Possible Application of Silicon Photomultiplier Technology to Detect the Presence of Spirit and Intention: Three Proof-of-Concept Experiments

Gary E. Schwartz, PhD[1#]

Context: Research investigating the survival of consciousness hypothesis has been hampered by the lack of an independent measure of the purported presence of spirit (POS). Although numerous anecdotes involving electronic devices (including tape recorders, answering machines, and computers) claim that POS can be detected with sensitive electromagnetic sensors, little systematic laboratory research has investigated this possibility.

Objective: The purpose of this exploratory laboratory research was to test the feasibility of using a state-of-the-art silicon photomultiplier system to detect low photon levels potentially associated with POS. A PCDMini photon counting device manufactured by sensL provided a sensitive measure of sums of photons over time.

Design: Three proof-of-concept experiments were conducted. Each included multiple five-minute trials of "invited spirit" conditions as well as baseline controls. One experiment included a set of 10 noninvited control trials as well as controls for experimenter intention per se.

Setting: Data were collected as part of a university laboratory devoted to researching advances in consciousness and health.

Participants: The participants were purported spirits presumably motivated to participate in the research.

Intervention: The primary intervention was the experimenter's intention for purported spirits to enter the light-tight chamber on specified trials.

Main Outcome Measures: In a light-tight chamber, the PCDMini device software counted and displayed individual sums of typically 13 to 25 photon detections per approximately 90-milliseconds time periods (in complete darkness, most time periods contained zero photons detected); the number of photon sums could be counted precisely in five-minute periods.

Results: The average number of photon sums was found to be significantly higher in purported POS trials compared with noninvited trials. Matched control trials as well as explicit experimenter intention trials showed no effects.

Conclusion: Silicon photomultiplier devices may be sufficiently sensitive to investigate the POS and experimenter intention (psychokinesis) hypotheses.

Key words: survival of consciousness, detection of spirit, photomultiplier sensors, photons, experimenter intention, spirit intention, psychokinesis

(Explore 2010; 6:166-171.

INTRODUCTION

The survival of consciousness hypothesis has been receiving increased research as well as media attention. A brief review of historical and current research on mediumship was provided by Beischel and Schwartz in this journal in 2007.[1] Contemporary research has employed triple blind studies, and some ongoing research is using quintuple-blind protocols.[2]

As sophisticated as contemporary research with mediums is, the interpretation of the findings is limited. The primary reason is that the presence of spirit (POS) must be inferred from accurately scored information provided by research mediums. The primary theoretical question concerns the source of the information.[3-6] After ruling out fraud and other tricks (sometimes called cold reading), rater bias, and possible experimenter informational leakage or bias by using triple-blind (or more) designs, the remaining possible explanations fall into three broad categories: (1) basic psi (for example, telepathic reading by the medium of the sitter's mind), (2) super-psi (for example, hypothesized retrieval of "dead" [ie, nondynamic] information from the "vacuum" of space [sometimes described as a quantum hologram] or "akashic" field), and (3) survival of consciousness (ie, direct communication with the continuing consciousness/spirit of a deceased person). In this brief report, the term *spirit* is used to refer to the hypothesized continued existence of the consciousness and information (and associated energy) after physical death (also termed an entity); the term *presence* is used to refer the potential hypothesized localization of the consciousness, information, and energy/spirit of the deceased person.

An alternative to using research mediums is to potentially detect the hypothesized energy and information presumed to be associated with spirit. When quantum physics is integrated with feedback and systems theory, the result is the predicted existence of "info-energy" dynamical feedback systems in the "vacuum" of space that can continue to grow and evolve.[7]

The thesis that spirit is luminous and can sometimes be seen by clairvoyants has been put forth throughout recorded history.[8] Moreover, so-called "ghost hunters" typically employ low-light cameras to attempt to detect the localized POS. However, partly for financial as well as political reasons, uni-

1 Laboratory for Advances in Consciousness and Health, Department of Psychology, the University of Arizona, Tucson, AZ

Corresponding Author. Address:
Box 210068, Tucson, AZ 85721-0068
e-mail: gschwart@u.arizona.edu

ISSN 1550-8307/$36.00

EXPLORE May/June 2010, Vol. 6, No. 3
doi:10.1016/j.explore.2010.02.003

versity investigators have not been supported to apply state-of-the-art superlow-light photon counting devices for potentially detecting POS.

Schwartz and colleagues[9,10] have been exploring the application of superlow-light charged coupled device cameras to image biophoton light emitted by all living systems. Although the resulting images are extraordinary in terms of image detail and sensitivity, half-hour to one-hour exposure times are not uncommon, making dynamical measurement impossible. Although photomultiplier tubes can not provide images, they can monitor moment-to-moment changes in photonic activity.

