Phenomenological Research
and
Analysis

Authors:

Edwin C. May, Ph.D. and Wanda L. W. Luke

6 January 1992

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Presented to:

U. S. Government

Contract MDA908−91−C−0037
(Client Private)

Submitted by:

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January 8, 1992

Defense Intelligence Agency
Bolling AFB, DT—5
Washington, D.C. 20340—6150

Attention: [   ]   SG1J
Reference: MDA908—91—C—0037
             Interim Technical Report
             SOW 6.5 Final Report

Dear Dale:

Enclosed is our *Approved* Interim Technical Report for SOW 6.5 deliverable dated 6 January 1992. We are required by contract to distribute these draft deliverables according to the Contract Data Requirements List. Although it specifies the reports should be mailed to RSQ—4, I am sending them to you for the *final* report distribution:

DISTRIBUTION DI—MISC—80508/A002	
Requiring Office	Final Report Copies
DIA/DT—5A	2
RSQ—4	1

If you have any questions, please do not hesitate to contact me at (415) 325—8292.

Sincerely,

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

Edwin C. May

Edwin C. May, Ph.D.
Director, Cognitive Sciences Laboratory

cc Joe Angelo/w/enclosure
    Betty Muzio/w/o/enclosure
    file/w/enclosure

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I OBJECTIVE

This document is a final technical report on support for phenomenological research and analysis.*

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* This report constitutes the deliverable DI—MGHT—80508 for SOW 6.5 under contract number MDA908—91—C—0037.

II INTRODUCTION

Under the Statement of Work item 6.5 in contract number MDA908–91–C–0037, the Cognitive Sciences Laboratory of Science Applications International Corporation was tasked to support phenomenological research and analysis. That tasking included:

- attending professional conferences,
- replicating experiments where applicable,
- developing protocols for research and applications,
- recommending and developing database applications,
- recommending storage retrieval systems.

This document details the activity accomplished under these tasks and constitutes the SOW 6.5 final report.

III TASKS

1. Conferences (Task 6.5.1)

This section contains travel reports for two separate trips. The first trip was to attend an international conference in Germany, while the second was to visit a laboratory in Scotland and to attend an international conference in Ireland.

1.1 Parapsychological Association Convention: Heidelberg, Germany

Two Cognitive Sciences Laboratory representatives attended the 34th Annual International Convention of the Parapsychological Association (PA) held in Heidelberg, Germany, on 8-11 August 1991. The purpose was to maintain close technical contact with the international research community. The following is a brief sampling of the pertinent papers that were presented as part of the convention program:

- **Eberhard Bauer** (Institut für Grenzgebiete der Psychologie und Psychoygiene) "Periods of Historical Development of Parapsychology in Germany − An Overview" − A look at three of the four primary historical periods in the development of the field of parapsychology in Germany: 1810−1850 was characterized by the rise and decline of mesmerism/magnetism; 1880−1890 was dominated by the philosopher Carl du Prel and his "Psychologische Gesellschaft;" attempts to integrate parapsychology within an academic frame work occurred during the period 1919−1935. The post-war period was not covered in the paper.

- **George P. Hanson, Jessica M. Utts** (Division of Statistics, University of California, Davis), **and Betty Markwick** "Statistical and Methodological Problems of the PEAR Remote Viewing Experiments" − This paper critically reviews the methodology and statistical analysis of the remote viewing program at the Princeton Engineering Anomalies Research (PEAR) laboratory at Princeton University. The authors question the validity of the PEAR laboratory's remote viewing results by demonstrating that their randomization and analysis techniques do not adequately control for sensory cues, shared biases (i.e., between agent and viewer), and fraud.

- **Hoyt L. Edge** (Department of Philosophy, Rollins College and Australian Centre, University of Melbourne, Australia) "Mediumship and Magic in Bali" − The author describes two mediumship sessions in Bali and compares them to Western mediumship. A brief summary of the Balinese magico-religious world view is given in order to make clear the differences. The author shows that mediumship for information-oriented Westerners is most often geared for gaining information, while for the Balinese, the medium acts as a healer to help restore balance between the Upper World and the Lower World, and between the macrocosm and the microcosm. Because mediumship varies from culture to culture, it must be understood within its own cultural context.

- **Norman S. Don, Bruce E. McDonough, and Charles A. Warren** (Kairos Foundation and the University of Illinois at Chicago) "Correlation Waves, Cognitive Style and Target Characteristics" − In studying anomalous cognition (AC) responses to Zener-card stimuli, Don et al. examined all possible displacements (i.e., response matches a target from a different trial) and found persistent patterns in the data. In applying this technique to a study by Crandall that examined cognitive style, they found

that a power spectrum analysis of the displacement patterns produced a significant peak, which correlated to a significant degree with high/low imagery targets.

