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Phenomenological Research and Analysis Technical Proposal (U)

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Presented to:

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Submitted by:

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I. OBJECTIVE (U)

(U) The objective of this effort is to pursue, in response to solicitation number MDA908-92-R-0164, the most promising basic and applied research in understanding anomalous mental phenomena (AMP).

II. BACKGROUND (U)

(U) With regard to this proposal, AMP can be divided into two broad categories:

- Anomalous Cognition (AC): The awareness of information that is considered otherwise shielded from all known sensory channels.
- Anomalous Perturbation (AP): The perturbation of physical matter under conditions of complete physical and sensorial isolation.

1. Historical Perspective (U)

(S/NF) Serious government-funded research of both these domains began in 1973 when the Central Intelligence Agency (CIA) initiated a modest effort to determine if a genuine anomalous phenomenon could be verified and to assess the degree to which it could be applied to general intelligence problems. Through fiscal year 1990, a variety of intelligence organizations from the military services and the Defence Intelligence Agency (DIA) had supported predominantly application-oriented research programs at SRI International in Menlo Park, CA.

(S/NF) Beginning in fiscal year 1986, the U. S. Army Medical Research and Development Command (USAMRDC) initiated the first coordinated, long-term examination of AC and AP phenomena. This program had three major objectives:

- Provide incontrovertible evidence for the existence of AC and AP.
- Determine the physiological and physical basis for AC and AP.
- Determine the degree to which AC data could be integrated into the intelligence community.

(S/NF) The results and conclusions from the Army program were:

- The first objective had been partially met. An information transfer anomaly exists (i.e., AC) that can not be explained by inappropriate protocols, incorrect analyses, or fraud; however, there was insufficient evidence to conclude if AP exists.
- Significant progress had been made in meeting the second objective. For example,
  (1) The central nervous system (i.e., the brain) of individuals with known AC ability appeared to respond to isolated AC stimuli. These responses were similar to those observed when their eyes were stimulated directly.
  (2) Two physical models have been constructed. One (called Decision Augmentation Theory) systematizes the data of over 600 separate experiments spanning 22 years in the open literature and suggests a possible physical transfer mechanism for AC data. The other is a speculative fundamental physical model for the type of information that is sensed by AC.

(U) Under the same research program, a number of different physical systems were examined for their susceptibility to putative AP effects. They included single-cell algae, single alpha particles, and elec-

tronic devices such as random number generators and piezoelectric strain gages. However, in these carefully controlled experiments, some with experienced AP subjects, no evidence of AP was observed.

2. Recent Program (U)

(S/NF) Beginning in February 1991, DIA initiated a comprehensive, 18 month, investigation of AMP at Science Applications International Corporation (SAIC). In that program, basic research was defined as research that is primarily oriented toward understanding the physical, biophysical, physiological, and psychological mechanisms of AC. Applied research was defined as research that is primarily directed toward improving the output quality of AC data.

(S/NF) The primary thrust of that effort was to:

- Prepare a comprehensive, integrated, 5-year research plan
- Conduct basic and applied research that supported operational applications of AMP.

Experiments included investigations of central nervous system responses to AC stimuli and physical properties of AC targets. A complete description of all the experiments and their results can be found in technical final report.[1*] We summarize here, however, three major findings.

(S/NF) We found a significant correlation between the quality of AC data and a single physical target property, the total change of Shannon entropy. Should this result be verified in a formal replication attempt, then it can be easily integrated into further laboratory studies and guide the selection of targets that are likely to yield positive results in operations.

(U) In the same experiment, we determined that it is not a requirement of AC functioning for an individual (i.e., sender†) to observe directly an intended AC target.

(U) The results of our megnetoencephalograph investigation is less clear. We uncovered a flaw in the mathematical analysis that prevented us from determining if the central nervous system responds to remote stimuli; however, we are currently re-analyzing the data with better techniques. The results of that analysis will be available as part of an extension of the original work.

(S/NF) In very preliminary trials, we observed possible AP effects in special wave detectors.

3. Proposed New Effort (U)

(S/NF) This proposal suggests two major experimental efforts and a variety of theoretical and other experimental investigations. We propose to improve the measurement of psychophysiological parameters to optimize the likelihood of observing response to remote stimuli. Because of a direct application potential, we propose to replicate our earlier finding: determine if the total change of Shannon entropy is a valid intrinsic property of AC targets. The remainder of this document describes our proposal in detail.

* References may be found in Section V beginning on page 18.

† For a definition of terms, please refer to the Glossary in Section IV on page 17.

III. APPROACH (U)

(U) Each heading in this section includes numerical references to the statement of work (SOW) contained in solicitation MDA908-92-R-0164.

1. Basic Research (SOW 6.1) (U)

(U) Basic research of AMP is defined as that activity that is primarily designed to understand the parameters of and theoretical basis for AMP.

1.1 Biophysical Measurements (SOW 6.1.1) (U)

(U) Science Applications International Corporation (SAIC) will conduct two different biophysical investigations. SAIC will:

- Determine if the dominant alpha rhythm is affected by remote and isolated stimuli.
- Determine if the electrical properties of the skin act as indicators of AMP.

1.1.1 Electroencephalograph Measurements (SOW 6.1.1.1-6) (U)

1.1.1.1 Objective (U)

(U) The objective of this effort is to perform electroencephalograph (EEG) measurements for the purpose of identifying neurophysiological parameters that correlate with anomalous cognition (AC). To achieve this goal, the behavioral setting for the EEG measurements should match, as closely as possible, that of a usual AC session.

1.1.1.2 Background (U)

(U) In a series of EEG experiments conducted at SRI International beginning in 1974, the central nervous system (CNS) of individuals was found to respond to remote and isolated visual stimuli (i.e., a flashing light).[2,3,4] In the first experiment, during randomly interleaved 10-second epochs (i.e., trials), either a flashing light (16 Hz) or no light was present in a sensorially and physically isolated room. Significant decreases of occipital alpha power of isolated receivers were observed by Rebert and Turner.[2] Two replications were conducted in collaboration with Galin and Ornstein at the Langley Porter Neuropsychiatric Institute. As reported by May et al., the results were inconclusive; the first replication confirmed the Rebert and Turner finding, a decrease of alpha power concomitant with the flashing light, but the second replication attempt found an increase in alpha power.[4]

(U) Under another program in FY 1989, SRI International and the Biophysics Group at Los Alamos National Laboratory conducted an experiment using the magnetoencephalograph (MEG) technique. This experiment was designed as a conceptual extension of the May et al. EEG experiment, although there were significant differences in the protocol. Two types of stimuli were randomly presented to an isolated sender while MEG data were collected from a receiver. The experimental stimulus (i.e., remote stimulus) was a 5-cm square, linear, vertical sinusoidal grating lasting 100 milliseconds. The se-

cond stimulus, a control stimulus (i.e., pseudostimulus), was simply a time marker corresponding to a blank screen in the data stream, and was also delivered to the sender. There was no change in the alpha power, as reported by May et al., but a *post hoc* analysis revealed a root-mean-square average phase shift of the dominant alpha frequency.[5] A key result of that experiment was that similar "anomalous" phase shifts were obtained for the remote stimuli and the pseudostimuli. Three candidate explanations for these results were suggested. The observed phase shifts might have been:

- Spurious (i.e., statistical deviations within chance expectations)
- Electromagnetic artifacts
- Evidence of anomalous cognition

(U) In order to determine which of these three candidate explanations was correct, SAIC replicated the study in Los Alamos during 1992. In the replication experiment, ten times the amount of data from the 1989 study was collected, including an equal number of control runs, which contained an equal number of trials with no receiver present under the MEG to check for possible electromagnetic artifacts.

(U) As of August 1992, the final results of our MEG investigations are pending. Using the same analytical techniques that were used in the 1989 study, we did not observe significant alpha activity concomitant with remote stimuli; however, we realized, after the fact, that the 1989 analytical technique contained a subtle flaw. We were attempting to measure instantaneous phase shifts of the dominant alpha rhythm in the presence of considerable noise (i.e. the signal-to-noise ratio was approximately 0 decibels). Under this circumstance, the variance of the phase is primarily determined by the noise (i.e., the Crammer-Rao relationship[6]). Thus, if there were phase shifts related to the remote stimuli, we would not have seen them, as shown by the Crammer-Rao relationship.

(U) Aside from the technical difficulties associated with the Crammer-Rao relationship, all of our earlier attempts to identify CNS correlates to AC did not contain any concomitant behavioral measure of AC, and the conditions under which experiments were conducted were not similar to those known to be conducive to the production of AC data. For example, there is no evidence that a flashing light constitutes a valid AC target. It is also likely that when EEG electrodes are attached to a receiver's scalp or if a receiver is asked to recline face down in a MEG laboratory, that the conditions for the receiver are not optimal. Therefore, we have no independent measures that AC functioning occurred in these experiments.

1.1.1.3 Proposed Experiments (U)

(U) We propose to design and conduct experiments to measure CNS responses to AC-stimuli, and since we will not be initially concerned about source localization, we will not immediately require the special properties of a MEG, and thus, realize a significant cost savings. Should the proposed experiments warrant, however, we will provide access to appropriate MEG technology. EEG technology is capable of addressing the specific variables in the Statement of Work. In addition, we are able to observe all areas of the brain, albeit with less spatial resolution, with a single measurement—a significant labor/cost savings.

(U) Specifically, we will remedy the problems that were described above in a series of EEG experiments that

- Use stimuli that are identical to those in standard AC experiments
- Demonstrate CNS correlates to these stimuli when they are directly presented to receivers
- Provide a potential for independent, but concomitant, behavioral evidence for AC

In addition, we will use EEG measures that more closely resemble those used in more traditional psychophysiological experiments.

One such example is event-related desynchronization (ERD). Spontaneous EEG reveals short-lasting, task- or event-related amplitude changes in rhythmic activity within the alpha band. This amplitude change or desynchronization is one of the elementary phenomena in EEG. It was first described in 1930 by Berger[7] in scalp EEG as alpha blocking, and was later termed ERD by Pfurtscheller and Aranibar.[8] ERDs can be quantified as a function of time and can then be used to study cortical activation patterns during the planning of motor behavior,[9] sensory stimulation, and cognitive processes.[10,11,12] Kaufman et al. provide a more recent example of cognitive-process-related ERDs.[13] They found a significantly shorter ERD when subjects simply responded to a target stimulus, compared with the ERD that occurred when a subject had to search visual memory to determine whether the target matched one previously presented. Because ERDs can be observed in a variety of tasks, they are a likely variable to use to study how the CNS responds to AC stimuli.

1.1.1.4 Proposed Experiments (U)

(U) **Experiment 1.** We propose to replicate an observation by Kaufman et al. of ERDs from visual stimuli. We propose, however, to change the stimuli to those that more closely match AC targets (i.e., photographs from the *National Geographic* magazine). Other than that, the experiment will closely follow that of Kaufman et al. The primary purpose of this replication will be to demonstrate CNS correlates (i.e., ERDs) to AC-like stimuli that are directly presented to the receivers. These ERDs will serve as a system calibration and may provide data for an adaptive filter to enhance the signal-detection of ERDs when the stimuli are remote.

(U) A secondary purpose of this replication is based upon the results of Kaufman et al. They found a significant lengthening of the ERDs when their subjects were asked to review internal mental images. One variable that may be important in understanding AC is mental imagery, since for novice receivers, mental imagery is thought to be a source of confounding mental noise. More advanced receivers, however, are able to use mental imagery as a source of valid information. We will examine qualitatively the relationship between the duration of ERDs for advanced and novice receivers when they are asked to scan internal mental images.

(S/NF) **Experiment 2.** The objective is to observe ERDs with AC stimuli. To achieve this goal, we will explore a variety of approaches to measure ERDs under circumstances that closely match those during a standard AC session. All approaches will use the stimulus set from Experiment 1, above. In pilot experiments, we will determine an optimal protocol and then conduct a formal experiment using that protocol. The pilot approaches will include, but will not be limited to:

- Searching for ERDs during a standard AC session while a receiver is writing and drawing. Muscle artifacts may be a problem; however, we can determine their impact with a few pilot trials.
- Using a counterbalanced random protocol to conduct a standard AC session without EEG followed by an EEG session where only AC mental activity is used to access the same target.

We will collect behavioral AC data as closely as possible to the CNS data. In addition, the protocols for the behavioral and CNS experiments will be as similar as possible. In pilot trials, we will correlate the behavioral data with the CNS data to determine if behavior can be an *a priori* indication of a receiver's performance in CNS experiments. If so, we can use this indicator to enhance the likelihood of observing

effects in the CNS data during formal trials. Likewise, we may be able to use CNS data to indicate *a priori* performance in operational AC tasks.

(U) In both EEG experiments, standard techniques for sensor placement, artifact rejection, and data collection will be employed. In addition, a "dummy" lead, which will be connected to a fixed resistor, will be used to check for possible electromagnetic artifacts.

(U) Depending upon the outcome of the pilot trials, we will use the optimized protocol to conduct a formal experiment to test the hypothesis that the CNS responds to remote AC stimuli. If the formal experiment is successful, we will be more able to address a variety of other variables that may be important in determining the CNS's response to AC stimuli. For example, we will than explore the impact of different stimuli (e.g., audio, various changes of entropy) and whether parameters such as distance, shielding, and sender condition affect the functioning.

1.1.2 Electrodermal Potential Measurements (SOW 6.1.1.7) (U)

(U) In 1990 and again in 1992, Braud et al. reported on electrodermal correlates of remote attention.[14,15] They found that the electrodermal properties of receivers correlated significantly with the intense attention, via closed circuit TV, of an isolated and remote experimenter (i.e., $p \leq 0.009$, *effect size = 0.59*). Four other experiments of a similar nature have been reported in the literature since 1913, but Braud et al. observed the largest effect size. The technical arguments for the existence of such a correlation may be found in their report.

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(U) To examine the claim, we propose to conduct a replication of the Braud et al. experiment. Using a balanced random schedule of attention and rest periods of a remote gazer, we will continuously monitor the electrodermal activity of each receiver. We will explore a number of possible analysis techniques, but they will include a normalized ratio of electrodermal activity in effort and rest periods, the technique used by Braud et al.

(U) We will conduct a brief pilot experiment to assure that protocol, equipment, and analysis are working properly and will modify the protocol as needed during this period. We anticipate that approximately 20 individuals will be screened for a positive electrodermal response. The five best of these will be used in a formal experiment. Should the formal experiment succeed, we will add EEG to the protocol and repeat the measurements.

(U) We will subcontract to the Lucidity Institute to gain access to a well-equipped psychophysiology laboratory in which to conduct the proposed EEG and electrodermal experiments. In addition, we will conduct with the Lucidity Institute a few lucid dreaming trials in the same laboratory. In these trials, we will be looking for brain-wave patterns that might indicate a lucid dream/AC state.

1.2 Data Patterns/Parameters Correlations (SOW 6.1.2) (U)

(U) The search for patterns or correlations within anomalous cognition (AC) is part of basic research, but contains elements that are applied research.

1.2.1 Virtual Reality and Subliminal Stimulation (SOW 6.1.2.1-2) (U)

(U) Virtual reality (VR), the construction of a sensorial environment using computers, is a technology, which is currently at its earliest stages of development. We will scan the appropriate literature and determine if these techniques may be applied to specific questions in the research of AMP. Specifically, can VR be adapted as a method of registering an AC response, and thus, improve the quality of the data?

(U) Subliminal perception (SP) is also at an early stage of understanding. We will continue to follow the pertinent research and provide improved protocols as they become available.

1.2.2 Sender/No-Sender in the Ganzfeld (SOW 6.1.2.3) (U)

(U) Under a previous effort, we let a subcontract to University of Edinburgh to construct a room that is qualified for Ganzfeld studies. In addition, we let a subcontract to Psychophysical Research Laboratories (PRL) to perform a retrospective analysis of the literature to determine the effects of a sender in AC-Ganzfeld studies. That analysis was inconclusive because of an insufficient number of studies.[17] Under the same subcontract, PRL developed a detailed technical protocol for an experiment that would be definitive in determining the role of the sender in the Ganzfeld.[18] Pilot trials for this experiment are being conducted as an extension to the previous effort.

(U) We propose, therefore, to conduct a definitive formal study to determine the role of a sender in the Ganzfeld. Twenty five of the best receivers from the pilot study will contribute two Ganzfeld trials each. We propose to examine four different sender conditions during which the sender is exposed to:

- The full video and audio of the target material
- The video portion of the target only
- The audio portion of the target only
- No portion of the target material

(U) The latter case is one in which the sender is blind to the target material. As part of the standard auto-Ganzfeld procedure, personal and psychological profiles will be collected from each receiver. In addition, we will add the Q-Sort profile. (See Section 1.2.3 below for details.) Full details of the auto-Ganzfeld protocol can be found in Honorton et al.[19] In conjunction with SOW 6.2.2, we will determine if the sender is important with regard to specific target elements in long-range AC experiments (see Section III.1.4.2.4 and page 14).

1.2.3 A Heuristic Variable Search, the Q-Sort (SOW 6.1.2.4) (U)

(U) We propose to explore potential personality variables, such as verbalizer vs imager, as they relate to AC ability through the use of the Q-Sort method, a systematic and quantitative technique for obtaining comprehensive psychodynamic descriptions of individual personalities, and through a meta-analysis of the appropriate literature. Using the Q-Sort, we will address the following questions:

- What personality variables are common to those individuals that perform well on AC tasks? Is there a typological uniformity?
- What would an ideal AC profile look like?
- How do the personalities of individuals who do not do well on AC tasks differ from those who do?