With the advent of state-of-the-art silicon photomultiplier sensors, it has become technically and economically feasible to explore the possibility of using them to detect the hypothesized POS. This brief report describes three proof-of-concept experiments, which together point to the feasibility and promise of employing this technology to assess POS as well as possible experimenter intention (psychokinetic) effects.

METHODS

Silicon Photomultiplier System and Light-Tight Chamber

A miniature photon counting device, model PCDMini (sensL Ireland, Blackrock, Cork, Ireland) was used in conjunction with sensL's Integrated Environment software interfaced with LabVIEW drivers. The PCDMini has low timing jitter, low after pulsing, transitor-transistor logic output, it is not damaged by ambient light, its detector is insensitive to magnetic fields, it has controlled thermoelectric cooling to −20°C creating extremely low dark count, and it contains an integrated counting resolution of 200 microseconds. The diameter of the sensor was 100 micrometers.

For experiment I, a double "box within a box" light-tight environment was created; for experiments II and III, it was increased to a triple "box within a box within a box." The PCDMini system (approximately 4 cm × 4 cm × 4cm) was attached with Velcro to a plastic base approximately 18 cm × 21 cm × 4 cm. The actual sensor lens (approximately 1 cm in diameter) peered into an empty white papered covered box approximately 10 cm × 10-cm wide and 5-cm high. The white color reflected light within the box (black would have absorbed the light).

This integrated unit was placed within a larger tightly covered black plastic box approximately 27 cm × 44 cm × 29 cm. It was then placed inside a third, large, tightly covered black plastic box approximately 43 cm × 67 cm × 30 cm. Cables were passed through sealed holes at the bottom of the plastic boxes.

Sums of numbers of photons (counted over approximately 90-millisecond time periods (ie, approximately 12 time periods per second) were displayed and stored by using sensL Integrated Environment software. Photon sums per 90-millisecond time period could range from 0 (no photons detected within a given period) to 10,800,000 (the maximum number within a given period displayed by the software). Operational details of the software are available from sensL on request.

With the covers of the boxes removed, the PCDMini saturated at an average of a total of 3,600 photon sums collected over a five-minute trial (12 × 60 × 5); each individual sum contained 10,800,000 photons. In other words, every 90-millisecond time period within a five-minute period produced a 10,800,000 photon sum. In contrast, with the two covers in place in experiment I, the background (control) light was dramatically reduced to an average of only five photon sums greater than 0 (ie, five time periods out of a possible 3,600) collected over five minutes; each sum contained approximately 13 to 25 photons. Furthermore, in experiments II and III, with three covers in place, the background light was reduced to less than an average of a total of only three photon sums greater than 0 collected over five minutes; again, each sum contained approximately 13 to 25 photon counts. According to sensL, background (dark) counts can vary somewhat across PCDMini systems; the present PCDMini happened to have a particularly low dark count.

Variations in room lighting, presence of more than one person in the room, air temperatures outside and inside the boxes (recorded continuously with Vernier LabPro interface, temperature sensors, and software, Vernier Software & Technology, Beaverton, OR), and time of day, had no observable effects on baseline photon counts recorded with the covers in place. It was not possible in this experiment to determine the source of the baseline (dark) counts. They might be due to emitted photons within the innermost box (including by hypothesized spirit and/or experimenter), electronic noise, cosmic rays, or other external sources.

Experimental Methods

The specifics of each experiment are provided in the context of their respective results sections. In general, combinations of five-minute "spirit intention" (SI) trials (ie, spirit or spirits invited to affect the PCDMini) were intermixed with control trials (baselines). Depending upon the experiment, different spirits were "invited" to participate.

In experiment I, the author as experimenter, claiming no skills as a medium or psychic, attempted to directly affect the photo counts with his own intention trials. Also, sets of "no-intention" control trials were interspersed with conventional baseline trials. Experiment II had an unequal number of trials.

The hypothesized spirit participants had all been involved to various degrees in previous mediumship research in the author's research. Four research mediums independently claimed that these hypothesized spirits (1) were committed to the research, and (2) would listen for mental requests from the experimenter to be present and follow the procedures as requested. In experiments I and II, the hypothesized spirits were invited mentally (ie, in the author/experimenter's mind). In experiment III, the hypothesized spirits were mentally instructed to watch a large computer monitor; printed instructions on the screen indicated SI and control/baseline trials.

There was no attempt in this set of proof-of-concept experiments to include a blinded protocol with research mediums to verify independently whether specific spirits presumably "showed up" or not in specific trials. We reasoned that if positive effects were obtained in the initial experiments, the findings would stimulate and justify the conduct of future more extensive and systematic research.

Since virtually nothing is currently known about hypothesized spirits' potential abilities to affect photon sensing devices, the author hypothesized that practice with the system might