- **Susan Blackmore, Katherine Galaud, and Catherine Walker** (Perceptual Systems Research Center University of Bristol, England) "Psychic Experiences as Illusions of Causality" – This paper was concerned with the experience of and belief in psi. The authors hypothesized that psychic experiences are comparable to visual illusions. That is, individuals, who are adept at recognizing relationships may, at times, create them where none exist. They are more willing, therefore, to believe in psi. The authors explore 5 different types of illusion. Two experiments were done showing that sheep (i.e., people who believe in psi) are more willing to see patterns while goats (i.e., people who do not believe in psi) are not. The authors discourage viewing either the most gullible sheep or goats as being better or more correct, but rather understand that both qualities are necessary. The authors state that these issues should be viewed as being separate from the question of evidence for the actual existence of psi.

- **Walter von Lucadou** (WGFP, Freiburg, Germany) "Locating Psi-bursts Correlations Between Psychological Characteristics of Observers and Observed Quantum Physical Fluctuations" – von Lucadou describes a very complex, multi-variable experiment to assess the relationship between physical and psychological variables in micro-pk experiments involving random number generators. In addition, Von Lucadou manipulated the feedback. Overall, he reports "islands" of significant correlations among the variable set.

1.2 Edinburgh, Scotland and Dublin, Ireland

One SAIC representative traveled to Edinburgh, Scotland, to meet with two of our subcontractors, and to Dublin, Ireland, to attend the 39th Annual International Conference of the Parapsychological Foundation (PF). Table 1 shows the travel itinerary:

Table 1

Travel Itinerary

Date	Activity
9/17-18/91	San Francisco — Edinburgh, Scotland
9/19-20/91	Psychology Department, Edinburgh University
9/20-23/91	PF Conference, Dublin, Ireland
9/24/91	Dublin, Ireland — San Francisco

1.2.1 Edinburgh, Scotland

The purpose of the Edinburgh portion of the trip was to meet with Dr. Robert Morris and Dr. Deborah Delanoy, both of the University of Edinburgh, and to meet with Mr. Charles Honorton. Significant results of this visit were as follows:

Thursday – Friday, September 19 – 20, 1991

- Dr. Robert Morris and Dr. Deborah Delanoy provided an introduction and tour of their laboratory and of the University in general.
- Mr. Honorton was establishing the Psychophysical Research Laboratories at the University of Edinburgh for experiments to be done under subcontract to SAIC. It was apparent that progress was being made. Much of the equipment was already in place, and Mr. Honorton was able to demonstrate some of the computer programs that will be used in the experiments to examine the sender-no sender condition.

- The SAIC representative was granted open access to other colleges at the University of Edinburgh, and information about the colleges' work was provided.
- The University of Edinburgh extended an open invitation for return visits by any employees of SAIC's Cognitive Sciences Laboratory.

1.2.2 Dublin, Ireland

The purpose of the Dublin portion of the trip was to attend the 39th Annual International Conference of the Parapsychological Foundation entitled "Women and Parapsychology." The following is a brief overview of the conference program:

Evening — Friday, September 20, 1991

- **Welcome hosted by the Colys** — This provided an opportunity to meet all of the participants and most of the observers of the conference. About 30 people attended the conference.

Day One — Saturday, September 21, 1991

- **Lisette Coly** (Parapsychology Foundation Inc. Vice President) — Introduction
- **Eileen Coly** (Parapsychology Foundation Inc. President) — Greetings
- **Rhea White** (Parapsychology Sources of Information Center) "Feminist Science and Its Relevance to Parapsychology" — This paper was about post-modern science and post-empiricist science. In it the terms "feminist science" and "male science" were defined. Feminist science was defined as science in which inner and outer worlds are fused; a male science as science in which these two worlds are both separate and objective. Ms. White has developed a bibliography of feminist science.
- **Jessica Utts** (Division of Statistics, University of California, Davis) "Social, Institutional and Cultural Influences of Gender on Science" — A general survey on women in science in the United States. A surprising statistic was that there was no correlation between women not being promoted for tenure and the number of children they had, although Dr. Utts stated this information may well be biased by not considering lesbian women and those women who were forced out altogether.
- **Beverly Rubik** (Center for Frontier Sciences at Temple University, Philadelphia, Pennsylvania) "The Feminine Archetype: A Missing Factor in Contemporary Psi Research" — An attempt was made to define a feminine archetype and to define how it should be integrated in current research styles by using the analogy of ying and yang. Dr. Rubik, however, did not suggest specific changes or how they should take place.
- **Susan Blackmore** (Perceptual Systems Research Center, University of Bristol, England) "Are Women More Sheepish? Gender Differences in Belief in the Paranormal" — The author used a model of two classic types of human perception involved in belief development, commonly referred to as sheep and goats, to discover whether there are gender differences. Sheep are more willing to see correspondences as psi while goats are not. The author found that women are indeed more sheepish, although not as much as historically claimed. The author discouraged viewing either sheep or goats as being better or more correct, but rather encouraged the idea that both qualities are necessary. The author states that this issue should be viewed as being separate from the question of evidence for the actual existence of psi.
- **Nancy Zigrone** (History Department, Duke University, Durham, North Carolina) "Images of Women as Medium: Power, Pathology and Passivity in the Writings of Frederic Marvin and Cesare Lombroso" — A historical overview of women mediums who lived and worked around the turn of the century. This paper presented the idea that mediumship was an accepted liberating force for women in an otherwise oppressive society during the early 1900s.
- **JoAnne McMahon** (Eileen J. Garrett Library) "Tribute to Eileen J. Garrett: A Woman Who Made a Difference" — A biography of Eileen Garrett.