(U) First conceived by William Stephensen, the Q-Sort method has developed into a useful tool for comparing personality variables between a wide variety of different populations. For example, studies

have ranged from examining the differences between effective and ineffective liars to analyzing the difference between individuals who tend to rely upon external visual fields rather than proprioceptive (i.e., musculo skeletal) cues in determining true vertical.[20]

(U) For each individual, the method involves sorting 100 cards into nine categories with an assigned number of cards placed within each category. On each card is written a single psychological statement in a theoretically neutral form, so as to suggest a continuum rather than an either/or dichotomy. The numbers of cards within each category must be 5, 8, 12, 16, 18, 16, 12, 8, 5, respectively. The success of this method, in general, is primarily because the individual is forced to make limited (i.e., ten) decisions about him/herself in the extreme categories (i.e., the very most and the very least characteristic) where the Q-Sort comparisons are most sensitive. Those statements that are sorted into the middle categories represent statements that are psychologically neutral where the Q-Sort comparisons are relatively insensitive. The Q-Sort is self administered and takes approximately 20 minutes per individual.

(U) In 1989 we conducted a preliminary test of this method using 14 individuals, including three receivers who were known to be talented in AC. Figure 1 shows the results in a cluster diagram. Cluster analysis assembles Q-Sort scores into groups of similar profiles, and attempts to create groups that are as different from one another as possible. The result is a visual display of the clusters as shown in Figure 1. To the 14 receivers, we have added three standard profiles; a normal and two different types of personality pathology.[20] It is striking to observe in Figure 1 that the pathological profiles are in a cluster by themselves and that the normal profile is clustered with the receivers.

(U) To date, the Q-Sort method shows potential in that the personality descriptions of the three known talents (i.e., receivers 009, 454, and 389) were grouped together in a single cluster. By averaging the personality traits of these three individuals we have developed a tentative AC profile, which is also shown in Figure 1.

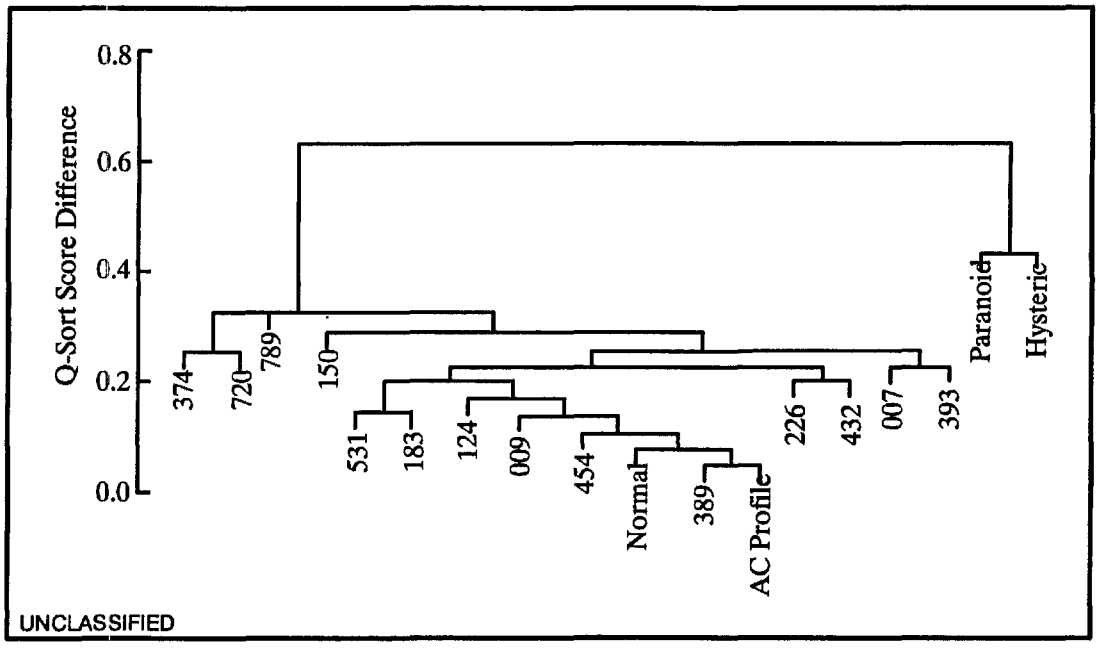

Figure 1. Cluster Diagram for 14 Receivers (U)

(U) We propose to administer the California Q-Set version of the Q-Sort to approximately 25 people, including individuals who are known to be highly talented in AC, individuals who are known not to be talented in AC, and individuals with unknown AC skill. All Q-Sort data will be entered into a cumulative database where it will be available for analysis. A cluster diagram similar to the one in Figure 1 will be used to display the results. If the AC profile continues to appear in a different cluster than receivers who have little AC talent, then we will recommend that a formal experiment be conducted to test the AC abilities of those individuals whose profiles were clustered with the AC profile.

1.3 Theoretical Issues (SOW 6.1.3) (U)

(U) Theoretical issues include heuristic and fundamental modeling from physics, physiology, and psychology used to systematize what is known about AMP. In addition, experiments may be conducted that address specific constructs that are basic to the various models.

1.3.1 Anomalous Perturbation (SOW 6.1.3.1-3) (U)

(U) In conjunction with the sponsor, we propose to design a pilot experiment protocol for an anomalous perturbation (AP) experiment, which will be conducted at a facility specified by the sponsor. SAIC will provide two AP high-talent specialists to participate in that study. Their participation will not exceed more than two three-day visits to the sponsor-designated laboratory. Should the pilot experiment succeed, then we will explore the role of a variety of variables such as shielding and distance.

1.3.2 Theoretical Models (SOW 6.1.3.4-5) (U)

(U) The data from AMP experiments have begun to suggest theoretical approaches toward understanding the underlying principles for the phenomena. Most of the previous modeling has been quantum mechanical,[21,22] metaphoric,[23] or behavioral[24] and generally has not led to testable hypotheses. One heuristic model does suggest experiments, but it does not provide fundamental insight into the mechanisms of AC.[25] We propose to explore a variety of different theoretical approaches that are either dictated by the strength of the AC data or strongly suggested by fundamental concepts.

(U) Specifically, we propose to examine in detail those theoretical approaches, from among the following, that are most likely to provide testable hypotheses (i.e., new protocols) and lead us toward a theoretical understanding of the physics of AC:

(U) **The Einstein, Poldasky, Rosen (EPR) Paradox.** The paradox suggests possible information transport during the collapse of a wave function. The paradox arises naturally when considering two-particle correlations and the effect of measuring the state of one particle, which gives rise to unambiguous knowledge of the state of the correlated particle even though they may outside each others light cones. While no one any longer questions the validity of the predictions of quantum mechanics for correlated systems, the fact of that validity has caused a philosophical revolution. There is no underlying reality—no absolute reality. There is only reality as defined by measurements made by an observer. This approach is suggested because AC experiments appear to show "correlation" of separated events. While it is doubtful that AC is quantum mechanical, nonetheless the EPR formalism might provide conceptual insight into possible AC mechanisms.

(U) **Thermodynamic Entropy.** For nearly two hundred years scientists have taken the position that the entropy of a closed system can never decrease with time and that, on the scale of the universe, entropy always increases with increasing time. Recently however, Steven Hawking has raised the possibility that macroscopic time or psychological time, the time that we perceive, is actually determined by the change of entropy.[26] The study of classical thermodynamic entropy appears likely to be the most productive

based upon the results of a recent Shannon entropy experiment[27] and on the extensive evidence for so-called precognition—AC of targets *before* they have been determined.[28]

(U) **General Relativity.** Matt Visser's paper on traversable wormholes suggests that it is physically possible to transport energy (and, therefore, information) can transfer between remote space-time points without traversing the classical distance between the space-time events.[29] General Relativity, therefore, is a candidate for a theoretical basis for AC.

(U) **Tachyons.** It is possible to describe mathematically a fully consistent universe in which everything moves faster than the speed of light. The particles inhabiting such a universe are named tachyons while, in contrast, the particles with which we are familiar are named tardyons. The important fact is that neither particle can ever travel at the speed of light. Photons, of course, are common to both universes. Moreover, this is a non-quantum mechanical description. Theoretical understanding of tachyons may assist in defining an energy transfer mechanism for AC.

(U) **Physical Interpretation of Potentials.** Classical mechanics and, for the most part, quantum mechanics have treated potentials as convenient mathematical descriptions for which there was no physical instantiation. Recent experiments have shown, however, that a potential can affect a particle even when there is no corresponding force present. If potentials could be made to propagate, then they could be candidates for an energy transfer mechanism for AC.

(U) All theoretical approaches will be constrained to provide testable hypotheses. We suspect that if a reasonable theoretical model can be developed, that it will entail physics mechanisms that can be tested by traditional experimentation.

1.3.3 Change of Shannon Entropy: An Intrinsic Target Property (SOW 6.1.3.6) (U)

(U) Most previous research has considered AC from a "systems" perspective in that the target and receiver are thought of as a single AC unit.[30,31] This is not particularly productive if we are searching for intrinsic properties of target systems to guide target selection. An intrinsic target property is one that is inherently tied to the target (e.g., size, distance from the receiver, activity, entropy) and devoid of any external interpretation. Interpretations, such as emotional impact, can be considered as extrinsic properties of the target or, more precisely, intrinsic properties of the receiver. Extrinsic target properties are critical when AC is viewed from a systems point of view; however, if these properties can be controlled in experiments, then it is possible to examine intrinsic target properties with little confounding interference from the extrinsic ones.

(U) As an aid in understanding extrinsic noise properties of targets, we define target pool *bandwidth* as a qualitative indicator of the number of disparate target elements in the pool. Clips from video movies represent a large-bandwidth pool; such disparate scenarios as Superman in space, a nature segment on the Grand Canyon, and a James Bond thriller can be included in the same target pool. Conversely, the well-known Zener cards represent a vary narrow target bandwidth. Our collection of *National Geographic* magazine photographs represent an intermediate bandwith; the size and general content of the material is roughly the same throughout this pool.

(U) We hypothesize that the bandwidth of the target pool is a source of *intrinsic* noise in the receiver. We assume that the information that is gained by AC is small compared to other sensory mechanisms, and the primary mental task for a receiver is to discriminate the AC data from internally generated,

target-unrelated information. For large bandwidth target pools that may contain almost anything, a receiver is unable to censor his/her internal experience. Thus, target-related and target-unrelated material are equally reported; therefore, large bandwith pools are extrinsically noisy. Small bandwith pools are also extrinsically noisy but for a different reason. If a receiver is cognizant of all of a limited set of target elements (e.g. Zener cards), then he/she has an internal discrimination problem. All target possibilities are experienced with equal intensity because of knowledge about the pool and vivid short-term memory. Assuming there is weak AC information about the specific target, then target-extrinsic noise is generated because of the very low signal-to-noise ratio.

(U) By developing an appropriate target pool, which possess an intermediate bandwidth, we may be able to control for various target-extrinsic noise sources and, therefore, focus upon intrinsic target properties. If the change in Shannon entropy is an intrinsic target property, then we would expect that AC quality for dynamic targets should be higher than the quality from static targets. In the previous program we observed a significant correlation between AC quality and entropy within the static target pool, but we did not obtain significant evidence for AC within the dynamic pool, and thus were not able to determine entropy correlations within that pool. We speculate that the lack of significant AC in the dynamic pool might be due to bandwidth considerations. We propose to improve upon this previous study. Specifically,

- We will develop a new target pool of static and dynamic targets that possess an "intermediate" bandwidth similar to our existing photographs from *National Geographic* magazine. Our approach will be to develop dynamic segments that are similar in quality to the existing static pool, and select frames from that dynamic set to construct a new static pool. This will assure that the bandwidh of the two target types (i.e., static and dynamic) are similar. The static and dynamic Shannon entropy will be calculated as described in the technical protocol for the earlier experiment.[32]
- We will conduct each AC trial at our Menlo Park facility, and each trial will be monitored. This is in contrast with our earlier experiment during which receivers were unmonitored.
- We will provide immediate and full color feedback at the end of each trial. This is in contrast with our earlier experiment during which feedback was significantly delayed.

(U) With these improvements, we plan to conduct an experiment to test the specific hypothesis that the quality of AC linearly depends upon the intrinsic target property, the change of Shannon entropy.

(U) We will employ approximately five receivers who will contribute a total of 20 trials each (i.e., 10 trials with dynamic and static targets, respectively).

(S/NF) A successful outcome of this experiment will determine, with a high degree of confidence, if the change of Shannon entropy qualifies as an intrinsic target property. If it qualifies, then we will be able to improve target selection significantly for laboratory experiments and intelligence applications.

1.4 Applied Research (SOW 6.2) (U)

(U) Applied research of AMP is defined as that activity that is primarily designed to improve the quality of experimental results.

1.4.1 Database (SOW 6.2.1) (U)

(S/NF) As an aid to determining the range and limits of AMP for applications, we propose to construct an on-line database that records a number of physical, psychological, and environmental variables for each AMP trial. Examples of physical variables include receiver-target distance and changes in thermodynamic and/or Shannon entropy of the target system. Similarly, psychological and environmental vari-

ables include scores from the Q-sort personality test, and the A_p geomagnetic index, respectively. SAIC routinely enters many experiment variables into an existing database, but we propose to update the database with variables that are more useful in intelligence applications. In addition, the protocol and outcome of each trial will be coded into the database.

(S/NF) Once this database contains sufficient numbers of laboratory and intelligence experiments, then relatively simple queries may reveal ranges or limits to specific variables. We propose to perform such queries each time sufficient new data are added to the database.

1.4.2 Quantitative Assessment (SOW 6.2.2) (U)

(U) It is now clear that free response AC experiments can generate much larger effects than forced choice protocols. However, the problem of determining the quantity and accuracy of information in free response experiments has not been satisfactorily resolved. Such experiments typically generate both textual and visual information. This information has previously been assessed by ranking and descriptor set methods. Both methods have disadvantages: ranking can greatly underestimate statistical significance, while descriptor-based methods suffer from uncertainty as to how to define the conceptual categories used to distinguish target and response elements. The research described below aims to improve these assessment methods.

1.4.2.1 Neural Networks (U)

(U) Neural networks have been widely applied to image and pattern recognition problems. However, they have not been applied to the problem of assessing free response AC data. SAIC will explore the application of neural networks to the existing fuzzy set assessment method. Neural networks will be trained on fuzzy set encodings of stimulus-response pairs from AC trials by individual subjects. If consistent patterns between receivers' responses and their intended targets exist, then neural networks can be trained to recognize them. The trained networks can be used to assess additional AC data sets and the results can be cross validated against existing fuzzy set scoring and ranking methods. Because neural network methods can discriminate complex mappings in the presence of noise, the method may yield more precise estimates of target-response correlation than the current fuzzy set descriptor system.

1.4.2.2 Image Decomposition (U)

(U) Numerous techniques have been developed for image compression. While most of these algorithms compress images by exploiting redundancy in the pixel array, some recent techniques take a different approach based upon image decomposition.[33] This "fractal image compression" method relies on partitioning images into subsets that can be used to reconstruct the original by recursively applying affine transformations to the subsets. When applied to conventional image compression, the technique relies on a judicious choice of the original partitioning. It may hold particular promise for assessing AC responses because such responses seem to be characterized by a limited set of formal elements, which give a natural set of basis elements or partitions. We propose to explore the fractal image analysis of AC responses to verify that such responses can be characterized by a relatively small set of underlying forms. These will be used as the basis set for the partitioning of the target material used in the AC experiments. Judging schemes based upon these forms can then be investigated. A further refinement will involve searching for a set of optimal basis elements for the partitioning of targets and responses using an efficient search method such as a genetic algorithm. The goal will be to develop an analysis method that avoids the arbitrariness associated with descriptor-based methods, while capturing much of the formal richness of information seen in superior AC performance.

1.4.2.3 Fuzzy Sets (U)

(U) We will continue to improve our standard fuzzy set approach to qualitative analysis of AC. In particular, we will determine if the sensitivity of the method can be improved by redefining the visual elements that are in current use.[34]

1.4.2.4 Intelligence Application Test-bed (S/NF)

(S/NF) One primary difficulty in assessing the quality of AC in intelligence applications is that frequently there is little or no ground truth. Thus, we have had to rely upon other collection methods to provide corroborating evidence. Even in those cases, the kind of information that is obtained is frequently not helpful in learning how to improve AC for the collection of intelligence data.

(S/NF) Under an earlier program, we carried on two intelligence-like AC trials.[35,36] These trials were conducted just as if they were real-world problems except that the targets were chosen by the sponsor specifically because complete ground-truth could be obtained. Thus, it was possible to provide quantitative assessment in near-operational conditions.

(S/NF) We propose to conduct up to five such AC trials. We will provide up to four receivers for this activity. The sponsor will provide a variety of different targets, most of which will contain elements that would normally be of interest to the intelligence community. As a calibration, we suggest that some of the targets be AC sites that are used during laboratory investigations (e.g., bridges, buildings, etc.), and that SAIC personnel should remain blind to the entire target pool.

(U) At the end of each trial, the sponsor and SAIC will construct an evaluation matrix, which may include fuzzy sets, to compute the accuracy and reliability of the AC session. The results of that evaluation will be entered into the tracking database so that receiver-dependent historical records will be preserved. SAIC will provide summaries and raw data in a report at the end of each trial.

