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APPLICATIONS OF INSTRUMENTATION
IN THE INVESTIGATION OF HAUNTING
AND POLTERGEIST CASES

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INTRODUCTION

The question whether any aspect of human personality survives bodily death is an extremely difficult one to answer, and a decision must be reached on the basis of evidence from many sources rather than on the basis of any one "crucial" experiment or observation. One such source of evidence is cases of hauntings, in which the apparent movement of physical objects by some sort of psychokinesis (PK) is frequently reported. Similar phenomena are reported in poltergeist cases, as well as from séances with physical mediums.

Haunting and poltergeist cases are of particular interest insofar as they seem to share these apparent (and spectacular) PK phenomena. But hauntings are traditionally associated with the belief that some aspect of a human personality which has survived death is responsible for them, while poltergeist cases seem to be generally associated with a living agent. If the ways in which the apparent PK phenomena of these two types of cases resemble and/or differ from each other could be clarified, the relevance of both types of cases to the question of survival could be more precisely assessed. For example, are certain types of PK phenomena found in hauntings that are seldom or never found in poltergeist cases? If so, are such phenomena more readily explained by a survival hypothesis than by some other hypothesis?

In discussing poltergeist cases, W. G. Roll (10) asked two questions: "Are there cases in this literature in which there were physical events for which there is no known reasonable explanation? If so, are the phenomena related to deceased persons in ways which make it reasonable to suppose that these persons might somehow be the agents for the events?" The second question cannot be answered until the first is answered, of course, and I feel that the cases in the existing literature cannot yield a definitive answer to this basic question concerning the reality of the apparent PK phenomena. Furthermore, the continued investigation of haunting and poltergeist cases in the usual manner will do little to clarify the question.¹ New techniques of investigation are needed to

¹ This conclusion applies only to the question of the reality of the apparent PK phenomena. The recent emphasis on psychological evaluation of poltergeist cases represents a significant advance in investigatory technique.

ascertain the reality (or lack of it) of the reported PK phenomena, and the present paper will deal exclusively with a survey of techniques which may be of value in reaching a more adequate answer.

In the typical poltergeist case, the investigator hears about the disturbances (usually through the mass media) after they have been occurring for a few days to a week or so. Shortly after he gets to the site, some interesting phenomena happen. But since he does not at this point have good control of the situation, his observations must remain tentative, although he decides the case is worthy of intensive investigation. Unfortunately, by the time he is in good control of the situation, the phenomena cease! The net result is that the investigator is not *certain* that the phenomena must be explained by postulating some form of PK and also he is not *certain* that they were produced by normal means (fraud, earth tremors, etc.). Thus, one more ambiguous case is added to a literature which already consists largely of ambiguous cases. The phenomena of hauntings and physical mediumship often take similar courses. Haunting cases, in which the phenomena typically persist over long periods of time, have the drawback that the effects are temporally so widely spaced that the investigator is unable to remain at the site long enough to make any good observations.

The traditional approach to these phenomena—exploratory observations in preparation for more detailed and controlled observations later—seems to be of very little value in terms of the amount of information obtained for a given amount of time expended. The techniques of investigation must be improved so that definitive observations can be made immediately, while there still are phenomena to be observed. The use of modern electronic instruments is of considerable promise in bringing about this improvement.

Why haven't electronic instruments been widely used to study these cases? There seem to be two main reasons. One is the cost. Yet, when one considers the expense involved in having an investigator on hand for weeks merely to collect inconclusive data, the initially high cost of instrumentation that will produce much more definitive data seems like a good investment.