<u>Day Two — Sunday, September 22, 1991</u>

- **Marilyn Schlitz** (Mind Science Foundation, San Antonio, Texas) "Women Power, and the Paranormal: A Cultural Critique" — This paper addressed the position of women in the cultural history of psychical research and parapsychology. The focus was on the negotiation of personal and social power and powerlessness within the framework of beliefs and practices related to the paranormal. The author held that women's identities are negotiated and reconstructed within the context of their experiences with the paranormal. This was examined from three perspectives: psychic practitioners and mediums, believers, and researchers.

- **Anjum Khilji** (Foreign Service Institute, Rockland, Virginia) "Behind the Veil: Muslim Women's Contributions to Parapsychology" — An attempt was made to equate the "transmitted sciences" of the Koran with parapsychology. Five different groups of Islamic women, who were said to have contributed to the transmitted sciences primarily through Sufi texts, were presented as examples.

- **Ruth-Inge Heinze** (Center for Southeast Asian Studies, University of California, Berkeley) "Life Patterns of Women Active in Parapsychology — East and West" — A comparative cross-cultural example of women mediums in Malaysia and the United States.

- **Position Papers and General Discussion** — Each of the above participants presented a short position paper, and a general discussion was held after each presentation. Many of the papers were in whole or in part autobiographical and presented problems each individual had faced as a woman in science. All agreed that there are problems with how science is done today, and most agreed that the use of terms such as "feminist" function only as a convention, for lack of better words. Some of the conference attendees thought that a discussion on these same current problems in science was possible without any mention of feminist issues. Many of the male attendees said that they also had grappled with some of the same issues. There was some criticism that, for the most part, specific problems had not been identified and therefor had not been addressed. One of the male attendees suggested that a future meeting might consist of working groups to identify some of the specific problems and to suggest specific solutions. This suggestion was enthusiastically received by the others at the conference.

- Closing remarks by Rhea White.

<u>Morning — Monday, September 23, 1991</u>

- A base for a possible future professional relationship with Dr. Ruth-Inge Heinze was established.

1.3 Conclusions

1.3.1 PA Convention

The presentated topics ranged widely from a critical review of methodological and statistical problems within the field of Parapsychology within the United States; to historical overviews of parapsychology in Iceland, Germany, and Norway; to reports on current experimental research occurring within several countries.

As has been the case with previous PA conventions, the quality of the presented papers was highly variable. Discussions with von Lacadou about his paper, however, provided valuable insight into an application of neural networks to extend his multi-variable approach to psi research. If Don et al.'s hypothesis about correlation waves is correct, then a new and powerful enhancement technique is possible.

1.3.2 Edinburgh and Dublin

The site visit to the University of Edinburgh provided valuable insight into its operation and demonstrated that our subcontract with Psychophysical Research Laboratories is on schedule.

Attending the PF conference established new contacts with leading parapsychologists in the international community and at home.

2. Assessing Foreign Research (Task 6.5.2)

2.1 Background

In 1978, Mr. Zoltán Vassy of Budapest, Hungary, published a brief description of an experiment that demonstrated significant correlation between physiology and AC events.[1]* The hypothesis tested in that experiment was that an individual can be classically conditioned to a stimulus that is physically isolated. In that experiment, Vassy used a sender/receiver model. The following sequence of events represented a single trial:

- The sender, who was physically isolated from the receiver, observed a single light flash.
- After a predetermined delay, a mild electrical stimulus was applied to the receiver's left hand.
- The galvanic skin response (GSR) of the receiver's right hand was monitored.