1.4.3 Intelligence Applications (SOW 6.2.3) (S/NF)

(S/NF) At the sponsor's request, SAIC will provide personnel to participate in intelligence applications of AC. This will include access to up to four receivers for a total of five separate target systems. SAIC will provide summaries and raw data in a report at the end of each task.

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1.5 Research Methodology and Support (SOW 6.3) (U)

1.5.1 Committees (SOW 6.3.1) (U)

(U) We propose to use the existing committees as support and quality control for methodological and policy issues. These committees are the Scientific Oversight Committee (SOC), the Institutional Review Board (IRB), and the Policy Oversight Committee (POC).

1.5.1.1 The Scientific Oversight Committee (U)

(U) The five voting members of the SOC are respected scientists from the following disciplines: physics, astronomy, statistics, neuroscience, and psychology. The membership is as follows:

- Steven A Hillyard, Ph.D. — Professor of Neuroscience, University of California, San Diego
- S. James Press, Ph.D. — Professor of Statistics, University of California, Riverside
- Garrison Rapmund, M.D. — Liaison with the Institutional Review Board (see below)
- Melvin Schwartz, Ph.D. — Director, High Energy and Nuclear Physics, Brookhaven NL
- Yervant Terzian, Ph.D. — Chairman, Department of Astronomy, Cornell University
- Philip G. Zimbardo, Ph.D. — Professor of Psychology, Stanford University

(U) The SOC is tasked with three major responsibilities:

- Review and approve all experimental protocols prior to the collection of data.
- Critically review all experimental final reports as if they were submissions to technical scientific journals. All remarks are in writing and are included in the final technical report to the sponsor.
- Suggest directions for further research.

(U) In addition to these three responsibilities, the SOC members are encouraged to exercise un-announced drop-in privileges to view experiments in progress.

1.5.1.2 Institutional Review Board (U)

(U) The IRB's responsibility is to assure the safety of human subjects in experiments and to assure the sponsor that all research involving the use of human subjects is in compliance with all appropriate federal regulations. The IRB members represent the health, legal, and spiritual professions in accordance with government guidelines. The membership is as follows:

- Byron Wm. Brown, Jr., Ph.D. — Biostatistics, Stanford University
- Gary R. Fujimoto, M.D. — Occupational Medicine, Palo Alto Medical Foundation
- John Hanley, M.D. — Neuropsychiatry, University of California, Los Angeles
- Robert B. Livingston, M.D. — Neuroscience, University of California, San Diego
- Robin P. Michelson, M.D. — Otolaryngology, University of California, San Francisco
- Ronald Y. Nakasone, Ph.D. — Buddhist Studies, Institute of Buddhist Studies, Berkeley, CA
- Garrison Rapmund, M.D. (Chair) — Air Force Science Advisory Board
- Louis J. West, M.D. — Neuropsychiatry, University of California, Los Angeles

1.5.1.3 Policy Oversight Committee (U)

(S/NF) The POC's responsibility is to advise SAIC and assure the Defence Intelligence Agency that the activity under this contract fulfills the requirements of the intelligence community and the Department of Defense. In addition, the POC recommends policy for the establishment of a long-term program for the application of AMP to problems of interest to these communities.

1.5.2 Management and Research Support (SOW 6.3.2) (U)

(U) We will provide technical, management, and administrative support for all research activity, which will include the production of financial and interim technical reports.

1.5.3 National/International Conferences (SOW 6.3.3) (U)

(U) We will provide SAIC personnel to attend selected national/international conferences that relate to biophysics, AMP, and neuroscience.

2. Quick Reaction Capability (SOW 7.0) (U)

(U) We propose to reserve approximately five percent of the program effort in order to respond rapidly to the sponsor's request for briefings, technical papers, conference attendance, or unanticipated experiments or applications.

IV. GLOSSARY (U)

(U) 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:

- AC—A form of information transfer in which all known sensorial stimuli are absent. That is, some individuals are able to gain access, by as yet an unknown process, to information that is not available to the known sensorial channels.
- Agent—An individual who attempts to influence a target system.
- Analyst—An individual who provides a quantitative measure of AC.
- Feedback—After a response has been secured, information about the intended target is displayed to the receiver.
- Monitor—An individual who monitors an AC session to facilitate data collection.
- Protocol—A template for conducting a structured data collection session.
- Receiver—An individual who attempts to perceive and report information about a target.
- Response—Material that is produced during an AC session in response to the intended target.
- Sender/Beacon—An individual who, while receiving direct sensorial stimuli from an intended target, acts as a putative transmitter to the receiver.
- Session—A time period during which AC 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).

V. REFERENCES (U)

(U) All titles are unclassified.

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4. E. C. May, R. Targ, and H. E. Puthoff, "Possible EEG Correlates to Remote Stimuli Under Conditions of Sensory Shielding," *Electro/77 Professional Program*, Meeting of the IEEE, New York (April 1977) UNCLASSIFIED.
5. E. C. May, W. L. W. Luke, V. V. Trask, and T. J. Frivold, "Observation of Neuromagnetic Fields in Response to Remote Stimuli," *Proceedings of Presented Papers*, The Parapsychological Association 33rd Annual Convention, Chevy Chase, MD, pp 168-185, (August 1990) UNCLASSIFIED.
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9. G. Pfurtscheller and A. Aranibar, "Evaluation of Event-related Desynchronization (ERD) Preceding and Following Self-paced Movement," *Electroencephalography and Clinical Neurophysiology*, Vol. 46, pp. 138-146 (!979) UNCLASSIFIED.
10. G. Pfurtscheller, G. Lindinger, und W. Klimesch, "Dynamisches EEG-Mapping—Bildgebendes Verfahren fuer die Unterschung Perzeptiver, Motorischer und Kognitiver Hirnleistunger," *Z. EEG-EMG*, Vol 17. pp. 113-116 (1986) UNCLASSIFIED.
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15. W. Braud, D. Shafer, and S. Andrews, "Further Studies of Autonomic Detection of Remote Staring: Replications, New Control Procedures, and Personality Correlates," *Proceedings of the Parapsychological Association 35rd Annual Convention,* Las Vegas, NV (August 1992) UNCLASSIFIED.

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20. J. Block, *The Q-Sort Method in Personality Assessment and Psychiatric Research,* Consulting Psychologists Press, Inc., Palo Alto, CA (1978) UNCLASSIFIED.

21. E. H. Walker, "Quantum Mechanics/PSI Phenomena: The Theory and Suggestions for New Experiments," *The Journal of Research in PSI Phenomena,* Vol. 1. No. 1, pp. 38-52 (1976) UNCLASSIFIED.

22. E. H. Walker, "A Comparison of the Intuitive Data Sorting and Quantum Mechanical Observer Theories," *The Journal of Parapsychology,* Vol. 51. No. 3, pp. 217-228 (1987) UNCLASSIFIED.

23. R. G. Jahn and B. J. Dunne, *Margins of Reality: The Role of Consciousness in the Physical World,* Harcourt Brace Jovanovich, Orlando, FL (1987) UNCLASSIFIED.

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VI. RESUMES (U)

(U) All the following resumes are unclassified.

Edwin C. May, Ph.D.

Director, Cognitive Sciences Laboratory

EDUCATION

Ph.D., Physics, University of Pittsburgh, 1968
B. S., Physics, University of Rochester, 1962

EMPLOYMENT HISTORY

1991 – Date	Director, Cognitive Sciences Laboratory Science Applications International Corporation, Menlo Park, California
1985 – 1990	Program Manager, Cognitive Sciences Program SRI International, Menlo Park, California
1979 – 1985	Senior Research Physicist for the Psychoenergetics Program SRI International, Menlo Park, California
1976 – 1979	Consultant to the Psychoenergetics Program SRI International, Menlo Park, California
1973 – 1979	Research Conslultant and Hardware Engineer The Biofeedback Institute of San Francisco, San Francisco, California
1972 – 1979	Technical Consultant and Software Engineer Digital Pathways, Inc., Mountain View, California
1972 – 1976	Physics Instructor City College of San Francisco, San Francisco, California
1972 – 1976	Technical Consultant Psychophysical Research Laboratories, Princeton, New Jersey
1968 – 1971	Postdoctoral Fellow University of California, Davis,California
1960 – 1964	Summer Position, Earh and Planetary Sciences Department The RAND Corporation, Santa Monica, California

SPECIALIZED EXPERIENCE

Currently, Dr. May is the Director of the Cognitive Sciences Laboratory (CSL) which currently employs over twenty full or part-time researchers from a variety of disciplines. He refined his management skills while being the Program Manager for a similar, five-year program at SRI International. Dr. May has been involved in various forms of anomalous cognition research for over 19 years. Prior to that, he accumulated over 12 years experience in experimental physics research, nuclear reaction mechanisms, and nuclear structure. His accelerator experience includes a three-stage tandem Van de Graaff (18 Mev); a 76-inch, variable energy cyclotron (50 Mev); an FM cyclotron (450 Mev protons); fixed frequency cyclotron (8 Mev); FN tandem Van de Graaff (18 Mev); and an EP tandem Van de Graaff (30 Mev). Other specialize experience includes four years of γ-ray spectroscopy (on and off line), one year of trace-element analysis (x-ray, and α particle techniques), numerical analysis, Monte Carlo techniques, digital signal processing, and cardiac blood flow research.

For over thirty years, Dr. May has participated in the design and construction of fast (< 0.1 ns) digital electronics, and in the programming and implementation of sophisticated computer systems. Platforms include UNIX workstations and various main frames. Besides C, Dr. May is fluent in Fortran and a variety of assembly and 4GL languages.

DISSERTATION

"Nuclear Reaction Studies via the (p,pn) Reaction on Light Nuclei and the (d,pn) Reaction on Medium to Heavy Nuclei," B. L. Cohen, advisor, University of Pittsburgh, Pittsburgh, PA (1968).

PUBLICATIONS

Author or co-author of a total of 130 reports: 11 papers in experimental nuclear physics, 12 papers presented at technical conferences on anomalous cognition; 19 abstracts presented at professional conferences on physics and cognitive science; 79 technical or administrative reports to various clients of SRI International; and 9 miscellaneous reports and proposals.

GENERAL INTERESTS

Application of experimental nuclear physics technology and methodology to other fields of interest (e.g., psychology, psychophysics, neuroscience, cognitive science, and medicine); compute technology, AI, biofeedback, Indian religions, music, exotic food and soaring.

Wanda L. W. Luke

Research Analyst, Cognitive Sciences Laboratory

EDUCATION B.A., Anthropology, University of Nevada/Reno, 1986.

EMPLOYMENT HISTORY

1991 – Date	Research Analyst, Cognitive Sciences Laboratory Science Applications International Corporation, Menlo Park, California
1984 – 1990	Research Analyst, Cognitive Sciences Program SRI International, Menlo Park, California

SPECIALIZED EXPERIENCE

Currently, Dr. May is the Director of the Cognitive Sciences Laboratory (CSL) which currently employs over twenty full or part-time researchers from a variety of disciplines. He refined his management skills while being the Program Manager for a similar, five-year program at SRI International. Dr. May has been involved in various forms of anomalous cognition research for over 19 years. Prior to that, he accumulated over 12 years experience in experimental physics research, nuclear reaction mechanisms, and nuclear structure. His accelerator experience includes a three-stage tandem Van de Graaff (18 Mev); a 76-inch, variable energy cyclotron (50 Mev); an FM cyclotron (450 Mev protons); fixed frequency cyclotron (8 Mev); FN tandem Van de Graaff (18 Mev); and an EP tandem Van de Graaff (30 Mev). Other specialize experience includes four years of γ-ray spectroscopy (on and off line), one year of trace-element analysis (x-ray, and α particle techniques), numerical analysis, Monte Carlo techniques, digital signal processing, and cardiac blood flow research.

For over thirty years, Dr. May has participated in the design and construction of fast (< 0.1 ns) digital electronics, and in the programming and implementation of sophisticated computer systems. Platforms include UNIX workstations and various main frames. Besides C, Dr. May is fluent in Fortran and a variety of assembly and 4GL languages.

DISSERTATION

"Nuclear Reaction Studies via the (p,pn) Reaction on Light Nuclei and the (d,pn) Reaction on Medium to Heavy Nuclei," B. L. Cohen, advisor, University of Pittsburgh, Pittsburgh, PA (1968).

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GENERAL INTERESTS

Application of experimental nuclear physics technology and methodology to other fields of interest (e.g., psychology, psychophysics, neuroscience, cognitive science, and medicine); compute technology, AI, biofeedback, Indian religions, music, exotic food and soaring.

Joseph A. Angelo, Jr.

Director, Advanced Technology

EDUCATION

Ph.D. Nuclear Engineering, The University of Arizona, 1976
M.S. Nuclear Engineering, The University of Arizona, 1968
B.ME. Mechanical Engineering, Manhattan College, 1965

PROFESSIONAL/TECHNICAL EXPERIENCE

Scientific and Engineering Professional—27 years experience (including 20 years with Air Force)

SPECIFIC EXPERIENCE

1990 – Present, SAIC

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1. Director, Advanced Technology, Melbourne Office

Philip D. Wasserman

Director of Neural Network Applications

EDUCATION

Study leading to Ph.D. in Computer Science and Engineering

MS Electrical Engineering and Computer Science, Santa Clara University

BS Mathematics, Summa Cum Laude, College of Notre Dame

PROFILE OF EXPERIENCE

Over 25 years experience in the field of artificial neural networks. Author of two books and several papers on theory and applications. Successfully applied artificial neural networks to solve a wide range of real world problems.

More than 30 years diversified experience as an Electronics Engineer, heavily involved in the detailed design of electronic instruments, analog and digital circuits, computer software, computer hardware and computer systems. Extensive project management and technical supervision experience.

Founder of two profitable electronics manufacturing firms. Served as Chief Executive Officer for eight years. Designed all of the firms instrumentation products.

MAJOR ACCOMPLISHMENTS, 1979 - 1991

Developed artificial neural network architectures and training algorithms. Applied these to various problems in pattern recognition, optimization, and control. Published technical papers and presented technical seminars on artificial neural networks for a number of organizations.

Wrote two books, Neural Computing and Neural Source, on artificial neural networks. Published by Van Nostrand Reinhold in 1989.

Developed analog and digital circuits and sub-systems for an automatic instrument used in semiconductor manufacturing, including signal acquisition and conditioning, electromechanical servo controllers, and software written in C for control and processing of data.

Designed an autofocus system for a diffraction limited microscope. Included inventing an algorithm, (patent pending) designed a digital signal processing board, and developing the software system to operate in a multi–processor environment.

Designed a solid–state high resolution video camera for use in a semiconductor inspection system, including video frequency, low level analog signal processing circuits.

Designed a high speed video signal conditioning and image digitizer board with interface to a 40 Megabyte/sec parallel digital bus, including a/d, d/a, and analog signal processing.

Performed architectural design of high speed digital signal processing circuit intended for SMOS integration. Supervised a group which designed and constructed TTL prototype to evaluate the architecture, and implemented digital signal processing algorithms for V22 bis modem.

Developed the architecture, circuit, and system design of a high speed modem utilizing a multiprocessor configuration. Produced a custom assembler, wrote programming instructions and assisted algorithm developers in its use. Designed active filters and implemented sample and hold, a/d, and d/a circuits. Designed power supply including thermal design of package. Supervised printed circuit layout, mechanical packaging, and conducted tests verifying performance to specification.

Designed three new nuclear radiation measuring instruments and supervised their packaging and production engineering.

Conceived, designed circuits, and supervised hybrid circuit packaging of a wrist worn digital heart rate monitor. This involved the design of two semi-custom integrated circuits, one bipolar and the other CMOS, and coordination with the integrated circuit producers. Supervised mechanical design and performed production engineering leading to a successful product.

SAIC®

Designed hardware and algorithms for a 160 MBPS, parallel–pipelined image processing system. This included software simulation of processing algorithms, digital and analog circuit design, and integration with optical and mechanical systems.

Participated in the establishment of a Computer Science Major at the College of Notre Dame. Recommended courses, evaluated instructors, and taught many of the courses. Selected software and installed a new administrative computing system for the College of Notre Dame. Upgraded hardware, established procedures, trained personnel, and wrote programs to integrate system for Finance, Admissions, Registration, and Graduate Office.

MAJOR RECENT PROFESSIONAL EMPLOYMENT

1990 – Present — Director, Neural Network Applications, Science Applications International Corporation

Identify applications for artificial neural networks, develop solutions, and implement them.

1975 – Present — President, Anza Research, Inc.

Designed artificial neural network architectures and algorithms for pattern recognition, optimization, and control. Completed challenging, detailed, hardware and software design projects. This included both analog and digital circuits and systems. Designed software systems and algorithms, from concept to coding and test. Managed development projects, solved technical problems in manufacturing, developed and evaluated new product proposals, performed technical and marketing studies.

1983 – 1989 (part time) — Program Director and Assistant Professor, Computer Science, College of Notre Dame, Belmont, California

Teach computer science courses, participate in curriculum development, staffing, scheduling. Provide academic advising for students.

1987 – Present (part time) — Lead Instructor, Computer Science, Chapman College, Sunnyvale, California

Teach computer science courses, evaluate instructors, assist in course planning.

1985 – 1986 — Director of Administrative Computing, College of Notre Dame, Belmont, California

Establish and maintain the central computerized administrative computing system, supervise support personnel, provide training and documentation for the various offices.