The more important reason, however, is that most parapsychologists probably do not realize how much can be accomplished with modern instrumentation, how these instruments operate, and just where to obtain information about them. The purpose of the present paper is to provide a general survey of how various instruments could be useful in poltergeist and haunting cases. This will not be an exhaustive survey by any means, nor will it provide "how-to-do-it" instructions for particular devices. It is merely intended to give the investigator a general idea of what instrumentation can do, so that he may consult with an electronics

engineer or technician for detailed information about the purchase, construction, and use of various devices.²

THE USES OF INSTRUMENTATION

There are two basic uses of instrumentation in haunting and poltergeist cases. One is the detection of fraud. The other (assuming that there will be cases in which fraud is ruled out) is providing information about the nature of the phenomena. Most of the instruments described below will serve both purposes. No amount of instrumentation, of course, can *completely* eliminate the possibility of fraud, and the investigator will remain responsible for guarding against it. However, instrumentation should (a) make the task of guarding against fraud considerably easier in most cases, (b) make the case for or against PK phenomena much stronger, and (c) allow the investigator to take a more relaxed attitude toward the persons involved in the case, with the psychological advantages that this brings about.

The instrumentation will be described under two headings: (a) The detection and measurement of various physical events and energies, and (b) the registration and recording of the events and energies detected. Possible ways of cheating some of the instruments will be noted³ and hypothetical examples of the sorts of information (other than detecting fraud) which may be obtained will be given.

DETECTION AND MEASUREMENT

Light

By light is meant any electromagnetic radiation in the visible, infrared, or ultraviolet portions of the spectrum (the latter two portions of the spectrum being invisible to the human eye). The presence, absence, or change in intensity of light in a given area (e.g., a room) may be easily measured. By the use of filters, various sections of the spectrum may be monitored separately. The basic

² For the reader who wishes to understand the nature and operation of the various devices described below, books by the following authors may be helpful: Bukstein (3), Cornsweet (4), Hill (6), Lion (8), Smyth (11), and Stacey (12). If the reader does not have any background in elementary electricity and electronics, the excellently written chapters of *The Radio Amateur's Handbook* (2) are recommended. *The American Journal of Medical Electronics* (1) would also be of value to those wishing to keep up with the latest advances in some helpful instrumentation.

³ I would appreciate hearing from readers who build and use any of the devices described herein and discover other ways of cheating them.

transducers (light intensity to electrical signal) are photocells and photoconductors, relatively inexpensive and rugged devices.

Example: An observer in an alleged haunted house reports seeing a luminous apparition in his darkened bedroom. Was it a subjective event only, or did it have a physical component that actually emitted light? A photocell in the room would answer the question. Several photocells, filtered to respond to different portions of the spectrum, could provide detailed information about the radiation, if any, emitted by the apparition.

Another important detector of invisible light is the well-known Snooperscope of World War II fame. This device converts an image scanned by infrared light into a visible image on a small eyepiece. A room perfectly dark to the eye, but illuminated by infrared light, can be inspected, a particularly useful thing in investigating physical mediumship. The World War II devices sell quite cheaply on the surplus market. Greatly improved (but much more expensive) versions are also available. Closed circuit television cameras which will operate with infrared or ultraviolet light are also commercially available.

Heat

By heat is meant relatively slow changes in ambient temperature of solids, liquids, or gases, rather than infrared radiation. As with light, the absolute level or change in temperature may be measured for any given area or object. The basic transducers are thermocouples or thermistors, inexpensive devices whose electrical resistance changes with temperature.

Example: An observer reports that after an apparition appeared in his room, the air felt chilly. A thermistor monitoring room temperature would indicate whether or not this was an objective change in temperature. So-called "cold spots" in haunted houses could also be tested for objectivity with a thermistor.

Sound Waves

By sound is meant airborne pressure waves, whether audible to the human ear or not. Electronic filters can separate sounds into audible, subsonic, and ultrasonic components. The basic transducer is the microphone, which may be directional (responding best in a fixed direction) or omnidirectional. Microphones may be used in sets to allow more precise localization of the origin of a sound. The output from a microphone may be used to activate a device called a voice key, thus providing a simple present vs.

absent indication, or the output may provide a measure of the waveform and amplitude of any detected sound.

Example: It is a tradition that dogs react strangely in haunted houses and it is known that dogs hear into the ultrasonic region. A microphone could determine whether ultrasonic sounds were present, and whether they showed any temporal relationship with apparent PK phenomena.