Figure 1 illustrates the sequence of events. The latency interval, Δt_L, was determined on each trial from the shock time to the sharp rise of the GSR. To avoid any anticipatory response, the trials were generated at random intervals. Note, as simulated in Figure 1, the receiver produced a GSR AC response to the remote light stimulus.
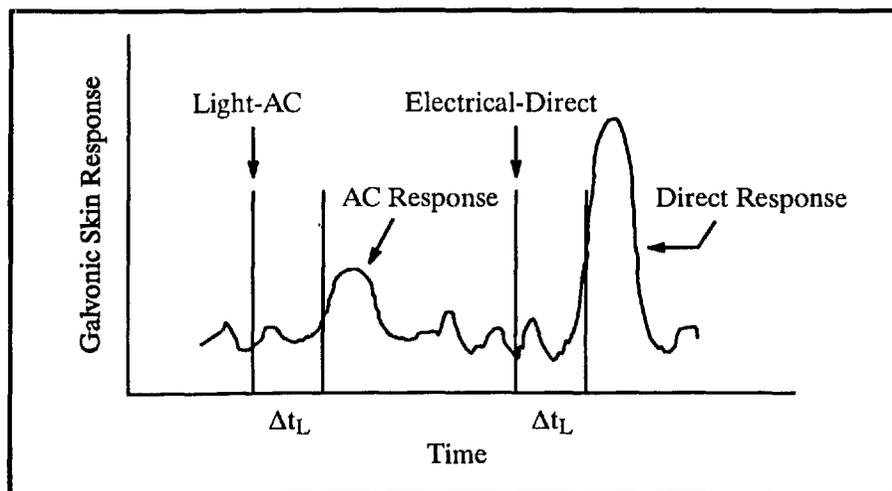

Figure 1. Timing for a simulated AC-physiology correlation experiment.

Vassy conduced an experiment with 5 receivers for a total of 10 sessions. Each session consisted of approximately 800 trials. Seven of the ten sessions demonstrated independently significant responses to the AC stimulus (effect size ≈ 2.9, $p \leq 8.1 \times 10^{-8}$).

Based upon this result and on that reported by May et al. in 1989,[2] we initiated a survey of AC receivers to determine their individual central nervous system (CNS) responses to direct light stimuli.

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* References may be found at the end of this document.

2.2 Pilot Survey

It is beyond the scope of this report to describe in detail the experiment to measure the response to direct light stimuli; however, and overview will be presented here.

The CNS produced both electric and magnetic responses to external stimuli. Using a 7-channel magnetoencephalograph (MEG), we monitored the magnetic field generated in response to 100-ms sinusoidal gratings in the lower left visual field of the receivers. On a random basis, approximately 30 such stimuli were presented during a 1 to 2 minute interval.

The MEG was positioned over the occipital region of the right hemisphere in such a way to observe the largest possible CNS response. Figures 2 and 3 show these responses for 16 receivers who were provided by the sponsor.
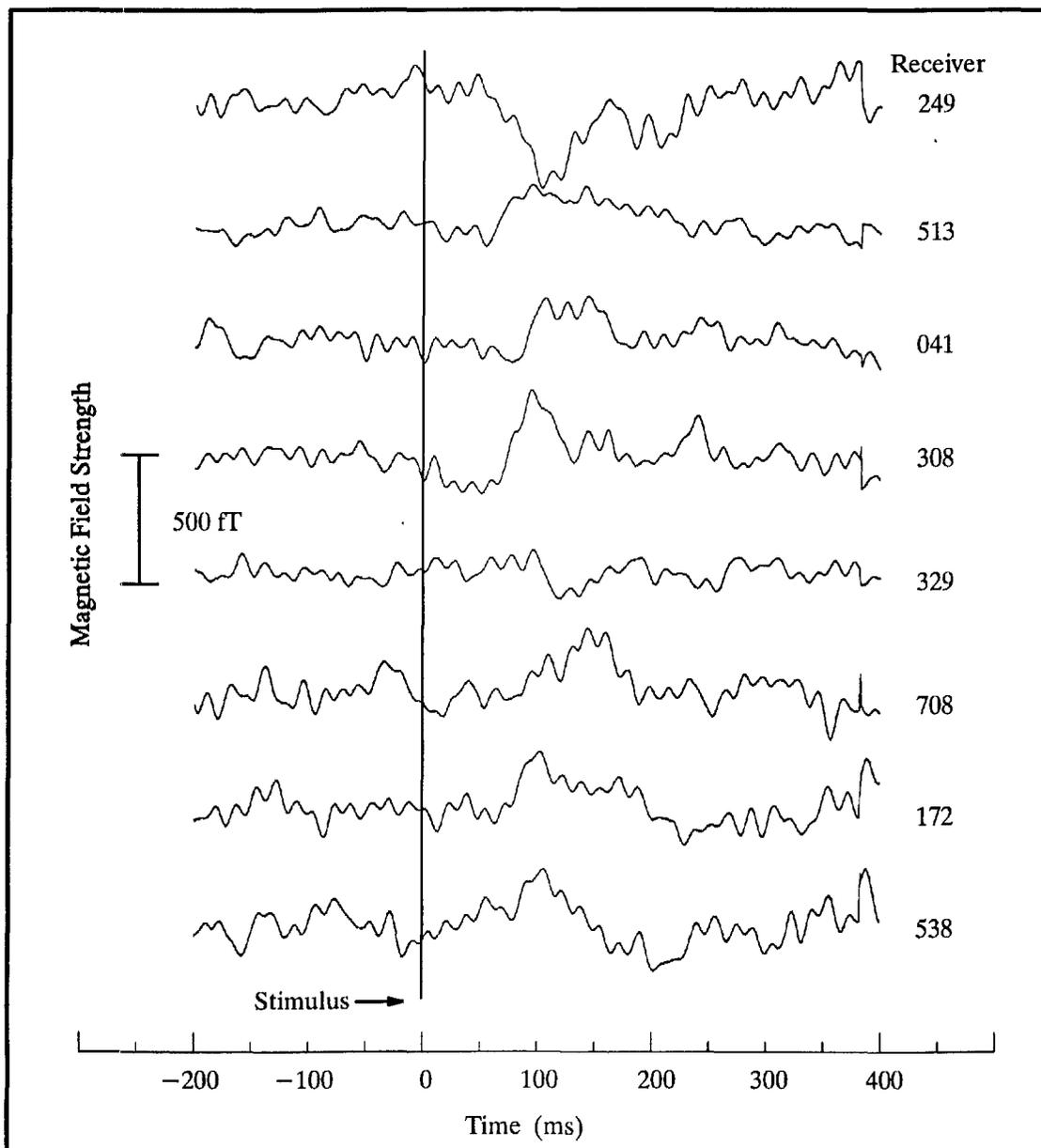