Steven A. Hillyard

Scientific Oversight Committee

EDUCATION

1968	Ph.D., Psychology, Yale University
1964	B.S., Biology, California Institute of Technology

PROFESSIONAL EXPERIENCE

1980 – Present	Professor of Neurosciences, Department of Neurosciences, University of California, San Diego
1968 – 1980	Lecturer through Associate Professor, Department of Neurosciences, University of California, San Diego
1964 – 1968	USPHS Traineeship at Yale University in Physiological Psychology with Robert Galambos
1963 – 1964	Research Assistant at Caltech in Psychobiology with C. R. Hamilton and R. W. Sperry

TEACHING AREAS

Basic Medical Neurology

Sensory Processes: Neurophysiology of Vision and Audition

Human Information Processing: Attention and Perception

Psychophysiology

Neuropsychology

HONORS AND AWARDS

Fellow of the American Association for the Advancement of Science

MERIT Award from National Institute of Mental Health

UCSD Neurosciences Department Outstanding Teacher Award

ADVISORY AND REVIEW PANELS

NIMH Study Section: Mental Health Small Grant Committee, 1976 – 1980.

NIMH Study Section: Neurosciences Research Review Committee, 1986 – 1990.

Advisory Council: International Association for the Study of Attention and Performance, 1978 – 1983, 1985 – Present.

Advisory Panel to NIMH Neurosciences Research Branch, 1982 – 1983.

S. James Press

Scientific Oversight Committee

EDUCATION

1961 – 1964	Ph.D., Statistics, Stanford University
1952 – 1954	M.S., Mathematics, University of Southern California
1950 – 1951	Physics, University of Minnesota
1947 – 1950	B.A., Physics, New York University

ACADEMIC HISTORY

1977 – Present	Professor, Department of Statistics, University of California, Riverside
1984 – 1985	Visiting Scholar, Department of Statistics, Stanford University
1977 – 1984	Professor and Chairman of Department, Department of Statistics, University of California, Riverside
1974 – 1977	Professor, Faculty of Commerce and Business Administration, and Institute of Applied Mathematics and Statistics, University of British Columbia
1966 – 1974	Associate Professor, Graduate School of Business, University of Chicago
1972 – 1973	Visiting Professor, Department of Statistics and Department of Administrative Sciences, Yale University
1970 – 1971	Honorary Research Fellow, Department of Statistics, University College, London
1970 – 1971	Visiting Professor, Department of Statistics, London School of Economics and Political Science
1964 – 1966	Lecturer/Assistant Professor, Statistics, UCLA Graduate School of Business Administration – Business
1956 – 1960	Lecturer, Extension Mathematics Courses, UCLA Physical Science
Summer 1968	Visiting Professor, Department of Economics, UCLA

NONACADEMIC EXPERIENCE

1964 – 1966	Statistics, Econometrics, Operations Research, The Rand Corporation, Santa Monica, California
1954 – 1961	Statistical Analysis, Reliability, Operations Research, Douglas Aircraft Corporation, Santa Monica, California
1951 – 1954	Statistical Control and Information Theory, Northrop Aircraft Company, Hawthorne, California
1949 – 1950	Cosmic Ray Physics, Microscopy, Atomic Energy Commission, Brookhaven National Laboratories, Upton, New York

PROFESSIONAL MEMBERSHIPS

American Association for the Advancement of Science (Elected Fellow, January, 1981)

American Statistical Association (Elected Fellow, August, 1974)

Bernoulli Society for Mathematical Statistics and Probability

Biometric Society

Econometric Society

International Statistical Institute (Elected December 1979)
Institute of Mathematical Statistics (Elected Fellow, 1981)
New York Academy of Sciences (Elected March, 1979)
Royal Statistical Society (Elected Fellow, 1971)
The Institute of Management Sciences

Garrison Rapmund, M.D.

Major General (Retired), United States Army

EDUCATION

1972 – 1975	George Washington University School of Government and Business Administration; half MBA curriculum completed when selected for Army War College, which superseded MBA course.
1964 – 1965 1959 – 1960	Chinese (Mandarin), private tutorial in Malaysia
1949 – 1953	College of Physicians & Surgeons (P & S), Columbia University. M.D. Degree
1945 – 1949	Harvard College. A.B. Degree
1934 – 1945	St. Andrew's College Preparatory School, Aurora, Ontario, Canada

POSTGRADUATE MEDICAL TRAINING:

1961	NIH Postdoctoral Fellowship in Microbiology at P & S, Columbia
1954 – 1957	Pediatric residency: Babies Hospital, Columbia–Presbyterian Medical Center, New York; Chief Resident Pediatrician, 1956 – 1957
1953 – 1954	Internship, Bellevue Hospital, New York

PROFESSIONAL CERTIFICATION:

1961	Certified in Pediatrics by the American Board of Pediatrics Medical Licenses: New York No. 077729–1 California No. G–004697

MILITARY EDUCATION:

1976	Army War College, Carlisle, Pennsylvania
1966	Officer Career Course, Medical Field Service School, Fort Sam Houston, Texas
1957	Officer Orientation Course, Medical Field Service School, Fort Sam Houston, Texas

PROFESSIONAL EXPERIENCE:

Present Position — Consultant to Systems Engineering and Management Associates, Falls Church, Virginia

Responsible for facilitating commercialization of Strategic Defense Initiative technologies to the health care industry and the life sciences research community.

1987 – 1990 — Chief Scientist (Biomedical Operations), Flow General, Inc., McLean, Virginia

Advised the Chief Executive Officer on health–related activities of the six subsidiary companies world–wide. Served as Director, Biomedical and Veterinary Services Division, Flow Laboratories, Inc., owned by Flow General, Inc.

1957 – 1986 — United States Army

Volunteered for Active Duty, Commissioned Captain, USAR, 1957; awarded Regular Army Commission, 1966; promoted to MAJ (1964), LTC (1967), COL (1968), BG (1979), MG (1981); Retired 1 September 1986.

MILITARY ASSIGNMENTS:

1979 – 1986 Assistant Surgeon General (R & D)
Pentagon, Washington, DC

Represented medical R & D on the Army General Staff and to the Office of the Secretary of Defense, Office of Management and Budget, and Congressional committees.

1979 – 1986 Commander, U.S. Army Medical Research and Development (USAMRDC), Fort Detrick, Maryland

Supervised execution of a broad biomedical research program leading to the development of the following kinds of products for protection of the health of military personnel: drugs and vaccines against infectious diseases and biological warfare agents; drugs against chemical warfare agents; field medical materiel for the diagnosis, resuscitation and treatment of severe trauma; definition of human performance limits in the operation of Army aviation, in the operation of Army weapon systems, and in all types of climatic extremes.

1976 – 1979 Director, Walter Reed Army Institute of Research (WRAIR), Washington, DC

Command of largest DoD medical research lab (1400 personnel, $40M budget), including research units in Thailand, Malaysia, Brazil, Kenya, and West Germany.

1975 – 1976 Deputy Director, WRAIR

1974 – 1975 Associate Director for Operations, WRAIR

Troubleshooting the worl-wide operations of WRAIR.

1972 – 1974 Chief, Life Sciences Division, Army Research Office, and Chief, Life Sciences Directorate, Office of the Chief of Research and Development, Headquarters, Department of the Army (HQDA)

Only physician on Army General Staff; staff responsibility for food as well as all medical R & D.

1971 Deputy Commander, USAMRDC Headquarters

1970 – 1971 Chief, Research Planning Office, USAMRDC Headquarters

Prepared first long–range plan for Army medical research.

1969 – 1970 Director of Medical Research, US Army Medical Research and Development Command (USAMRDC) Headquarters

Senior staff cognizance for medical and environmental research.

1965 – 1969 Commander, US Medical Research Unit, Kuala Lumpur

Planned and executed lab and field research on rickettsial and other diseases with British, Australian, New Zealand, Thai, and Malaysian Armed Forces, and with Malaysian Ministry of Health, in Malaysia, Thailand, and Borneo.

1964 – 1965 Department Chief, US Army Medical Research Unit, Kuala Lumpur: Department of Rickettsial Diseases

Mite–borne typhus research.

1961 – 1964 Research Officer, WRAIR: Department of Rickettsial Diseases

Tick–borne spotted fevers.

1958 – 1960 Research Officer, US Army Medical Research Unit, Kuala Lumpur, Malaysia
Arthropod–borne viruses, mite–borne typhus.

1957 – 1958 Research Officer, Walter Reed Army Institute of Research (WRAIR): Diagnostic Section, Department of Virus Diseases

Influenza, arthropod–borne viruses.

Melvin Schwartz

Scientific Oversight Committee

EDUCATION:

1958	Ph.D., Columbia University
1953	A.B., Columbia University

PROFESSIONAL EXPERIENCE:

1956 – 1957	Research Associate, Brookhaven National Laboratory
1957 – 1958	Associate Physicist, Brookhaven National Laboratory
1958 – 1960	Assistance Professor, Columbia University
1960 – 1963	Associate Professor, Columbia University
1963 – 1966	Professor, Columbia University
1966 – 1983	Professor, Stanford University
1983 – Present	Consulting Professor, Stanford University
1970 – 1991	Chairman/CEO, Digital Pathways, Inc.
1991 – Present	Associate Director for High Energy and Nuclear Physics, Brookhaven National Laboratory

PUBLICATIONS:

Principles of Electrodynamics	McGraw–Hill – 1972 Dover Press – 1985

Approximately forth scientific articles in the field of High Energy Physics.

RESEARCH:

While at Columbia and Stanford: High Energy experimental particle physics with particular emphasis on weak interactions. Most noted achievement is the discovery of Muon type neutrinos.

Yervant Terzian

Scientific Oversight Committee

Yervant Terzian is the James A. Weeks Professor of Physical Sciences, and is the Chairman of the Department of Astronomy at Cornell University. He has been a member of the University faculty for 26 years (the first three of which were spent at Cornell's Arecibo Observatory.) He is also a Professor in the graduate field of History and Philosophy of Science and Technology. His fields of expertise are the physics of the Interstellar Medium, Galaxies, and Radio Astronomy. He has been a Visiting Professor at various universities including the University of Montreal (Canada), the University of Thessaloniki (Greece), and the University of Florence (Italy.) He has been Chairman or member of numerous national and international scientific committees affiliated with NASA, the U.S. National Academy of Sciences, and the International Astronomical Union. He has been President of Cornell's Sigma Xi Scientific Research Society; Chairman of Cornell's Research Policies Committee, a Danforth Associate, and a Research Professor with the National Astronomy and Ionosphere Center. he is a member of the International Astronomical Union, the International Union of Radio Science, the American Astronomical Society, and the Society for Scientific Exploration, among other memberships. His is an Associate Editor of *The Astrophysical Journal.* in 1984, he received the Clark Distinguished Award for Excellence in Teaching. In 1988, he was appointed Director to the New York Cluster of the Pew Undergraduate Program in Science Education, and in 1989 he was awarded an Honorary Doctor of Science Degree from Indiana University for his scientific achievements. In 1990, he was elected Foreign Member of the Armenian Academy of Sciences. he is the author or co–author of more than 150 scientific publications and the editor of four books. At Cornell he teaches a popular undergraduate course on "The Nature of the Universe" and graduate radio astrophysics courses.

Phillip G. Zimbardo

Scientific Oversight Committee

EDUCATION:

1959	Ph.D., Yale University
1955	M.S., Yale University
1954	A.B., Brooklyn College

PROFESSIONAL EXPERIENCE:

1968 – Present	Professor, Department of Psychology, Stanford University
1970 – 1988	Director, Stanford University Social Psychology Research Training Program
1969 – 1980	Co–Director (with Dr. E. Hilgard), Stanford Hypnosis Research Laboratory
1963 – 1967	Training and Research in Hypnosis, Morton Prince Clinic, New York
1961 – 1968	Assistant/Associate Professor, New York University
1959 – 1960	Post Doctoral Trainee, West haven Veteran's Hospital
1959 – 1962	Research Associate, Dr. S. Sarason, Yale University
1958 – 1961	Instructor/Assistant Professor, Yale University

Visiting Professor: Yale, Barnard College, Stanford, Columbia University, University of Louvain (Belgium), University of Texas, University of Hawaii, International Graduate School of Behavioral Sciences, Florida Institute of Technology at Lugano, Switzerland.

EDUCATION:

1989	Order of Merit List Selectee, US Army War College
1989	US Army Computer Science School, Artificial Intelligence Orientation
1988	Science Applications International Corporation, Soviet Military Operations Research Course
1985	US Army Command and General Staff College
1970	Bachelor of Arts, University of Miami

PROFESSIONAL EXPERIENCE:

1990 – 1991	Science Applications International Corporation, Menlo Park, CA. Employed by the Cognitive Sciences Laboratory to participate in a number of anomalous cognition experiments.
1984 – Present	Student and Author–Instructor, US Army Command and General Staff College

Prepare and present large and small group instruction to student officers in areas of advanced tactics, intelligence and Electronic Warfare operations, and Soviet tactics including Soviet Automated Troop Control. Developer of threat scenarios. Recognized Subject Matter Expert (SME) for US Army Intelligence and Electronic Warfare operations. Designer of the Artificial Intelligence decision support methodologies for Defense Advanced Research Projects Agency (DARPA) sponsored AirLand Battle Management (ALBM) Program. Principal instructor for Advanced Tactical Operations. Voting member of the prestigious CGSC Master Tactician Board. Developer of the standardized targeting and collection management doctrine to support 1989 publication of Corps Deep Operations Tactics, Tech-

niques and Procedures manual.

1981 – 1983 Tactical Intelligence Officer

Principal intelligence staff officer (S3) for a heavy maneuver brigade and principal assistance (G2/Ops) for a heavy division. Direct the activities of a 12 person intelligence element at brigade, ensuring continuous 24--hour intelligence support to the brigade and subordinate battalions during field operations. At division level, coordinate and direct the activities of six principal G2 elements and the intelligence requirements of four major and six separate subordinate commands of the division in garrison, during contingency planning, and during field deployment.

1970 – 1980 Human Intelligence Case Officer and Counterintelligence Special Agent in tactical and strategic settings.

Plan, coordinate and execute unilateral and bilateral collection operations in support of theater command intelligence needs. Conduct liaison with national level federal and military agencies in areas of positive collection and technical surveillance countermeasures.

SKILLS:

Career Army Military Intelligence Officer highly experienced in all–source intelligence operations from national level through maneuver battalion. A Human Intelligence Case Officer fully experienced in the development and conduct of highly sensitive and compartmented Department of Defense collection operations. a Counterintelligence Special Agent experienced in security analysis and investigative procedures. A tactical intelligence officer experienced at brigade, division and corps level. A trainer of soldiers through the general officer level in intelligence and electronic warfare subjects, Soviet–style operational art and tactics, and US Army operational decision making and tactics. A highly regarded Subject Matter Expert and Knowledge Engineer in US Army Intelligence and Electronic Warfare systems, operations and methods and the application of emerging Artificial Intelligence hardware and software technologies to Army operations. Current SBI.

Daryl J. Bem

EDUCATION:

1961 – 1964	Ph.D., Social Psychology, University of Michigan
1960 – 1961	Graduate work in physics, Massachusetts Institute of Technology
1956 – 1960	B.A., Physics, Reed College

PROFESSIONAL EXPERIENCE:

1978 – Present	Professor of Psychology, Cornell University
1987 – 1988	Visiting Professor of Psychology, Harvard University
1978 – 1971	Professor of Psychology, Stanford University
1964 – 1971	Assistant Professor to Professor of Psychology & Industrial Administration, Carnegie–Mellon University

PROFESSIONAL SERVICE:

Personality Editor, *Journal of Personality and Social Psychology*, 1976 – 1978
Consulting Editor, *Journal of Personality*, 1982 – 1984
Consulting Editor, *Journal for the Theory of Social Behavior*, 1982 – Present
Consulting Editor, *Psychological Review*, 1982 – 1988
Review Board Member for several other journals.

Member at Large of the Division of Behavioral Sciences of the National Research Council (National Academy of Sciences). 1971 – 1974.

Testimony on the psychological effects of false confessions, delivered before the Senate Subcommittee on Constitutional Amendments of the Committee on the Judiciary. July 20, 1966.

Consultant to Pennsylvania Human Relations Commission, 1970.

Author with S. Bem of *Training the woman to know her place: The social antecedents of women in the world of work*, distributed by the Pennsylvania Department of Education to guidance counselors. 1970. Several similar articles over the years in various magazines, journals, and textbooks, including: Bem, D. J. (Fall, 1987). A Consumer's Guide to Dual–Career Marriages. *ILR Report*, 25, No. 1.

Research and testimony for the Equal Employment Opportunities Commission before the Federal Communications Commission on sex–segregated practices at AT & T. 1972.

Member of the Secretary's Advisory commission of the Rights and Responsibilities of Women (Commission serving as advisors to the Secretary of Health, Education & Welfare.) 1972 – 1973.

Consultant to the League of Women Voters in a sex–discrimination suit against the U.S. Department of Labor (with S. Bem.)

Consultant in several other sex–discrimination cases.

Joseph G. Depp

EDUCATION:

1970	Ph.D. Theoretical Nuclear Physics, Carnegie Mellon University
1966	M.S. Physics, Carnegie Mellon University
1965	B.S. Physics, Carnegie Mellon University

PROFESSIONAL EXPERIENCE:

Dr. Depp served as an officer in the U.S. Army from October 1969 to June 1971. During this period, he worked as a strategic intelligence analyst for the Defense Intelligence Agency. He also served a tour in Vietnam as the Operations/Intelligence Officer for the 21st Signal Corps. He left active duty as a captain having received honors as the Distinguished Military Graduate, the two-time recipient of the Army Commendation Medal, and the recipient of the Bronze Star.

