, Science Applications International Corp.

Fax Phone Number: (415) 322-7960

Date: Sun, Jun 18, 1995 • 17:53

Transmitting (22) pages, including cover sheet.

If there is difficulty with this transmission, please call: (415) 327-2007

Note:

SG1I [redacted] please call in the early am on Monday to confirm that this 21-page annotated bibliography reached you. We can discuss it then. Thanks, Ed

Approved For Release 2001/03/07 : CIA-RDP96-00791R000200170016-2