Example: An observer reports hearing a scream in a haunted house. A set of microphones in various rooms would indicate where the sound originated from, if it was objective.

Example: In a poltergeist case, the sound of a vase being struck by a hard object is heard from another room, and the sound was detected by a microphone and recorded on a tape recorder. The investigator may now strike the vase with various objects in the room, recording these sounds, and, by means of later spectrographic analysis, determine which object in the room, if any, could have produced the originally detected sound.

Mechanical Vibrations

Pressure waves traveling through solids are termed vibration, rather than sound. The basic transducer for measuring force and waveform of vibrations are contact microphones, vibration pickups, and accelerometers. An ordinary phonograph pickup can be used as an excellent vibration pickup.

Example: In poltergeist cases and haunting cases, earth tremors have been hypothesized by Lambert (7) as the cause of the disturbances. Any tremors intense enough to move objects should be easily detectable by inexpensive vibration pickups, bonded to the frame of the house, and acting as simple seismographs.

Movement of Objects and Persons

Apparent PK phenomena have an annoying tendency to occur in any other room than the one the investigator is in. Rapid and accurate detection of such movement is important so that the investigator may hurry to the site for further investigation, perhaps even catching the phenomena before they stop. The spatial displacement of any object or person may be detected in a variety of ways.

Simple switches are the most straightforward and inexpensive approach. Their closing would immediately signal the movement of an object. If a vase has been repeatedly knocked over in a poltergeist case, for example, it could be set on a small platform (about the size of a pack of cigarettes) containing a switch. The

next time it fell over, the exact moment would be signaled by the closing of the switch. Switches could also indicate the opening and closing of doors, movement of furniture, etc., by being attached to them with string.

Example: At time X all the persons in a house are present with the investigator. He later discovers a lamp knocked over in a distant room, and the polygraph record of the switch under the lamp shows that it fell at time X. Thus, the probability that any of the persons with the investigator moved the lamp by normal means is low.

A more refined device than a switch is a strain gage, which measures the actual force applied to an object it is attached to.

Example: An object rests on a small platform containing a strain gage. By consulting his polygraph recording, the investigator might find that the object was knocked from the platform by a series of pulsed forces, each greater in amplitude than the preceding one, until they finally became intense enough to move the object.

A capacitance relay is an electronic device which produces an output signal proportional to any change in the electrical capacitance of its immediate environment. Since every material object possesses electrical capacitance, any object greater than a certain minimal size (which can be quite small) entering the immediate environment of the capacitance relay will affect its output signal, as will a shift in position of objects already within the device's immediate environment. A relatively simple version of a capacitance relay could have an entire room as its immediate environment and would be capable of detecting the movement of a person's hand moving six inches toward or away from the device. It is virtually impossible for anyone to enter a room protected by a capacitance relay without activating the device, and it is often used as a burglar alarm. If an object moved within such a protected room, but the device did not indicate that anyone had entered it, this would constitute strong evidence for PK (assuming that threads, reaching rods, etc., were ruled out by the investigator's vigilance).

Example: An apparition is seen to enter a room protected by a capacitance relay, but the device's output is unaffected. The apparition was thus subjective or, at least, did not possess the property of electrical capacitance to any appreciable degree.

A narrow beam of light which continuously registers on a photocell constitutes a device to indicate whenever a non-transparent object interrupts the beam. Automatic door openers

commonly use this technique to sense when a person approaches a door, and it could be used in haunting and poltergeist cases to indicate whenever someone entered a door, crossed into a certain area of a room, etc. One disadvantage is that a person may try to dodge around the beam, but this can be made quite difficult by (a) having the beam criss-cross several times so that there is not a large enough space for a person to pass through, and/or (b) filtering the light beam into the infrared or ultraviolet spectrum so that it is invisible. Precautions, however, must still be taken against thin reaching rods and the like.

One could also measure the absolute amount of light picked up by the photocell from the beam, rather than only whether the beam was completely interrupted. This would make cheating more difficult, as well as introducing some other possibilities.