Dr. Depp joined SRI International (then Stanford Research Institute) as a Research Physicist in July 1971. For the next five years, he served as manager of a classified field program sponsored by the Defense Nuclear Agency and under the operational control of the JCS/Joint Reconnaissance Center. In recognition of his contribution to this national program, Dr. Depp was awarded the Exceptional Public Service Medal by the Defense Nuclear Agency.

In 1976, Dr. Depp was named manager of SRI's Electro-Optics Program. During this period, the Electro-Optics Program produced the country's first operational differential absorption lidar. The transportable lidar system was built for the Electric Power Research Institute. It was used by EPRI as part of a five-year field program to measure sulfur dioxide in the atmosphere. Dr. Depp also supervised several programs to examine the vulnerability of laser-guided weapons to optical countermeasures and participated in the development of a design concept for the integrated reconnaissance system.

In 1979, Dr. Depp became the founding director of SRI's Special Systems Office (SSO). For seven years, the SSO provided an interface for applying SRI technologies to the problems of intelligence collection and processing. In 1979-1980, Dr. Depp led a multicontractor effort to produce a five-year plan for Air Staff Intelligence (AFIN). This plan began with an examination of Air Force roles and missions, developed collection requirements for these mission, assessed current and planned capability to meet the requirements, and recommended technology and system initiatives to fill shortfalls.

During the early to mid-80's, Dr. Depp supervised the design, development, and deployment of an HF system to detect atmospheric nuclear bursts. The system is still in use at several overseas locations. During the same period, Dr. Depp participated in the evaluation of the vulnerability of certain Stealth aircraft. He contributed to the IR signature analysis and he prepared a report on the detectability of LPI radar.

Dr. Depp joined Science Applications International Corporation in 1986. He began the Advanced Applications Division (AAD) in the SAIC Los Altos Office. The AAD focused primarily on the application of active and passive optical technology. During this period, Dr. Depp was a participant in a multi-

contractor study, the Exploitation Technology Initiative, which determined the requirements for automated assistance to imagery analysts and recommended a development program to meet the requirements.

In January 1989, Dr. Depp joined Advanced Decisions Systems (ADS) as Manager of Special Programs. In this position, he provided in-depth technical expertise for a broad set of applications. In March 1989, Dr. Depp assumed the supervision of a major ADS program for the development and deployment of a situation assessment system for US ARMY EUROPE. The system was completed on time and successfully deployed to Europe for a demonstration. In July 1989, at the request of ADS corporate management, Dr. Depp formed the ADS Research Department to provide a clear path for technology migration into ADS from the universities. Dr. Depp was named manager of the Planning and Systems Control Division in April, 1991. The P&C Division is the largest division within ADS. It's programs are in the areas of advanced planning systems for defense C2, automated scheduling systems, and automonous vehicles. Dr. Depp remained the division manager until he left ADS to form a new company, ACCURAY, in October, 1991.

Dr. Depp is currently the president and CEO of ACCURAY Inc. ACCURAY is a medical electronics company formed to bring to market a new device for radiosurgery, the Neurotron 1000. ACCURAY has been formed with private funding. It enjoys close ties with Stanford University Hospital, which will provide clinical testing for the Neurotron 1000.

Jennifer Lovejoy Dole

EDUCATION:

1987 – 1991	B.A. Psychology, University of Kansas Graduated magna cum laude. Phi Beta Kappa.

EMPLOYMENT:

1991 – Present	Research Assistant, The Lucidity Institute

PROFESSIONAL EXPERIENCE:

Jennifer Dole's position at the Lucidity Institute sprang from her keen interest in lucid dreaming. Lucid dreaming is defined as dreaming while knowing that you are dreaming, and is the primary focus of the research efforts of the Lucidity Institute. Jennifer Dole had been experimenting with lucid dreams since early childhood, but did not realize this was an area of scientific investigation until 1986, when she came across the work of the psychophysiologist, Dr. Stephen LaBerge, founder of the Lucidity Institute.

This is her first year of employment following graduation. Her duties at the Institute, and as an assistant to Dr. LaBerge, include collection and entry of data, operation of equipment in the sleep laboratory, and much contact with subjects. Jennifer Dole also has specialized technical knowledge of the company's computerized biofeedback device, the DreamLight, which is used to facilitate the induction of lucid dreams. She responds to the queries of DreamLight users, and offers solutions to overcoming impediments they may encounter while working with the product.

Jennifer Dole has worked with the Lucidity Institute in all stages of experiments designed to expand the knowledge of lucid dreaming, and to further describe the potential of this powerful state of consciousness. She has experience in lucid dreaming research as a collaborator in the creation and design of experimental protocols, and as both technician and subject in the sleep laboratory.

Jennifer Dole is capable of applying her personal and professional knowledge of lucid dreaming to the scientific investigation of other discrete mental states.

Thane J. Frivold

Software Engineer

Geoscience and Engineering Center
SRI International, Menlo Park, CA

EDUCATION:

1986 B.A., Computer Science (summa cum laude),
Dartmouth College, Hanover, NH

PROFESSIONAL SKILLS:

Technical Expertise: user interface design and implementation, object–oriented design, database design and interface, statistical data analysis, systems programming.

Computer Languages: C, Objective–C, PostScript, SQL, LISP, ADA, Icon, Pascal, Mesa

Window Environments: X11 (Motif, Xt, Xlib), NeWS, SunView

Third Party Packages: SunUnify, PV–Wave, S, Qcalc, Mathematica, Macsyma, Interleaf OPS

Operating Systems: UNIX (BSD 4.3 and System V), Macintosh, MS–DOS, XDE

Foreign Language: French (spoken and written fluency)

REPRESENTATIVE PROJECT ASSIGNMENTS AT SRI (Since 1986)

Management of on–going maintenance and development for an existing C3 system (Sitmap)

Design and implementation of a Motif user–interface for an existing C3 system (Sitmap/UTACCS)

Development of an X11 window manager to coordinate collaborative, multi–media conferencing

Development of a UNIX process management tool for use in the administration of C3 systems

Enhancement of user interface and graphics features for a C3 system running under NeWS (C21S)

Implementation of extensions to a NeWS server for efficient rendering of maps

Design of numerous relational databases

Development of high level (forms) and low level (C language) interfaces to numerous databases

Development of decision analysis methods using fuzzy set paradigms

Development of encoding schemes for outdoor scenes using fuzzy set paradigms

Development of analysis tools for study of magnetoencephlographic brain wave data

Integration of a Sun Workstation with CAMAC hardware for real–time data acquisition

OTHER PROFESSIONAL EXPERIENCE:

Public Response Associates: designed, developed and maintained a real–time opinion monitoring tool for use in focus groups.

Dartmouth College: contributed to the design and development of an experimental, distributed relational database.

Keith Harary

EDUCATION:

1986	Ph.D. in Psychology, emphases in experimental psychology and clinical counseling, Graduate School of the Union Institute
1975	B.A., Magna Cum Laude with Distinction in Psychology, Duke University, Durham, North Carolina
1972 – 1967	Specialized training in crisis and suicide intervention, individual and family counseling, Mental Health Center, Durham, North Carolina

PROFESSIONAL EXPERIENCE:

1990 – 1991 Science Applications International Corporation, Menlo Park, CA. Employed by the Cognitive Sciences Laboratory to participate in a number of anomalous cognition experiments.

1986 – Present President and Research Director, Institute for Advanced Psychology

Advanced laboratory and field research and education in cognition, perception, communication, creativity, learning, group dynamics and stress.

1983 – 1985 Design Consultant, Atari Corporation

Psychological consulting in design of video game software.

1980 – 1982 Research Consultant, SRI International

Advanced research and applications in cognition, perception and communication.

1979 Director of Counseling, Human Freedom Center

Crisis intervention counseling under clinical supervision in halfway house for former Peoples Temple and other cult members re–entering mainstream society.

1976 – 1979 Research Associate, Department of Psychiatry, Maimonides Medical Center

Management of laboratory operations and budget, supervision and training of personnel; research in sensory deprivation, altered states of consciousness, cognition, perception and communication.

1973 – 1976 Research Associate, Psychical Research Foundation

Experimental research in cognition, perception and physiological correlates of altered states of consciousness, biofeedback, and human–animal communication.

1972 – 1976 Crisis Counselor, Durham Mental Health Center

Volunteer counseling in all aspects of crisis and suicide intervention, and supervising and training of other counselors for crisis intervention hotline and drop–in center.

1974 Counseling Intern, School of Nursing, Duke University Medical Center

Psychological counseling under clinical supervision with terminally ill patients and their families.

1974 Research Intern, Dorothea Dix State Psychiatric Hospital

Studying Milieu Therapy, interviewing psychiatric patients and reviewing long–term psychiatric case histories.

1972 Research Consultant, Foundation for Research on the Nature of Man

Research in psychophysical phenomena associated with cognition, perception and communication.

1971 – 1972 Research Consultant, American Society for Psychical Research

Research in cognition, perception and communication and physiological correlates of altered states of consciousness.

PROFESSIONAL ORGANIZATIONS:

Member, American Psychological Association
Member, Society for Professional Journalists
Member, Association for Media Psychology
Member, National Writers Union

Beverly S. Humphrey

EDUCATION:

Currently	Ph.D. graduate student, Anthropology, Stanford University
1977	B.A., Anthropology, Stanford University
1975	Language Study, The Goethe–Institut, Freiberg, Germany
1975	Archaeological Research, Stanford in Italy

SPECIALIZED PROFESSIONAL COMPETENCE:

Historical and theoretical linguistics; languages (modern and ancient); cognitive anthropology; archaeological field techniques.

REPRESENTATIVE RESEARCH ASSIGNMENTS AT SRI (Since 1978):

Design of computerized database management applications

Evaluation of free–response psychoenergetic data and development of evaluation techniques

Development of psychokinesis experimental protocols and responsibility for PK experimentation

Investigation of target demarcation and target selection

Participation in RV experiments as both experiment monitor and beacon

OTHER PROFESSIONAL EXPERIENCE:

Historical linguistics researcher in ancient Greek at Stanford University

Psychoenergetics research consultant for The Mobius Group (archaeological Egyptian project)

Researcher in correlations between botanical anomalies and archaeological site locations, Florence, Italy

Jean Jacobson

EDUCATION:

1985	Master of Science Degree, Water Resources Engineering, Stanford University, Stanford, CA
1980	Bachelor of Science Degree, Civil Engineering Massachusetts Institute of Technology, Cambridge, MA

EMPLOYMENT:

1989 – Present	Independent Contractor Clients include SRI International and EMCONAssociates.
1988 – 1989	Senior Technical Writer and Editor, SRI International, Menlo Park, CA
1987 – 1988	Supervisor of Technical Writing, EMCON Associates, San Jose, CA
1985 – 1987	Associate Engineer, Leedshill–Herkenhoff, San Francisco, CA
1980 – 1984	Environmental Engineer, U.S. Environmental Protection Agency, Oregon Operations Office, Portland, OR

PROFESSIONAL EXPERIENCE:

Writing and Editing. Responsible for writing and editing effective reports on a variety of topics: hazardous waste site assessment and remediation, groundwater and surface water hydrology and chemistry, radar, plasma dynamics, artificial intelligence, and many more. Have written policy guidance documents on sensitive drinking water issues for the general public and prepared enforcement documents for attorneys. Audiences have ranged from the highly technical and specialized readers of journal articles to the general public targeted by press releases.

Have developed document style guidelines for several companies, streamlined their publication process, and given seminars on effective and persuasive writing. Familiar with microcomputers and numerous word processing programs, including WordPerfect and Microsoft Word. Knowledgeable about desktop publishing.

Engineering. Have developed site assessment, remediation, and closure plans addressing contaminated soils, surface water, and groundwater. Have installed monitoring wells and conducted short– and long–term groundwater monitoring programs. Groundwater investigations have included groundwater flow patterns, influence of geological fault zones, historical water quality trends, and safe yield analyses. Inspected and provided technical assistance to drinking water systems; recommended changes in facilities or operations (or both); reviewed plans. Responsible for ensuring public health was protected during water system emergencies.

Research. As an engineer and writer, have conducted extensive literature searches, field investigations, and interviews. At the Massachusetts Institute of Technology and at Stanford University, performed original research in environmental and water resources engineering.

Graphics. Experienced in developing effective figures and tables and in working closely with graphics artists to ensure the final product presents a clear, uncluttered summary of the data. Familiar with several microcomputer graphic design programs.

Gary Langford

EDUCATION:

1971	M.S., Physics, California State University, Hayward Thesis: Experimental Research of the metastable States of Helium, Methane, and Ammonia
1969	A.B., Astronomy, University of California, Berkeley Graduate Paper: Kirkwood Gap Anomalies and Gravitational Tidal Forces

PROFESSIONAL EXPERIENCE:

1990 – 1991 Science Applications International Corporation, Menlo Park, CA. Employed by the Cognitive Sciences Laboratory to participate in a number of anomalous cognition experiments.

1985 – Present Geodynamics Corporation, Sunnyvale, California

1988 – 1991 Manager of Business Development

Responsible for corporate business development plan, corporate marketing strategy and Sunnyvale business plan. Set up recruiting and hiring program for Sunnyvale, began in–house seminar series and training courses. Reorganized and redirected marketing and sales activities. Worked with the staff to prepare proposals, white papers, and presentations.

1988 Manager of System Engineering Department

Turned around a department with morale problems; improved staff feelings of self worth; inspired higher performance to satisfy customers; and increased business and profit on department contracts. Prepared engineering report and contingency plans for major U.S. Air Force installation.

1986 – 1988 Program Manager

Increased contract work from one individual to nineteen over a two year period. Was the primary interface to prime customer, completing all contract negotiations. Trained all task managers and set up seminars to improve the technical staff's marketing abilities. Responsible for training nineteen individuals to prepare presentation materials for System Design Review; directed 115 engineers and managers to prepare presentation materials for a Preliminary Design Review, and 260 for a Critical Design Review. Received letters of commendation from customer and prime contractor, all three reviews were resounding successes. Co–developed a digital engineering technique to geoposition points on the earth's surface using synthetic aperture radar and geodetic reference maps. Designed the digital cartographic data storage and retrieval system to support the needs of a ground station data processing and image exploitation capability. helped develop the computer security policy for the program. Prepared the advanced synthetic aperture radar image processing requirements, defined the image processing requirements, and the human–machine interfaces.

1985 Member of the Professional Staff

Managed and trained a group of thirty–seven engineers and managers to prepare presentation materials for a Critical Design Review. Customer stated that it was the most informative and best CDR they had ever attended. Customer and Prime Contractor sent letters of commendation.

1984 – 1985 Private Investment Banking, Mountain View, California

Completed a merger between Maid–Rite and Argus Technology (deal valued at $78 million). Completed an acquisition of Zephre Design by Cal West Industries (deal valued at $28 million).

1983 – 1984 President and CEO of Zycom, Inc.

Profit and loss responsibility for $4.3 million public company (NASDAQ listed.)

1979 – 1983 President and CEO of Abacus II, Inc., Santa Clara, California

Profit and loss responsibility for $1.7 million computer manufacturing company. Designed a computerized point--of–sale system for the fast–food industry. Major customers included: McDonald's, Sizzler, Taco Bell, and Sail–Thru. Started company in my garage, raised $4.5 million from U.S. venture capitalist companies and two industrial companies, Verbatim Corporation and Matra, SA. Took the company public in 1983 through merger with Zycom, Inc.

1979 – 1985 Owner of Consultants International, Mountain View, California

Profit and loss responsibility for $300 thousand business. U.S. based consulting group focused on scientific and technical intelligence for the federal government. Participated in President's Working Groups on Strategic Planning.

1974 – 1979 Physicist, SRI International, Menlo Park, California

Specialized in scientific and technical intelligence. Responsible for foreign technology assessments in areas of directed energy weapons, strategic defense radars, tactical elements and communications, and facilities.

1971 – 1974 Research Engineer, Lockheed Missiles & Space Company, Sunnyvale, California

Space sensor technology engineering and qualification testing. Managed activities of high energy laser laboratory. Awarded two patents: one for night vision equipment, other for non–destructive testing device used to test the fuel system on C4 missiles.

1973 Physics Instructor, Foothill Junior College, Los Altos Hills, California

Taught first year physics for non–majors.

1970 – 1971 Associate Physics Instructor, California State University, Hayward, California

1965 – 1970 Fruitvale Canning Company, Oakland, California

Started low–level and was promoted to Assistant Foreman after two summers. Responsible for night shift operations of canning department. Restructured night work crews over a two night period and increased production by more than 50%.

Nevin D. Lantz

EDUCATION:

1979	Ph.D. Clinical Psychology, California School of Professional Psychology
1976	M.A. Clinical Psychology, California School of Professional Psychology
1969	B.S. Natural Science, Eastern Mennonite College

PROFESSIONAL EXPERIENCE:

1990 – Present Consulting Psychologist, Self–Employed, Lititz, PA

Provide consultation services to individuals, groups and industry in the areas of employee development, management development, problem–solving, training and other issues relating to the use of human resources in research and employment settings.

1985 – 1990 Senior Research Psychologist, SRI International, Menlo Park, CA

Multi–disciplinary "think–tank" doing contract research for government and private industry. Worked with a staff of 10 in the Cognitive Sciences Program conducting experiments in hypnosis, personality assessment, and brain function using MEG. Responsible for experimental protocols, conducting experiments, report writing and consulting with staff on psychological issues. Also functioned as human use officer for the project by developing informed consent procedures and forms, submitting experimental protocols to and interacting with the SRI Institutional Review Board and acting as project liaison to the client's human use representatives. Became familiar with all aspects of protecting human subjects from research risks.