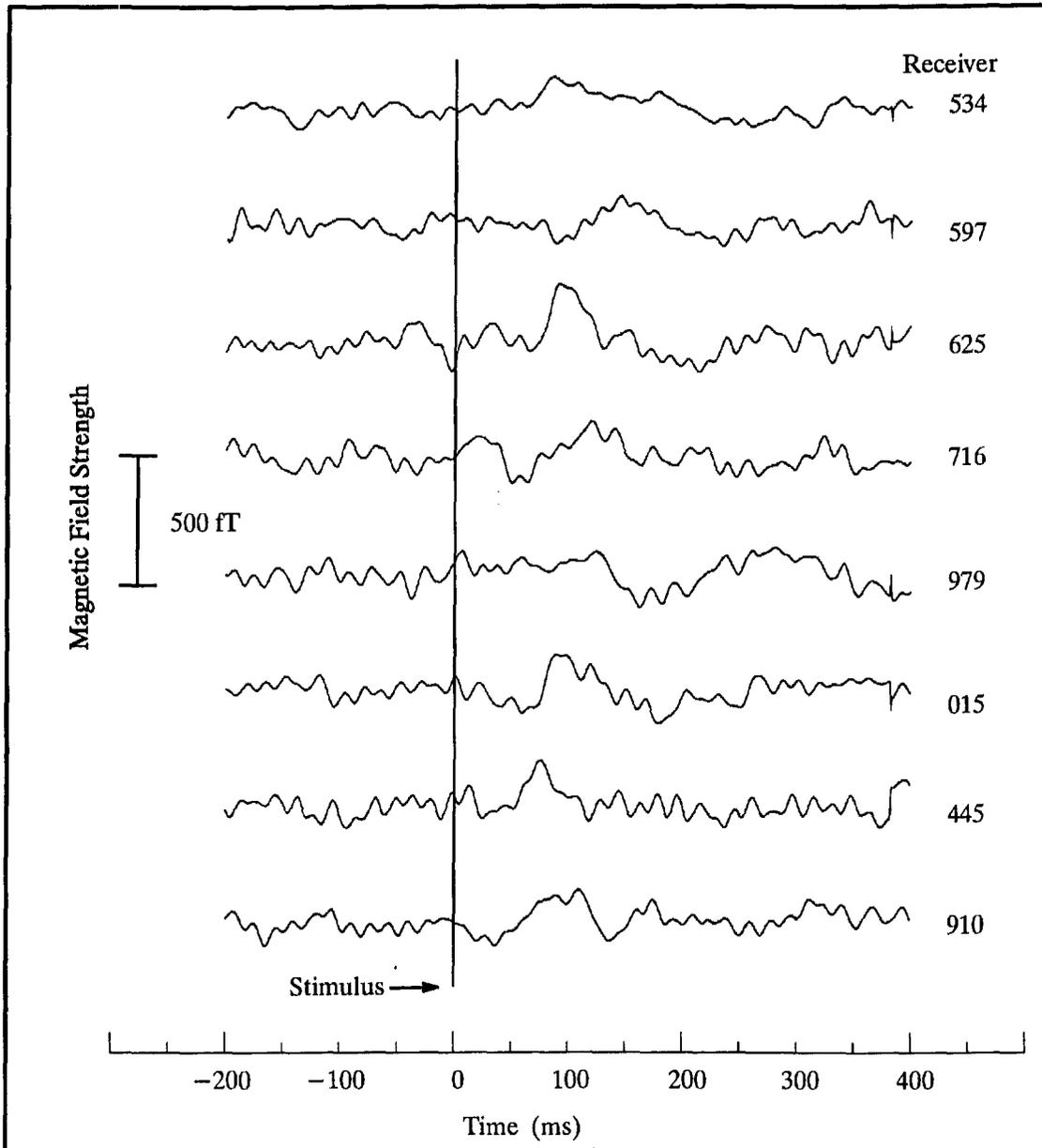Figure 2. Neuromagnetic responses to *direct* light stimuli.