Example: A doorway in a haunted house is protected by three light beam and photocell sets operating in the infrared, visible, and ultraviolet portions of the spectrum, respectively. An apparition is seen to pass through the doorway. Inspection of the photocell outputs reveals a drop in output from the infrared detecting cell, but not from the others. Thus the apparition is not only objective, it absorbs infrared radiation (consistent with the tradition that apparitions are cold).

Ultrasonic sound waves can protect a room in the same manner that a capacitance relay can. Such a device would generate ultrasonic sounds in a room and measure their reflection from walls and objects. Any change in the intensity or phase of the reflected waves, as would be caused by a person or object moving within the ultrasonic field, could be measured. Ultrasonic devices for this application are not commercially available, to my knowledge, but can be constructed (9).

The detection of movement of objects or persons by means of the instruments described above has depended on the natural physical properties of the objects and persons. It is possible to give them artificial properties which would enhance their detectability; e.g., a small (about the size of a pack of cigarettes), continuously operating radio transmitter could be attached to a person. Several receivers in different parts of the house would allow the investigator to keep track of this person's position by comparing the amplitude of the received signal at each location. This gets into fairly elaborate equipment, yet it should be kept in mind as a possibility, especially if physiological data were telemetered over the transmitter.

Example: On several occasions, person A shows a sudden increase in heart rate and a drop in skin resistance. A few seconds after such

reactions, an apparently paranormal event occurs somewhere else in the house. Barring fraud, person A is implicated as a "cause" of the phenomena because of the temporal relationship of the events and his pattern of physiological activation.

Miscellaneous Energies

There are quite a few events and energies that can be detected by instruments which have not been mentioned above because we have no idea from the present literature whether or not they would be worth looking for. This includes such things as radio waves, certain odors, changes in gaseous content of the air, magnetic fields, hard radiation, etc.

A novel type of detecting "instrument" would involve the objective assessment of the behavior of various animals. As mentioned above, it is a traditional belief that animals, particularly dogs and cats, act peculiarly in haunted houses. It is possible to measure much smaller changes in behavior than the panic-like states typically reported by the use of modern operant conditioning techniques. An animal is trained to press a bar for intermittent food reinforcement, and a very constant rate of bar pressing develops. This constant rate can be affected by a variety of operations, such as drugging the animal, introducing aversive stimuli, etc. As our folklore implies that animals are more sensitive to paranormal events than most humans, there are some interesting possibilities in using animals under conditions where they would be isolated from normal sensory stimuli, but able to respond to "psi stimuli" from paranormal events, as reflected in behavioral changes.

REGISTRATION AND RECORDING

The outputs from the various detectors must perform two functions. The first is to alert the investigator so that he may hasten to the disturbance for further observations. The second is to permanently and objectively record the information provided by the detectors for later detailed analysis.

Alerting the investigator is a straightforward task. Each detector could sound its own buzzer, or all detectors could operate a single centrally placed buzzer or bell. Microphones could be connected to a central loudspeaker, or to a miniature hearing-aid type earphone worn by the investigator, thus alerting him to any audible sounds detected. Subsonic or ultrasonic sounds detected would have to activate a voice key and thus sound a buzzer.

A loud buzzer would have the disadvantage of getting on people's nerves; also, it would be desirable to alert only the investigator

to an event of interest being detected so that he could be the first person on the scene. Instead of a central buzzer, there could be a central radio transmitter turned on by any detected event; this would activate a miniature receiver in the investigator's pocket and he could then be alerted by a buzz in an earphone, a mild electrical stimulus to his skin, or by vibro-tactile stimulation (5).