1985 – 1989 Private Practice, Berkeley, CA

Psychotherapy practice specializing in cognitive therapy for depression, relationship problems, and other neurotic disorders. Utilized hypnosis for controlling addictions.

1982 – 1985 Acalanes Psychology Associates, Walnut Creek, CA

Co–founder of group psychotherapy practice specializing in family therapy, psychological assessment and consultation. Provided counseling and employee development services to small businesses.

1979 – 1983 Staff Psychologist (Licensed CP), Alameda Co. Health Services, Oakland, CA

Delivered psychological services to the psychiatric and medical in–patient units of a county general hospital. Duties included psychological assessment, DMS III diagnosis, psychotherapy, crisis intervention, and expert witness in court cases involving involuntary hospitalization. Developed and conducted training programs for mental health employees aimed at increasing communication skills.

1977 – 1985 Private Practice (Licensed MFCC), San Francisco, CA

Counseling practice specializing in marriage, family and adolescent problems.

1975 – 1977 Counselor, National Center for Solving Special Social and Health Problems, San Francisco, CA

Served as a counselor in a community clinic that dealt with alcohol addiction, drug addiction, sexual dysfunction, and relationship difficulties.

1970 – 1972 Mental Health Specialist, Illinois State Psychiatriac Institute, Chicago, IL

Provided staffing for in–patient, emotionally disturbed/delinquent adolescent research program. Duties included working with a multi–disciplinary staff developing and carrying out individualized treatment plans using a variety of therapeutic modalities, administration of psychotherapeutic medications, group therapy, and collecting data for research purposes.

Ellen S. Messer

PROFESSIONAL EXPERIENCE:

1990 – 1991 Science Applications International Corporation, Menlo Park, CA. Employed by the Cognitive Sciences Laboratory to participate in a number of anomalous cognition experiments.

1989 – Present Associate Trainer, Program Development Specialist
DeLoayaza Associates

Training management and support staff in Human Relations Skills, Meeting Effectiveness and Career Development. Developing and producing workshop materials.

1989 – Present Trainer, Materials Development Writer
Innovations Group

Facilitating seminars in the concepts and applications of the Organizational Entrepreneur.

1988 – Present Associate Facilities Trainer
The O'Neil Group

Presenting Xerox Leadership Through Quality Programs to management and support staff in Xerox Business Service Centers throughout the United States.

1985 – Present Co–Director, Trainer, Program Planning and Development Writer
ACT Associates, Professional Communication Skills and Organization Development Consultants

Developing and writing presentations and workshop instructional materials. Presenting and facilitating management and support staff seminars in human relations technology specializing in Applied Communication and Assertiveness Skills.

1985 – 1989 Associate Trainer, JEA Associates

Presenting seminars and workshops in Management Skills, Team Building and Presentation Skills. Specializing in Organizing Skills Training based on Beyond Time Management: Organizing the Organization authored by Dr. Jane E. Allen.

1985 – 1989 Associate Trainer, Wilcox Training Systems

Presenting programs in Problem Solving and Supervisory Skills.

1984 – 1987 Program Development Writer/Field Coordinator and Trainer,
New York State Office of Human Resource Development

Developed and produced three day module of Supervisory Transition Skills for the New York State Department of Social Services. Delivered program to personnel throughout the state of New York.

1981 – 1986 Co–Director/Facilitator, Copwood Associates – Career Skills Development Consultants

Structured, developed and presented workshops and seminars in all aspects of personnel management including appraisals, team development, managerial skills, stress management, and creativity.

S. James P. Spottiswoode

EDUCATION:

1976 – 1979 BSc., Applied Mathematics, First Class Honors, University of Wales

PROFESSIONAL EXPERIENCE:

1981 – 1990 Consultant, SRI International, Menlo Park, California

Research on applications of pattern recognition and signal analysis to the detection of anomalous cognition and on the measurement problem in quantum mechanics.

1987 – 1989 Consultant and Chief Statistician, National Research Group, Los Angeles, California

Numerical modeling, simulation and forecasting of motion picture revenues.

1984 – 1986 Consultant, World Bank

Design of appropriate computer installations for agronomic monitoring in Africa.

1979 – 1984 Consultant, AGA Signals Plc, London

Design of microcomputer hardware, numerical analysis, and optics for navigational aids.

1971 – 1975 Research Assistant, Department of Geology, University of Wales

Research into sub bottom profiling, side scan sonar systems, high intensity underwater sound sources and hydrophone arrays.

John F. Stach

EDUCATION:

1979	M.S.E.E., Electromagnetics, communications, pattern recognition, and control systems, Air Force Institute of Technology, WPAFB, OH
1978	B.S.E.E., Electromagnetics, communications, computers and optics, Michigan Technological University, Houghton, MI

PROFESSIONAL EXPERIENCE:

1990 – 1991	Science Applications International Corporation, Menlo Park, CA. Employed by the Cognitive Sciences Laboratory to participate in a number of anomalous cognition experiments.
1984 – Present	Research Engineer, Remote Measurements Lab, SRI International, Menlo Park, California

Project and task leader for many research projects including development of electromagnetic measurement and simulation techniques, imaging methods, linear and nonlinear optimization, applications of adaptive networks and systems, and classification of biological signals. Responsibilities include technical management, research, and promotional activities.

1982 – 1983	Branch Chief (Captain, USAF), DSCS III Satellite Program, USAF Space Division, Los Angeles, California

Technical management of the communications payload of the DSCS III satellite. Responsibilities included all communications related research, development, and deployment of the operational DSCS III system.

1979 – 1982	Project Engineer (Captain, USAF), Aeronautical Systems Division, WPAFB, OH

Performed technical consulting and applied research for various project offices within ASD. Duties included Co–op training; and antenna simulation, testing, and evaluation on full–scale aircraft.

PROFESSIONAL PUBLICATIONS:

M.S. Thesis, 1979: "Validation and Receiver Design for a Random Point Process Model of Atmospheric Radio Noise."

URSI Conference, 1988: "Extrapolation of RCS Data Using an Admittance–Matrix Model," Syracuse, NY.

ACES Conference, 1989: "Improving Moment–Method Predictions Using Measurements," Monterey, CA.

URSI Conference, 1989: "On the Use of Measurements in Moment–Method Predictions," San Jose, CA.

PROFESSIONAL MEMBERSHIPS:

IEEE

International Neural Network Society (INNS)

Applied Computational Electromagnetics Society (ACES)

Planetary Society

Jessica M. Utts

EDUCATION:

1978	Ph.D., Statistics, Pennsylvania State University
1975	M.A., Statistics, Pennsylvania State University
1973	B.A., Math and Psychology, State University of New York at Binghamton

PROFESSIONAL EXPERIENCE:

1984 – Present	Associate Professor, Division of Statistics and Director, Statistical Laboratory, University of California, Davis
1987 – 1988	Visiting Scientist, SRI International, Cognitive Sciences Program, Menlo Park, California
1983, 1984 – 1985	Visiting Professor, Stanford University, Department of Statistics
1979 – 1984	Assistant Professor, University of California, Davis, Division of Statistics
1978 – 1979	Assistant Professor, University of California, Davis, Department of Mathematics
1978	Instructor, Pennsylvania State University, Department of Statistics

ACADEMIC HONORS:

Fellow, American Statistical Association

Academic Senate Distinguished Teaching Award, University of California, Davis, 1984

Magnar Ronning Award for Teaching Excellence, University of California, Davis, 1981

National Science Foundation Traineeship, Pennsylvania State University, 1973 – 1974

Phi Beta Kappa, State University of New York at Binghamton, 1973

PROFESSIONAL AFFILIATIONS AND OFFICES:

American Association for the Advancement of Science: Biometric Soc. Rep. to Section U, 1988 –

American Statistical Association: President, State College PA Chapter, 1977 – 1978

Biometric Society, Western North American Region (WNAR): President, 1986; Regional Committee, 1982 – 1984; Program Chair, 1983

Caucus for Women in Statistics: President, 1988

Institute of Mathematical Statistics: Treasurer, 1988 – ; Assistant Program Secretary, 1980, 1989

Parapsychological Association: Representative to AAAS, 1989 –

Phi Beta Kappa: President of UC Davis Chapter, 1984 – 1985, Vice President, 1983 – 1984

Society for Scientific Exploration: Council Member, 1987 –

MAJOR CONSULTATIONS AND PANELS:

National Academy of Sciences, Panel on the Evaluation of AIDS Interventions
Congressional Office of Technology Assessment, Panel to Assess Defense Technologies
National Park Service, Statistics Short Course for Resource Management Trainees
California Department of Health Services, Course on Statistics for Groundwater
SRI International Cognitive Sciences Program, Consultant
California Public Utilities Commission, Consultant
Hershey Medical Center, Sudden Infant Death Syndrome Study, Consultant
ABC News 20/20 Program, Interview (appeared July 4, 1985)

EDITORIAL POSITIONS:

Associate Editor, *Journal of the American Statistical Association*, Reviews
Statistical Editor, *Journal of the American Society for Psychical Research*

NAME: Byron Wm. Brown, Jr. SGFOIA3

BORN: SGFOIA3

MARITAL STATUS:

OFFICE ADDRESS: Department of Health Research and Policy, Division of Biostatistics, HRP, Room 114C, Stanford, CA 94305-5092
Phone: (415) 723-5687

HOME ADDRESS: SGFOIA3

EDUCATION:

University of Minnesota Major: Mathematics	B.A.	1952
University of Minnesota Major: Statistics	M.A.	1955
University of Minnesota Major: Biostatistics Minor: Mathematics	Ph.D.	1959

ACADEMIC APPOINTMENTS:

Assistant Professor, Biometry Division University of Minnesota	1959-1961
Associate Professor, Biometry Division University of Minnesota	1961-1965
Professor and Head, Biometry Division Director of Graduate Study in Biometry University of Minnesota	1965-1968
Professor and Head, Division of Biostatistics Stanford University, California	1968-
Acting Chairman, Department of Family, Community and Preventive Medicine Stanford University	1975-1976, 1984
Chairman, Department of Health Research and Policy Stanford University	1988-

RECOGNITION AND HONORS:

B.A. magna cum laude, Univ. of Minnesota
Phi Beta Kappa; Sigma Xi
Fellow, American Statistical Association
Fellow, Arteriosclerosis, American Heart Association
Fellow, American Association for the Advancement of Science
Who's Who in America; Dictionary of International Biography
Statistics Section Award, American Public Health Assn., 1983
International Institute of Statistics
Institute of Medicine, National Academy of Sciences

PROFESSIONAL SOCIETY MEMBERSHIPS:

American Statistical Association
Institute of Mathematical Statistics
Biometric Society
American Heart Association
American Association for the
Advancement of Science

GARY RANDALL FUJIMOTO, M.D.

Address: Division of Occupational Medicine
Palo Alto Medical Foundation
300 Homer Avenue
Palo Alto, CA 94301

Date of Birth: [redacted]

SGFOIA3

PRESENT POSITION:

04/88 - present	Medical Director, Occupational Medicine Department, Health Care Division, Palo Alto Medical Foundation Medical Director - Travel Medicine Clinic, Palo Alto Medical Foundation, Palo Alto, CA

ACADEMIC APPOINTMENTS:

1991 - present	Assistant Clinical Professor of Medicine, Department of Medicine Stanford University Medical Center, Stanford, CA
1987 - present	Assistant Clinical Professor of Medicine, Department of Medicine, School of Medicine, University of California, San Francisco, CA
1987 - 1989	Clinical Instructor in Medicine, Department of Medicine Stanford University Medical Center, Stanford, CA
1986 - 1988	Associate Chief, Division of Occupational Medicine and Employee Health Services, Santa Clara Valley Medical Center, San Jose, CA
1985 - 1987	Assistant Clinical Professor of Medicine, Department of Medicine, University of California Medical Center, San Diego, CA
1983 - 1985	Clinical Instructor of Medicine, Department of Medicine, University of California Medical Center, San Diego, CA
1983 - 1985	Post-Doctoral Scholar, Division of Pulmonary Medicine, Department of Medicine, University of California Medical Center, San Diego, CA

LICENSING AND CERTIFICATION:

1980	G43075	Medical License, State of California
1980	AF9486867	DEA Registration number
1983	089100	Board certified, American Board of Internal Medicine
1990	22406	Board certified, American Board of Preventive Medicine (Occupational Medicine)

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EDUCATION:

1982 - 1983	**Medical Chief Resident:** General Internal Medicine, Department of Medicine, University of California Medical Center, San Diego, CA
1980 - 1982	**Medical Resident:** Department of Medicine, University of California Medical Center, San Diego, CA
1979 - 1980	**Medical Intern:** Department of Medicine, University of California Medical Center, San Diego, CA
1975 - 1979	**Medical School:** M.D.: Albert Einstein College of Medicine, Bronx, N.Y.
1971 - 1975	**College:** B.A.: Oberlin College, Oberlin, OH

HONORS:

1979	Ira Rubin Memorial Award in Pulmonary Medicine, Albert Einstein College of Medicine
1975	Honors at graduation, Oberlin College

CONSULTANT FOR:

Raychem Corporation, Stanford University, Stanford University Medical Center, Alza Corporation, SyStemix Corporation, DNAX Corporation, Failure Analysis Stanford Research Insititute, California Biotechnology, City of Palo Alto, Menlo Park Fire Protection District, City of Sunnyvale Fire Department-Hazardous Materials Teams, City of Mountain View Fire Department-Hazardous Materials Teams

RELATED ACTIVITIES:

1989	Medical Advisor, Santa Clara County Infectious Waste Task Force
1988	Medical Advisor - HIV/Hepatitis B Exposures Among Health Care Workers, Santa Clara Valley Medical Center - Infection Control Subcommittee
1987 - present	Member, Environmental and Public Health Advisory Committee, Santa Clara County Medical Society, San Jose, CA
1987 - 1988	Member, Specialty Consultant Panel, Central-Coast Counties Regional Poison Center, San Jose, CA
1987 - 1988	Consultant, Subcommittee on the Health Effects of Refuse-Derived Energy, American Lung Association of San Diego and Imperial Counties

RELATED ACTIVITIES (continued)

1986	Chairman, Subcommittee on the Health Effects of Refuse-Derived Energy, American Lung Association of San Diego and Imperial Counties
1984 - 1986	Medical Director, County Medical Services Program, University of California, San Diego Medical Center
1983 - 1986	Occupational and Internal Medicine Consultant and Attending Physician, Beach Area Community Health Center, San Diego, CA
1982 - 1986	Occupational Medicine Consultant, American Lung Association of San Diego and Imperial Counties

SOCIETIES AND PROFESSIONAL ASSOCIATIONS:

Western Occupational Medicine Association
American Occupational Medical Association
Santa Clara County Medical Society
American College of Physicians
American Public Health Association, Occupational Health Section
American Lung Association of San Diego and Imperial Counties, Occupational and Environmental Health Committee
California Medical Association

RESEARCH ACTIVITIES:

1982 - Present	Acute and chronic effects of fire fighting among San Diego fire fighters. (Principal investigator)
1983 - 1985	Clinical research on new antihypertensive medications - MK 286 (a uricosuric diuretic) and tiapamil (a calcium channel blocker). A double blind clinical investigation. Paul Jagger, M.D. (Principal investigator)
05/78	Participation in a study of the Michigan population exposed to polybrominated biphenyls (PBB's). Mount Sinai School of Medicine, Environmental Services Laboratory. Irving J. Selikoff, M.D.
06-08/78	Research on the chemical hazards in the pharmaceutical industry. Albert Einstein College of Medicine, Department of Community Medicine, and the Oil, Chemical and Atomic Worker's Union

RESEARCH ACTIVITIES (continued)

06-08/75	Study of asbestos-related disease of the gastrointestinal tracts and lungs of individuals from Duluth, Minnesota, Mount Sinai, School of Medicine, Environmental Sciences Laboratory. Irving J. Selikoff, M.D.
1974 - 1975	Senior Honors Thesis (Oberlin College) on the biological effects of asbestos fiber (gross and electromicroscopic pathology) on the gastrointestinal tracts of mice. Oberlin College,. Department of Biology. Dr. Anna R. Brummett, Chairman, Department of Biology
06-08/74	Effects of heat and chemical exposures among workers in the rubber tire industry. Harvard School of Public Health. John M. Peters, M.D.
06-08/73	Study of pulmonary disease associated with asbestos exposure (electromicroscopic pathology). Mount Sinai School of Medicine, Environmental Sciences Laboratory. Irving J. Selikoff, M.D.
06-08/72	Occupational hazards in the newspaper industry. International Printing Pressmen's and Assistants' Union

PUBLICATIONS:

Edited Chapter by Graef, J.W. and Lovejoy, F.M., Jr.: Heavy Metal Poisoning, in Harrison's Principles of Internal Medicine. 11th Ed. 1986.

Fujimoto, G.R., McQuade, S.F., and Ramsdell, J.W., Eds.: Drug Pricing Manual. UCSD Publications 1983.

Fujimoto, G.R., Eckert, C.A., and Harrison, R.J.: Undergraduate Training in Occupational Health, Occupational Safety and Health Symposia, 1978. DHEW (NIOSH) Publication No. 80-105, 151-153.