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Figure 3. Neuromagnetic responses to *direct* light stimuli (continued).

The response of receivers 249, 308 and 625 appear to be qualitatively similar to one produced by an experienced receiver.

The comparisons of the CNS responses to those of an experienced receiver are visual and qualitative. If quantitative analysis (e.g., neural network analysis) shows that the response shape is a reasonable predictor of AC ability, then the response shape would indicate a neurological predisposition *only*. In choosing individuals for a program, however, other programmatical factors such as interest and group dynamics must also be considered.

3. Protocol Development (Task 6.5.3)

SAIC was not tasked with developing specific protocols; rather, SAIC personnel held frequent discussions about the overall problem of protocol development.

4. Database System (Task 6.5.4)

We recommend SYBASE as the database software system. There were two primary considerations that influenced this decision:

(1) SYBASE can be installed on many different hardware platforms including, Sun Microsystems SPARC, various Digital Equipment workstations, IBM workstations, and a number of main-frames from a variety of vendors.

   SYBASE maintains compatibility across all platforms and routinely runs in multi-vendor environments.

(2) All database management systems require that data and referential integrity be maintained. That is, if one datum references a second datum, the second datum must exist. For example, suppose that an *address* table exists in a personnel database, and that *123 Main Street, San Francisco, CA* is Ms. Jones' address. The database is corrupted if there is no Ms. Jones in the *persons* table.

   In traditional database management systems, each application is responsible for maintaining the database integrity. SYBASE is currently the only one that allows the database, itself, to maintain its integrity independent of the applications. This sharply reduces application development time.

4.1 A Database Design

Figure 4 shows a top-level Entity-Relation (ER) schema for a database that is designed to track activity for any given discipline. A complete ER schema would include descriptions of all the data elements (called "column names" in relational database parlance). Since these are primarily determined by the particular application, Figure 4 displays only the relationships among the data tables, and single and double arrows represent one-to-many relationships. Following is an overview of the intent of the tables shown in Figure 4.

Personnel: This table contains only data that are permanently tied to an individual. For example, birth dates and death dates, which never change, would be in the table; but an individual's address and phone number, which may change or have multiple values, would not be in the table.

All the multi-valued or changing data about a given individual are contained in a series of tables that are connected to the *personnel* table by one-to-many relationships. These are the tables shown on the left side of Figure 4:

Colleagues: These are individuals who are known to be associated with the target person. Their names and information are also part of the database.

Relatives: Self explanatory.

Travels: This includes visits to foreign counties, facilities, and other people.

Advisors: This table contains the individual's educational advisors. For example, a graduate student in physics may have a number of different advisors.

Citizenships: Self explanatory.