NAME: John Hanley, M.D.
ADDRESS: 760 Westwood Plaza
Los Angeles, Calif. 90024

DATE OF BIRTH:
PLACE OF BIRTH:
MARITAL STATUS:

SGFOIA3

EDUCATION:

Years	School	Location	Degree
1957-61	Boston University	Boston, Mass.	M.D.
1961-62	Loma Linda University Rotating Internship White Memorial Hospital	Los Angeles, Calif.	
1963-66	University of California at Los Angeles Psychiatric Residency		

PROFESSIONAL TRAINING AND EXPERIENCE:

1956-57	Research Assistant Massachusetts General Hospital Harvard Medical School	Boston, Mass.
1962-63	General Practice Kaiser Permanente (Compton Clinic)	Los Angeles, Calif.
1963-66	Member, Neuroendocrine Clinic and Diabetic Retinopathy Clinic, UCLA	
1965-66	Postdoctoral Fellowship Award USPHS MH-6415 Brain Research Institute, UCLA	
1966-present	Member, Brain Research Institute, UCLA	
1966-71	Assistant Professor in Residence, Dept. of Psychiatry, School of Medicine, UCLA; Assistant Research Psychiatrist, BRI, UCLA	
1972	Associate Professor in Residence, Dept. of Psychiatry, School of Medicine, UCLA	
1973-77	Joint Appointment: Associate Professor in Residence, Computer Science Dept., School of Engineering, UCLA	
1977-present	Joint Appointments: Professor in Residence, Dept. of Psychiatry, School of Medicine and Computer Science Dept., School of Engineering, UCLA	
1978-present	Joint Appointment: Professor in Residence, Dept. of Anesthesiology, School of Medicine, UCLA	

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UNIVERSITY COMMITTEE SERVICE:

Data Processing Laboratory Advisory Committee

Telemetry Consultant to Brain Research Institute Mountain Campus Committee

Representative for the Dept. of Psychiatry on Mental Health Training Program Committee

Mental Health Training Program Subcommittees on Budget and Education

Brain Research Institute Committee on Future of Brain Research Institute

The Next Ten Years Brain Research Institute Committee for BRI 10th Anniversary

Hospital Intensive Care Committee

Appointment and Promotion Committee, Dept. of Psychiatry (two years), Ad Hoc Committees

CONSULTATION SERVICES:

a. Consultant to Dept. of Urology, University of Rochester, School of Medicine, for hyperbaric research
b. EEG Consultant to NASA for Biosatellite III Program, 1967 to present
c. Consultant to AMPEX Corporation, Redwood City, California, for advanced EEG research
d. Consultant to Alza Corporation, Stanford, California, on computer analysis of EEG data
e. Consultant to Committee on Space Research (COSPAR), on space terminology
f. Consultant to Jet Propulsion Laboratory Biomedical Group on the use of ultrasonics
g. Consultant to the Behavioral Research Foundation, St. Kitts, British West Indies, on animal telemetry systems
h. Consultant to the Behavioral Science Foundation
i. Consultant to the Sleep Laboratory at the Southern California Neuropsychiatric Institute, La Jolla, California
j. Consultant to Assessment Systems, Incorporated, Houston, Texas
k. Consultant to the Sleep Disorders Clinic (John Andrews, M.D.), Provo, Utah
l. Consultation service to the N.I.H. Neurology Study Section (sleep)

HONORS:

1957-61 Leopold Schepp Foundation Scholar (in medical school)
1957-58 Johnson Wax Foundation Scholar

STEVEN A. HILLYARD

Curriculum Vitae

SGFOIA3

PERSONAL DATA

EDUCATION

B.S., California Institute of Technology, 1964. (Biology)
Ph.D. Yale University, 1968. (Psychology)

POSITIONS

Professor of Neurosciences, Department of Neurosciences, University of California, San Diego (U.C.S.D.) 1980 - present

Lecturer through Associate Professor, Department of Neurosciences, U.C.S.D. 1968-1980

USPHS Traineeship at Yale University in Physiological Psychology with Robert Galambos. 1964-1968

Research Assistant at Caltech in Psychobiology with C.R. Hamilton and R.W. Sperry. 1963-1964

TEACHING AREAS

Basic Medical Neurology
Sensory Processes: Neurophysiology of Vision and Audition
Human Information Processing: Attention and Perception
Psychophysiology
Neuropsychology

HONORS and AWARDS

Fellow of the American Association for the Advancement of Science
MERIT Award from National Institute of Mental Health
UCSD Neurosciences Department Outstanding Teacher Award

ADVISORY AND REVIEW PANELS

NIMH Study Section: Mental Health Small Grant Committee, 1976-1980.
NIMH Study Section: Neurosciences Research Review Committee, 1986-1990.

Advisory Council: International Association for the Study of Attention and Performance 1978-1983; 1985-present.

Advisory Panel to NIMH Neurosciences Research Branch. 1982-1983.

EDITORIAL BOARDS

Electroencephalography and Clinical Neurophysiology, 1977-present.

Journal of Cognitive Neuroscience, 1988-present.

Journal of Experimental Psychology: Human Perception and Performance, 1974-1979; 1985-1988.

Consciousness and Cognition, 1990-present.

SOCIETY MEMBERSHIPS

American Association for the Advancement of Science.
Society for Neuroscience

GRANTS AND CONTRACTS

Principal Investigator: NIMH 2 R01 MH 25594. "Electrophysiological Studies of Selective Perception." 1974-1995.

Principal Investigator: Sloan Foundation Grant B1980-35. "Event-Related Brain Potentials and Semantic Processing". 1980-1982.

Co-Principal Investigator (with M. Kutas): NSF BNS 80-05525. "Semantic Processing and Event-Related Brain Waves." 1980-1986.

Principal Investigator: NINCDS 1P01 NS17778. "Event-Related Potentials and Cognition: Program in Cognitive Neuroscience" Cornell Medical School (M.S. Gazzaniga, Program Head) 1982-1994.

Principal Investigator: Office of Naval Research Contract, N00014-86-K-0291. "Electrophysiological Studies of Visual Attention and Resource Allocation." 1986-1992.

Brief Curriculum Vitae, 1991 Robert B. Livingston,M.D.

Education: **Stanford University** (AB, 1940); **Stanford University School of Medicine** (MD, 1944); (Residency, Internal Medicine [under Professor **Arthur L. Bloomfield**], **Stanford University Hospitals,** 1943-1945).

Academic Appointments: **Stanford University** (Instructor in Pathology [under **Alvin Cox**], 1943-44); **Yale University School of Medicine** (Instructor to Assistant Professor of Physiology [under **John F. Fulton**], 1946-52); (concurrently) **Harvard Medical School** (Assistant Professor of Psychiatry [under **Harry Solomon**], 1946-47); **UCLA School of Medicine** (Associate Professor to Professor of Anatomy and Physiology [under **H. W. Magoun** and **John Field**], 1952-57); Adjunct Professor, Mid-Career Course, **U.S. State Department,** 1957-1964; Founding Chair, **UCSD School of Medicine**, Department of Neurosciences (Professor of Neurosciences, 1964-1989 [with **Theodore H. Bullock, Robert Galambos, Reginald Bickford, John O'Brien, Marjorie Seybold, Fred Gage, Robert Terry,** and **Robert Katzman**]; Guest Professor of Neurosciences, at the *Hirnforschungsinstitut* **der Universität Zürich** [under **Konrad Akert**], 1971-72). Science Consultant. [under **His Holiness, the Dalai Lama**], 1991--).

[Aim of this academic career has been to investigate combinations of nervous and mental functions, using a variety of neuroanatomical, neurophysiological, behavioral and clinical techniques and disciplines.]

Advanced Training: **Université de Génève** (National Research Council Senior Fellow in Neurology, [under **Oscar Wyss**],1948-49); **Universität Zürich** (ditto [under **Walter Rudolph Hess**], 1949); **Collége de France** (Wilhelm B. Gruber Fellow in Neurology, [under **Alfred Fessard**], 1949-50); **Oxford University** (ditto [under **F.S.C. Little** and **Paul Glees**], 1950); **Universitet Göteborg** (US Public Health Service Senior Fellow in Neurology, [with **Bo Gernandt** and **Holger Hydén**], 1956); **Massachusetts Institute of Technology** (Research Associate, Neurosciences Research Program, [under **Francis O. Schmitt**], 1961-1973).

National Service: **US Navy Medical Corps (Reserve), World War II:** [Established and directed the hospital for wounded Okinawans and Japanese POWs throughout the battle of Okinawa, (awarded U.S. Navy Bronze Star for this contribution), 1945]; [**"Interpreter"** for surrender of Japanese Army in North China, (U.S. Marine Corps needed people with even modest Chinese and Japanese language training), 1945]; [Chief, Medical Battalion Laboratory, **2nd Marine Division**, Tiensin and Peking, throughout "Cease-Fire" between Kuomintang and Chinese Communists, 1945-46]; U.S. Public Health Service representative -- **First Life Sciences Committee, NASA**, advisory for life support systems, safety, communication, selection of Astronauts, etc., 1958-63].

International Diplomatic Contributions: International Physicians for the Prevention of Nuclear War (IPPNW), winner of 1985 Nobel Prize for Peace, IPPNW Emissary [with **Lars Engstedt**] to Egypt, Jordan, Syria, Kuwait, Bahrian, and Saudi Arabia, to persuade Arab physicians to contribute internationally to prevention of nuclear war; IPPNW Ambassador, to Tibetan Government-in-Exile, Dharamsala, India. Contributed to three successive tutorials 1987, 1989, 1990 on Mind and Life [under **Tenzin Gyatso, His Holiness, The Dalai Lama**, winner of the 1989 Nobel Peace Prize],). Participant, two international diplomatic missions conducted by the Center for the Study of the Person [under **Carl Rogers**] in Rust, Austria, [with **Gay Swensen** after Roger's death] in San José, Costa Rica, [under **President Arias**], to establish dialogue between governments of Nicaragua and United States.

Research Contributions: Neocortical representations of visceral functions in monkey and chimpanzee [with **Ernest Sachs, Jr., Sam Brendler**, and **José Delgado**]; Human frontal and cingulate cortical representations of visceral functions [with **William P. Chapman, William H. Sweet,** and **Kenneth E. Livingston**]; Plasticity of muscle synergy in humans [with **Alfred Fessard, Jean Paillard,** and **Auguste Tourney**]; Eye movements controlled by frontal eye fields and occipital visual fields in monkey; Frontal motor representations in deep sulci of cats [with **José Delgado**]; Localization of frontal eye fields in cats; Head turning and eye deviation elicited by stimulation of frontal cortex in freely moving cats [under **Walter Rudolf Hess,** with **Donald A.**

MacDonald]; Explosive decompression at high altitude [with **Samuel Gelfan** and **Leslie Nims**]; Use of biological potentials to warn of anoxic anoxia [with **Harold S. Burr**]; Segregation, origin and destination of first-order sensory dorsal column axons [under **Paul Glees**]; Central control of ascending sensory pathways [with **Raúl Hernández-Peón** and **Harald Scherrer**]; Cortical influences on brain stem conduction systems, and on brain stem arousal mechanisms [with **John D. French, Raúl Hernández Peón, W. Ross Adey** and **José Segundo**]; Cerebrospinal fluid equilibria; Somatic functions of the nervous system [with **Raúl Hernández-Peón**]; Differential seizure susceptibility in monkey cortex [with **John D. French**]; Prevention of seizures in monkeys by intravenous procaine injections [with **John D. French, Bruce Konigsmark,** and **Ken Richland**]; Vestibulo-spinal motor projections [with **Bo Gernandt, Sid Gilman**, and **Magdolna Iranyi**]; Brain mechanisms and behavior; Neurophysiology of brain stem reticular formation [with **Frederic G. Worden**]; Neurophysiological contributions to internal medicine [with **Frederic G. Worden**]; Longitudinal spinal and brainstem reflex systems relayed through the bulbar reticular formation [with **Muneo Shimamura**]; Dynamics of acoustic pathways under control of middle-ear muscles [with **Arnold Starr** and **Peter Carmel**; What makes the sloth so slothful? [with **T.H. Bullock, Donald B. Lindsley**, and **Robert Galambos**]; Central control of receptors and sensory transmission systems; Role of central nervous mechanisms relating to reinforcement; Ultrastructure of myelin glial-axonal junctions, and functional dynamics of synaptic boutons [under **Konrad Akert**]; Cinemorphology of whole human brain serial surfaces, in registration, exposed at microscopically thin intervals throughout the entire brain in 68 "normal" human brains [with **Roy Mills** and **Thornton Egge**]; Three-dimensional reconstruction of one whole human brain, using interactive computer graphics [with **Kent Wilson, Bill Atkinson**, and **Bud Tribble, III**]. A film on this subject [produced under **Sy Wexler**] won sweepstakes awards at all major international documentary film festivals in 1976/7 and has been shown repeatedly on NOVA, National Geographic Society, BBC, OMNIMAX, and many other television programs, worldwide, since then. Undernourishment affecting human brain development in the U.S. [under **Doris H. Calloway,** with **Helen Ross,** and **Elisabeth Stern**]. Expeditions include: Ship's Physician and Chief Diver, Scripps Institution of Oceanography Expedition CAPRICORN [under **Roger Revelle** and **Walter Munk**], 1951-1952; Alpha

Helix Expedition to the Amazon [with **Theodore H. Bullock** and **Donald B. Lindsley**], 1968; Expedition to Panama [with **Theodore H. Bullock** and **Robert Galambos**] 1970.

Research Publications: Some 200 research publications including a few research monographs. Chapters on Neurophysiology in a textbook for psychologists; Chapters on Neurophysiology in a textbook for psychiatrists--these latter were republished as a separate monograph, *Sensory Processing, Perception, and Behavior*, 1978, Section on Neurophysiology consisting of a dozen chapters in *Best and Taylor's Physiological Basis of Medical Practice*, 11th Edition,1985, and 12th Edition, 1990.

Lectureships: AAAS Holiday Science Lecturer, for State-wide honor high school students: Florida, 1958, Oregon, 1959; National Sigma Xi Lecturer, 1960 and 1961; Queen Kamehameha Lecturer, University of Hawaii School of Medicine, 1965; AAAS Chautauqua Lectureship [shared with **Elisabeth Stern**], 1978 and 1979; Sachs Memorial Lecturer, Dartmouth Medical School, 1981.

Extra-Curricular Activities: Co-Incorporator [with **John F. Fulton**], the Journal of the History of Medicine, 1951. Participated closely with **Leo Szilard** in founding the Council for Abolishing War, which became the Council for a Livable World, 1962. Co-Incorporator [with **Richard J. Barnet, Marcus Raskin**, and **Christopher Jencks**], of the Institute for Policy Studies, 1962. Co-Incorporator [with **Fritjof Capra**] of the Elmwood Institute, 1979. Active [under **Bernard Lown**] in International Physicians for the Prevention of Nuclear War, as Emissary and Ambassador; Deputy Council representative for U.S. Physicians for Social Responsibility; House of Delegates, 1986-88, U.S. national Physicians for Social Responsibility, President-Elect 1991, [to serve as President, 1992, Past-President 1993; Co-President, San Diego Chapter, 1989-91.

Robert B. Livingston, M.D.
Professor of Neurosciences Emeritus
University of California San Diego
Address: 7818 Camino Noguera, San Diego, California 92122-2027.
Telephone: (619) 455-0306; Telefax: (619) 455-1874.

NAME: **ROBIN P. MICHELSON, M.D.**

BORN:

SGFOIA3

EDUCATION:

1932-1934	University of California Berkeley, Calfiornia	
1934-1936	Stanford University Stanford, California	B.S
1936-1940	Stanford University School of Medicine Stanford, California	M.D.

POSTGRADUATE TRAINING:

1940-1941	Assistant Resident, Pathology San Francisco General Hospital
1946-1948	Otolaryngology Resident Veterans Administration, San Francisco

MILITARY SERVICE:

1941-1946	Captain, U. S. Army (MC)

LICENSURE AND CERTIFICATION:

1940	California
1950	American Board of Otolaryngology

HOSPITAL AFFILIATIONS:

1945-1956	St. Luke's Hospital, San Francisco
1946-1956	St. Mary's Hospital, San Francisco
1968-Present	University of California Hospitals
1958-Present	Sequoia Hospital, Redwood City, California
	University of California Hospitals, San Francisco

POSITIONS HELD:
UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

Department of Otolaryngology

1968-1974	Associate Clinical Professor
1974-Present	Clinical Professor

OUTSIDE THE UNIVERSITY OF CALIFORNIA:

1948-1952	Clincal Instructor, Stanford University School of Medicine
1952-Present	Assistant Clinical Professor, Stanford University School of Medicine
1955-1958	Chief, Stanford ENT Service, San Francisco General Hospital
1960-1963	Chief of ENT Service San Mateo County Hospital
1940-1980	Private Practice, Redwood City, California

MEMBERSHIP IN SCIENTIFIC SOCIETIES AND THEIR COMMITTEES:

1945	American Medical Association
1945	California Medical Association

MEMBERSHIP IN SCIENTIFIC SOCIETIES AND THEIR COMMITTEES

1958	San Mateo County Medical Society
1949	Pacific Coast Oto-Ophthalmology Society
1950	American Academy of Ophthalmology and Otolaryngology (Now, American Academy of Otolaryngology-Head and Neck Surgery)
1955	American Laryngological, Rhinological and Otological Society (Triological Society) 1977-1978 Vice President 1978-1981 Member of Council 1981-1982 President-Elect 1982-1983 President
1945	San Francisco Medical Society
1972	American Otological Society
1980	Walter P Walter Society 1981-1982 Nominating Committee
1981	International Society for Artificial Organs

RONALD YUKIO NAKASONE
Graduate Theological Union
Institute of Buddhist Studies
1900 Addison Street
Berkeley, CA 94704

PROFESSIONAL EXPERIENCE:

Core Doctoral Faculty, Graduate Theological Union/Institute of Buddhist Studies, Berkeley, CA, July 1987 to present

Responsibilities: teaching Mahayana, Chinese and Japanese Buddhist philosophy, Buddhist ethics, Buddhist and Japanese aesthetics, homiletics, practical ministry; research and publications; thesis advising

Dean for Student Affairs, Institute of Buddhist Studies, 1987-present

Responsibilities: Student advising and counselling, Buddhist services and ritual, planning special programs and lectures; curator of art exhibits

Minister, San Jose Buddhist Church, May 1983 to August 1986

Responsibilities: ritual, sermons, temple administration, counselling; visitations etc.

Japanese Analyst with the U.S. Army Publication Review Unit, Silver Spring, MD, June 1981 April 1983.

Reviewed, translated and analyzed political, technical and economic publications

Lecturer, Dept. of East Asian Languages, University of Hawaii, Jan. 1980 - June 1981

Responsibilities: teach first and second year Japanese (Jordan I and II); teach calligraphy on a non-credit basis

Instructor, Japanese Conversation, Adult Education, Pearl City High School (part-time), Sept. 1979 - Dec. 1979).

Translator/Interpreter, Oscar Mayer Co., Madison, WI, 1977 (intermittently). Interpreting and translating of Japanese to English and English to Japanese.

Teaching English as a Second Language, Kyoto, Japan, 1969-75.

Graphic Artist, Planning Dept., City & County of Honolulu, Hawaii, 1968-69.

Prepared visual aids for public hearings; designed and coordinated the publication of government publications; researched and requisitioned visual aid equipment, etc.

Illustrator, University of Hawaii, Honolulu, Hawaii, 1967-68.

Developed visual aid materials for Japanese language textbook.

CURRENT RESEARCH

Ethics: "Decisionmaking in context of Buddhist notions of interdependence and karma, and its application in Japanese medicine," part of an attempt to develop a theory of Buddhist approach to bioethics

"Illness and Holiness: A Study of AIDS in an American Zen Community." To be presented at the Medicine and Its Stories Conference, May 1992

Buddhist Studies:

An interpretative study of the Awakening of Faith based on Chinese and Japanese sources

EDUCATION

University of Wisconsin-Madison, Ph.D., Buddhist Studies, 1980 (Ph.D. Minor in Philosophy)
Ryukoku University, Kyoto, Japan, M.A., Buddhist Studies, 1975
University of Hawaii-Manoa, M.A., Oriental Art History, 1967
University of Hawaii-Manoa, B.A., Philosophy, 1965

Ordained Jodoshinshu Honganji Sect Buddhist Priest in 1983

PROFESSIONAL COMMITTEES

Scholarship Committee, Graduate Theological Union, 1991-92
Internal Review Board, Science Application International Cooperation, Menlo Park, CA. Internal review of cognitive science research projects funded by U.S. Government involving human subjects. 1991-present.
UC-Berkeley Committee for the Protection of Human Subjects, 1988-1991; internal review of research protocols involving human subjects
Steering Committee for the Northern California Interfaith Network, 1989-present; sponsor programs of common concern

ACADEMIC AWARDS:

Luce Grant, Graduate Theological Union, 1991-92.
Visiting Professor, Ryukoku University, 1990.
Visiting Scholar, Center for the Study of World Religions, Harvard University, 1986-87.
Fulbright-Hays Doctoral Dissertation Research Abroad Fellowship, 1978-79.
Visiting Scholar, Institute of Buddhist Culture, Ryukoku University, Kyoto, Japan, 1978-79.
Hawaii Tendai Fellowship, 1976 and 1977 academic years.

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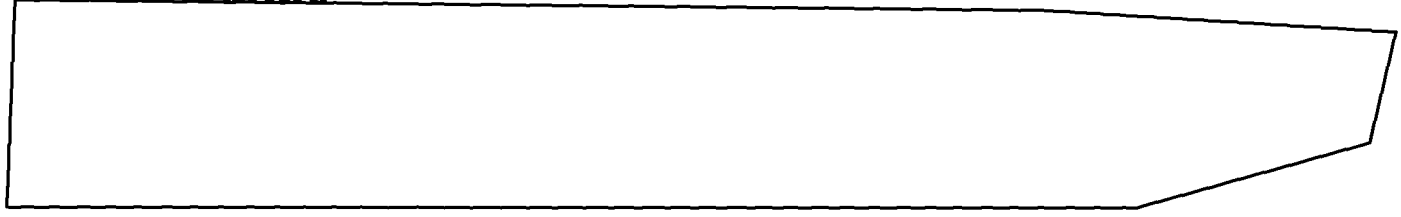
PERSONAL DATA:



LOUIS JOLYON WEST, M.D.

CURRICULUM VITAE

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PERSONAL

EDUCATION

Marquette School, Madison, Wisconsin	1929-1934
Harvey School, Madison, Wisconsin	1934-1935
East High School, Madison, Wisconsin	1935-1941
University of Wisconsin, Madison, Wisconsin	1941-1942
State University of Iowa, Iowa City, Iowa (Army Specialized Training Program)	1943-1944
University of Minnesota School of Medicine, Minneapolis, Minnesota	1945-1948

DEGREES

B.S.	University of Minnesota	1946
M.B.	University of Minnesota	1948
M.D.	University of Minnesota	1949

POSTGRADUATE TRAINING

Internship (Straight Medicine): University of Minnesota Hospitals, Minneapolis	1948-1949
Residency in Psychiatry: Payne Whitney Clinic of the New York Hospital (Cornell Medical Center), New York	1949-1952

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OTHER EDUCATIONAL EXPERIENCE

Personal psychoanalysis (candidate, Topeka Psychoanalytic Institute)	1958-1962
Group relations training programs (Tavistock/A.K. Rice Institute)	1965-1975
Fellow, Center for Advanced Study in the Behavioral Sciences, Stanford, California	1966-1967

MILITARY SERVICE

Army of the United States (enlisted): 301st Infantry Regiment, 94th Division; other assignments	1942-1946
United States Air Force Medical Corps (Lieutenant to Major)	1948-1956

MEDICAL LICENSURES AND SPECIALTY CERTIFICATION

Licensed: Minnesota, 1948; New York, 1950; California, 1951; Oklahoma, 1956
Diplomate: National Board of Medical Examiners, 1949
American Board of Psychiatry and Neurology (Psychiatry), May 1954

UNIVERSITY APPOINTMENTS

Assistant in Psychiatry, Cornell University Medical College, New York	1950-1952
Professor and Head, Department of Psychiatry, Neurology and Behavioral Sciences, University of Oklahoma School of Medicine, Oklahoma City	1954-1969
Professor of Psychiatry, UCLA School of Medicine	1969--
Chairman, Department of Psychiatry and Biobehavioral Sciences, UCLA School of Medicine, Los Angeles	1969-1989
Director, UCLA Neuropsychiatric Institute 1969-1989	

HOSPITAL APPOINTMENTS

Chief, Psychiatry Service, 3700th USAF Hospital, Lackland Air Force Base, San Antonio, Texas	1952-1956
Psychiatrist-in-Chief, University of Oklahoma Hospitals	1954-1969
Consultant in Psychiatry, Oklahoma City Veterans Administration Hospital	1956-1969

HOSPITAL APPOINTMENTS (continued)

Chief, Mental Health Section, Oklahoma Medical Research Foundation, Oklahoma City	1956-1969
Consultant in Psychiatry, United States Air Force Hospital, Force Base, Oklahoma	1956-1966
Consultant in Psychiatry, Palo Alto Veterans Administration Hospital	1966-1967
Psychiatrist-in-Chief, UCLA Medical Center	1969-1989
Attending Staff, UCLA Medical Center and UCLA Neuro-psychiatric Institute	1969--
Consultant in Psychiatry, Veterans Administration Center for Psycho-social Medicine at Brentwood, Los Angeles	1969--
Consultant in Psychiatry, Veterans Administration Hospital, Sepulveda, California	1969--
Attending Staff, Harbor General Hospital, Torrance, California	1971--
Medical Staff, Saint John's Hospital and Medical Center, Santa Monica, California	1979--

HONORS

Alpha Omega Alpha - Honor Medical Society
Oklahoma Nominee, "Ten Most Outstanding Young Men in America," United States Junior Chamber of Commerce (1959)
Medical Ambassador of Good Will, Pan American Medical Association (1963)
Commencement Speaker, University of Oklahoma School of Nursing (1963)
Leadership Award, Association of the University of Oklahoma Medical Faculty (1966)
Sommer Memorial Lecturer, Portland, Oregon (1968)
Certificate of Appreciation, Oklahoma City Council (1969)
Abreu Memorial Address, National Medical Student Research Forum, Student AMA (1969)
Distinguished Professional Service Citation, Oklahoma State Psychological Association (1969)
Certificate of Appreciation, Department of Health, Education and Welfare, United States Public Health Service (1969)
Benjamin Rush Gold Medal Award, American Psychiatric Association (1973)
Certificate of Appreciation "For Outstanding Service," University of Nebraska, School of Alcohol Studies (1973)
Commendation for Exceptional Service, United States Veterans Administration (1974)
First Annual Dr. Gustav Bychowski Memorial Lecture, Mt. Sinai School of Medicine, New York City (1974)
Knight of Mark Twain (1974)

HONORS (continued)

"Louis Jolyon West House" (Facility for Oklahoma Center for Alcohol-Related Studies, University of Oklahoma Medical Center, Oklahoma City, dedicated 1974)
Certificate of Commendation, American Psychiatric Association (1976)
L.I.F.E. Group Award for Outstanding Dedication to Humanity (1977)
Karolinska Institute Medal, Stockholm, Sweden (1978)
The H.B. Williams Memorial Travelling Professor of the Royal Australian and New Zealand College of Psychiatrists (1979)
Consultant Emeritus in Psychiatry, United States Army Medical Research and Development Command (1979)
Honorary Fellow, American Association of Psychoanalytic Physicians, Inc. (1980)
Walter C. Alvarez Memorial Award, The American Medical Writers Association (1982)
Annual Award for Distinguished Professional Service in the Field of Mental Health, The Group Psychotherapy Association of Southern California (1983)
Special Award, Society for Clinical and Experimental Hypnosis, "For Advancing the Role of Hypnosis in Psychiatry and Medicine" (1986)
Vestermark Award, The American Psychiatric Association and the National Institute of Mental Health (1987)
Outstanding Achievement Award, Southern California Psychiatric Society (1988)
Marshal, Hippocratic Oath Ceremony and Medical School Graduation, UCLA (1989)
First Annual Thomas H. Holmes Memorial Lecture, University of Washington (1989)
Philip R.A. May Award, Howard R. Davis Society for Knowledge Utilization and Planned Change (1989)
Leo J. Ryan Award, National Cult Awareness Network (1989)
Founder's Award, Center for Research on Alcohol and Drug Abuse, University of Oklahoma School of Medicine (1989)
Doctor of Humane Letters (hon. caus.), Hebrew Union College (1990)

Ray L. Leadabrand

EDUCATION

M. S., Electrical Engineering, Stanford University, 1953
B. S., Communications Engineering, San Jose State University, 1950

MAJOR PROFESSIONAL ASSIGNMENTS

1985 – Date	Sr. Vice President of National Security Affairs for SRI International
1979 – 1985	Sr. Vice President of SRI International's Engineering Research Group and National Security Program
1977 – 1979	Vice President of SRI International's Engineering Sciences Group
1969 – 1977	Executive Director of SRI International's Electronics and Radio Sciences Division
1962 – 1969	Director of SRI International's Radio Physics Laboratory
1955 – 1962	SRI International Project Leader, Project Supervisor, and Head of Propagation Group directing a variety of propagation related projects for DOD agencies

SOME PROFESSIONAL ACCOMPLISHMENTS

Led the pioneering efforts at SRI to understand the radar reflection characteristics of the Aurora, particularly at VHF and UHF. These efforts required the development of very large one-of-a-kind radars and extremely large steerable parabolic antennas—up to 150 ft in diameter—these radars were installed in Alaska and Europe and provided the basis for the installation of the BMEWS ballistic missile early warning radar system. In addition, the results of these experiments were used to develop radar scattering models for the Aurora and moon echoes and the scientific results were published as a number of scientific journal papers.

Played a key leadership role for both the US government and SRI International in developing the first radar instrumentation used in the US to study the effects on the ionosphere of ballistic missiles during launches and reentries. These pioneering experimental investigations led to the development of the field of reentry physics and deployment of Over the Horizon Radar systems.

Helped to plan and carry out the US measurement programs to understand the effects of nuclear weapons on the atmosphere and ionosphere. Led the SRI quick reaction effort to design and develop and use the special radar instrumentation which was used as the primary diagnostic tools during all the US high altitude nuclear weapons tests—Hardtrack in 1957, Argus in 1958, and Fishbowl in 1962. From these measurement programs and the subsequent analysis and theoretical efforts the SRI team developed the basis for most of the models used today to forecast the effects of nuclear weapons on the ionosphere and the related system effects.

SOME CURRENT PROFESSIONAL ACTIVITIES

- Member of the National Research Council Naval Studies Board Committee on combat networks
- Member of the Defence Intelligence Agency Scientific Advisory Committee
- Member of the National Security Agency Scientific Advisory Board
- President of the Bay Area Chapter of the Association of Unmanned Vehicle Systems
- Co-director of the Stanford Center for Radar Astronomy

PUBLICATIONS

Author or coauthor of more than 24 technical papers published in scientific journals, 36 papers presented at scientific meetings, and more than 50 SRI technical and scientific reports relating to propagation, radar, communications, nuclear weapon effects, reentry physics, and incoherent scattering.

PROFESSIONAL ASSOCIATIONS AND HONORS

Honored as a Fellow of the IEEE for original contributions on the effect of the aurora and nuclear weapons on radar and communications systems.

Member of the IEE Professional Group on Antennas and Propagations, American Geophysical Union, American Institute of Aeronautics and Astronautics, International Association of Geomagnetism and Aeronomy, Union Radio Scientifque Internationale (URSI), Armed Forces Communication and Electronics Association, Association of Old Crows, National Security Industrial Association, Security Affairs Association and Association of Unmanned Vehicle Systems.

James R. Ambrose

B.S. Engineering Physics (Magna cum Laude) University of Maine *1943*

Graduate work in physics and mathematics at Georgetown University, University of Maryland and Catholic University *1943-1948*

Naval Research Laboratory *1943-1955*

Research and development and research management in the fields of radar, semiconductors, nuclear weapons, nuclear reactors, and nuclear radiation effects.

Ford Motor Company (and Ford Aerospace and Communications Corp, a subsidiary) *1955-1979*

Vice President of Technical Affairs - management of corporate research and engineering encompassing most physical science and engineering fields, especially missile and weapon systems, communication networks and satellites, electronic components and equipment, and information processing networks and equipment. Also corporate functional management of engineering, manufacturing, purchasing, and quality control.

United States Army (Department of Defense) *1981-1988*

Undersecretary of the Army (also Army Acquisition Executive) - General management of the U. S. Army, with emphasis on operational and procurements requirements, acquisition of major weapon and other systems, capital investment programs, budget and financial management, and Congressional relations.

Consultant *1988-Present*

Defense-related matters.

Jack Vorona

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EDUCATION

BS(Physics) MIT 1953
PhD(Nuclear Physics) Duke 1957

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EXPERIENCE

1962-64: Technical staff member of the Institute for Defense Analyses. Concerned with vulnerabilities of strategic command and control, effectiveness of warning systems and the evaluation of procedures to prevent unauthorized use of nuclear weapons.

1964-89: Service with the Defense Intelligence Agency in the following capacities:

1964-74: Created and directed Nuclear Energy Division. Responsible for the production of nuclear intelligence, worldwide, in support of DOD and national requirements. DIA member to the Director of Central Intelligence Joint Atomic Energy Intelligence Committee. Represented Joint Chiefs of Staff in 1973 at the negotiations in Moscow leading to the Nuclear Threshold Test Ban Treaty.

1971-74: Assumed directorship of the Physical Sciences Division as well. Responsibilities included chemical and biological warfare, directed energy weapons and materials sciences.

1975-88: Promoted to Director of the DOD Scientific and Technical Intelligence Program with overall management authority for the 5 S&T Centers of the military services. As such, provided all-source finished intelligence to OSD, JCS, Military Departments, U&S Commands and other national level entities. During this period, the S&T Program experienced significant growth and importance and became a vital and recognized contributor to Defense systems acquisition, policy and military operations.

Represented the DIA on numerous standing and ad hoc interagency committees to include the Defense Science Board, the Intelligence R&D Council, the Armor-Anti-Armor Executive Committee, the President's Foreign Intelligence Advisory Board (as req'd), Under Sec'y of Defense for Acquisition special panels and ex-officio member of the DIA Advisory Board.

1989: Chief Scientist. Served as the senior executive S&T advisor to the Director DIA and as required, to other Intelligence Community and DOD officials on the application of advanced

technology to intelligence operations and programs.

Jan.1990-present: Consultant. Clients include members of the Intelligence Community, private industry, the National Laboratories(Los Alamos and Sandia), and the Senate Select Committee on Intelligence as a member of its Technical Review Panel.

Recognition: Sigma Xi, numerous agency and Intelligence Community performance citations and commendations, the DIA Director's award for exceptional civilian service, Senior Executive Service bonus awards, Presidental Rank as meritorious executive, and the National Intelligence Distinguished Service Award.