Conferences: A list of conferences that the target individual has attended. There may be links back into the database from this table. For example, a conference may be held at a facility that is located in another table in the database.
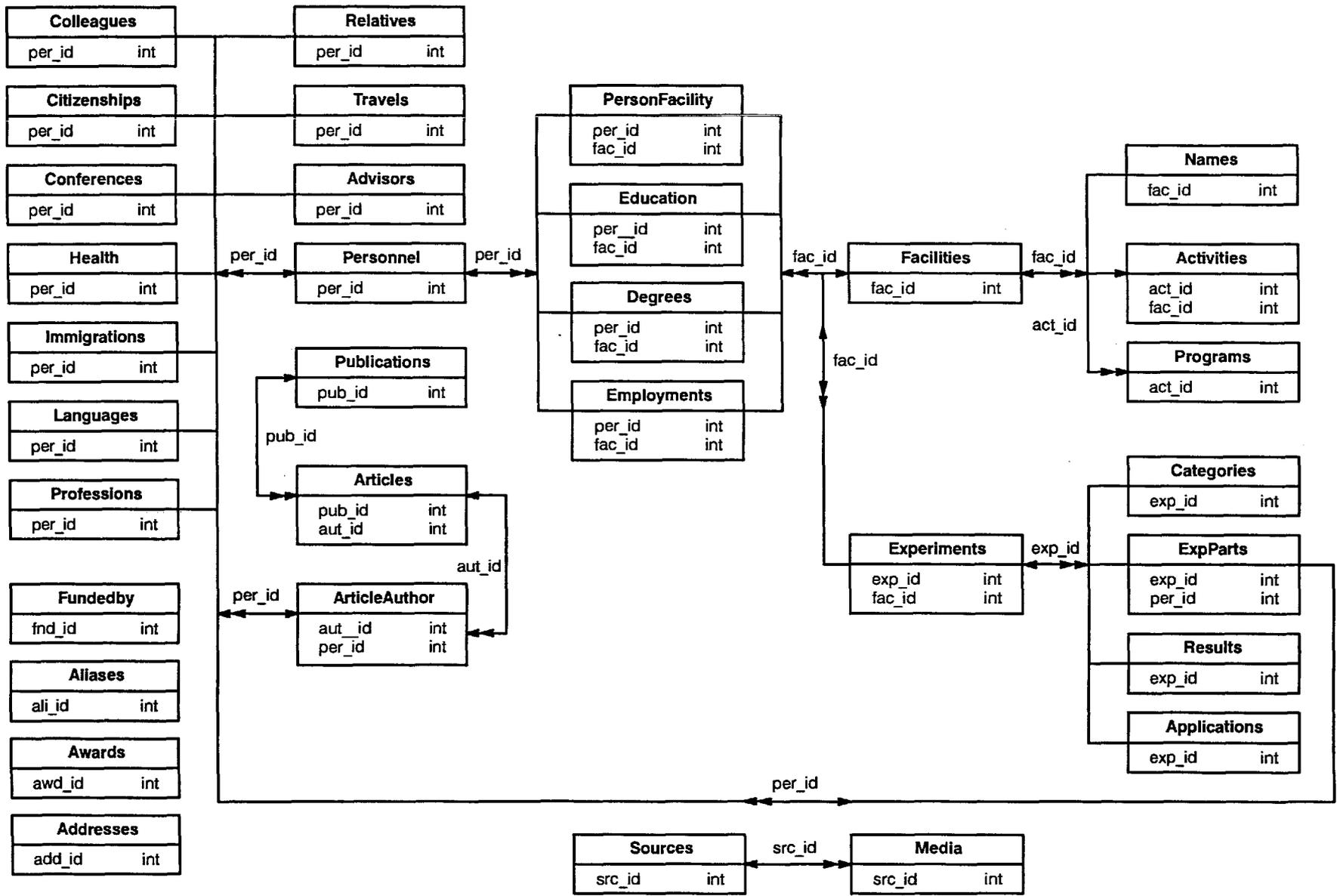
Figure 4.   Entitity-Relation (ER) diagram for tracking a given discipline.

Health: This table contains the health profile of the target individual.

Immigrations: The target individual may have immigrated to a number of different countries.

Languages: This table contains the languages and proficiency that the target person is known to speak.

Professions: Self explanatory.

The following tables in Figure 4 contain information about pertinent facilities.

Facilities: This table contains the permanent information about a facility, such as when it was founded.

Names: A target facility may evolve under a number of different names. For example, SRI International was previously named Stanford Research Institute.

Activities: This table describes the major activities that characterize the target facility.

Programs: Within a given activity at a target facility, there may be many programs.

The following tables describe the relationship between personnel and facilities.

PersonFacility: This is a many-to-many relationship table. For example, a single individual could work or be associated with many different facilities and vise versa.

Education: This table contains a person's formal educational history.

Degrees: This table contains the degrees and types of degrees awarded to an individual from a target facility.

Employments: Self explanatory.

The section on publications (see Figure 4) is typical of a library database. In particular:

Publications: This table contains the names and publishers of publications that are pertinent to the discipline under consideration.

Articles: A target publication may contain many articles. Depending on the application, this table might connect to an additional table that contains the topics that are discussed in the target article.

ArticleAuthor: This is a connection table to provide a many-to-many relationship between authors and articles. A target article may have many authors and an author may have written many articles. A possible column in this table might be author order.

The *Experiments* table and its associated tables provide a complete representation of a laboratory or field experiment.

Experiments: This table might include the experiment name and type and have pointers to the facility in which the experiment was conducted. Many of the other pertinent data involve one-to-many relationships.

Categories: The experiment category might be, for example, anomalous cognition, anomalous perturbation, or communication. A target experiment could be listed in a number of different categories.

ExpParts: This table is a connection table for a many-to-many relationship between personnel and experiments. It should also include what involvement the given person has with the target experiment (e.g., Principal Investigator, subject, etc.).

Results: Self explanatory.

Applications: This table contains a list of potential applications for the target experiment.

The tables *Fundedby, Aliases, Awards,* and *Addresses* include data about personnel, publications, and facilities. Using the tools of SYBASE, it is possible to allow each of these tables to have multiple functions.

The table *Sources* is connected to all the other tables in the database. Each piece of information in the database was obtained from some source such as a person or a publication, and is identified through the column name, *src_id.* A given source, however, may have obtained the information from a number of different media (e.g., KRON TV 4 and KGO radio), which are listed in the *Media* table.

As an illustration, consider a database query to list the awards received by Jones and to describe the source and confidence of the information. Let the *Personnel, Awards,* and *Sources* tables be given by:

Personnel

per_id	lname	fname	birthdate
215	Smith	Robert	1/11/40
342	Jones	Nancy	5/23/75
531	Thomas	Clarence	12/11/91
007	Bond	James	12/25/32

Awards

awd_id	award	tname	tid	src_id	confidence
1	National Honor Society	Personnel	007	1	high
2	Good House Keeping	Facilities	127	1	low
3	Nobel Prize	Personnel	342	2	medium

Sources

src_id	tname	tid
1	Personnel	215
2	Personnel	007

One query in Structured Query Language (SQL) that will provide the answer is given by:

> SELECT ln1.lname, award, ln2.lname, confidence FROM Personnel ln1, Awards, Sources,
> Personnel ln2 WHERE ln1.lname="Jones" and Awards.tname="Personnel" and
> ln1.per_id= awards.tid and Awards.src_id = Sources.src_id and Sources.tid=ln2.per_id

The answer provided by this query will be "Jones, Nobel Prize, Bond, medium." This example illustrates that in a relational database, the tables are rather simple, but even relatively simple queries can be complex. Relational databases trade flexibility for difficult queries; however, this is exactly what is needed to track any complex discipline.

5. Storage and Retrieval Recommendation (Task 6.5.5)

We recommend two different data storage and retrieval systems to accomplish different tasks: The first is an existing literature search system that is limited, but available immediately. The second is a more sophisticated general system that SAIC proposes as a solution for the long-term.

5.1 Immediate, Limited, On-line Literature Access

The Parapsychology Sources of Information Center (PSIC)[*] maintains a current abstract and literature search capability for most of the English literature for phenomenological research. The PSIC will provide the databases, retrieval software, and updates for 386 platforms for a yearly maintenance cost of approximately $5,000. This system will allow immediate, cost-effective access to the current research literature.

5.2 General Storage and Retrieval System

The problem, however, with all but two storage and retrieval systems is that the logical conditions for a textual search are "crisp." For example, suppose we wished to obtain those abstracts that contained the words "remote viewing" or "anomalous cognition." Only those abstracts with those exact words will be returned. This type of boolean logic is sufficient if the information that is required is known exactly. Practical questions of a body of literature, however, are usually not precisely known. For example, we might ask, in the above example, "Provide all abstracts that deal with ESP-like phenomena." Only storage retrieval systems that are based on mathematical fuzzy sets can answer such questions.

We recommend, therefore, a hardware and software solution to allow for broader access to existing text databases and for the construction of special text databases which are not currently available.

5.2.1 Information Input

Xerox Imaging Systems provides a 11×17 inch flat-bed scanner (i.e., ScanWorX) that directly connects to Sun Microsystems SPARC platforms.[†] With its associated software, the system acts as an intelligent optical character reader and graphics input device. Both text and graphics can be easily integrated into existing documents. In addition, scanned technical abstracts or complete articles can be added to any text retrieval system. The complete package is approximately $17,000.

5.2.2 Fuzzy-Set-Based Retrieval Systems

Currently two systems are available. Variety sells retrieval software called TOPIC. Depending upon the configuration, the software costs approximately $5,000 to $45,000.[‡] Interleaf Inc. sells a fuzzy-set based retrieval system called VIEWSTATION. This software uses a point-and-click approach for retrieval and provides its text output in Interleaf document format. In addition, VIEWSTATION allows for non-invasive annotation of the retrieved data. The software costs approximately $20,000.[†]

A fuzzy-set system works as follows. The software attempts to match the search requirements as closely as possible and scales a list of potential abstracts in accordance with the degree to which that abstract meets the requirements. By using indexing, both systems provide very rapid access to large databases, and using optical disk technology, the database size is unlimited.

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[*] 2 Plane Tree Lane, Dix Hills, New York 11746. (516) 271-1243
[†] Xerox Imaging Systems, 9 Centennial Dr., Peabody, MA 01960. (508) 977-2000
[‡] Variety, 1550 Plymouth Street, Mountain View, CA 94043. (415) 960-7600
[†] Interleaf, Inc., 3945 Freedom Circle, Suite 630, Santa Clara, CA 95054 (408) 496-6222

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2. May, E. C., Luke, W. L. W., Trask, V. V., and Frivold, T. J., "Observation of Neuromagnegic Fields in Response to Remote Stimuli," *Proceedings of Presented Papers,* pp. 168-185, Parapsychological Association 33rd Annual Convention, National 4-H Center, Chevy Chase, MD (August, 1990).