There are several ways in which various aspects of detected events can be permanently recorded. A camera is obviously one of the most useful. A flash camera, using a wide angle lens, could be set up in one corner of a room; if any event were detected in the room, the camera's electromechanical shutter would be activated and a picture instantly taken. A clock within the camera's field of view would provide a time mark. More elaborate techniques would involve using a movie camera programmed to take several seconds of pictures; or two still (or movie) cameras could be set up in opposite corners of the room for more complete coverage of the room and each other (for the naughty poltergeist who pushes over cameras!). Such a setup would be extremely useful in detecting fraud as the cameras would take pictures of anyone surreptitiously picking up a protected object to throw, or attempting to sneak into a protected room. Polaroid film would allow quick assessment of results from still shots.

A further refinement, using the camera as a detection instrument as well as a recorder, would be to employ several cameras with special films and filters sensitive to different portions of the spectrum.

Example: A vase falls in a protected room, activating a detector as it starts to move. The detector activates a movie camera for ten seconds and three still cameras filtered to respond to different parts of the spectrum. The pictures show nothing to indicate fraud; the movie camera indicates that the trajectory of the falling vase was flat for so many units of time, allowing the amplitude and direction of the force acting on it to be calculated; the still cameras show a "haze" around the vase in the ultraviolet region, but not in the infrared or visible region. Thus something may be learned about the physical components of PK.

A polygraph is another desirable recording instrument. This is a device in which paper runs under a set of recording pens at a constant speed, so that any displacement of the pens by signals can be measured as a function of time. The pens may indicate simply the presence or absence of an event (so-called signal marker pens), or may record the quantitative characteristics of such events. Both types of recording may be done on one polygraph. The temporal relationships of various detected events may then be

determined. Although polygraphs can be very expensive instruments (thousands of dollars), relatively inexpensive models may be used with many of the detectors described above. They can be quite small, easily portable, and useful for other studies, e.g., physiological correlates of psi.

The functions of a polygraph may be duplicated with an instrumentation tape recorder, but this has the disadvantage of higher cost and the need in any case to play the tape back onto a polygraph for analysis.

If microphones are used as detectors, an ordinary audio tape recorder is adequate for recording all audible sounds detected. The current availability of slow-speed four-track machines makes audio recording relatively inexpensive as a great deal of information can be put on a single reel of tape. This is an important consideration, since the tape recorder (and the polygraph) must run continuously.

MISCELLANEOUS TECHNICAL CONSIDERATIONS

The investigator must be able to turn off his detectors remotely as it would be of little value to have several dozen photographs of him entering a protected room to check the apparatus! This requires either a key switch (like an automobile ignition switch) outside protected areas or a small radio transmitter to turn off the detectors remotely. An ultrasonic signaling apparatus or a light beam apparatus (such as is used for remote control of TV sets) could also do the job. The latter techniques have the advantage that it would be extremely difficult for anyone to duplicate the control apparatus for fraudulent purposes (assuming that the investigator is careful to keep it in his possession).

All the detectors and recorders must be protected from tampering, of course. The investigator should maintain careful control over them, have them constructed in locked cases when possible, and periodically check them for signs of tampering as well as for proper functioning.

By now the reader probably has a vision of a horrible tangle of wires and weird looking apparatus all over the house, frightening the ghosts, poltergeists, *and* investigators away! While a large number of detectors and recorders inevitably results in a certain amount of complexity, the horrible vision need not be so; even a fairly elaborate array of instruments can be quite unobtrusive. The connecting wires can be quite thin and tucked behind furniture and under carpets. Most detectors can be housed in small, unobtrusive boxes. The recording polygraphs and/or tape recorders can be placed in out-of-the-way locations. If sufficient funds were available, the outputs of all detectors could be telemetered to the

recorders, thus eliminating connecting wires. As for portability, a number of detectors, a camera, and a small polygraph could fit into a single suitcase.

DISCUSSION

A number of instruments which could be of value in the study of poltergeists, hauntings, and physical mediumship have been briefly described. Some of these devices are of more immediate value than others; each investigator must decide which would be of greatest use to him. Any amount from five dollars to five thousand dollars may be spent on instrumental aids; at the one extreme, one acquires a little convenience in detecting the movement of an object; at the other extreme, a very complete portable laboratory for investigating the possible physical properties of apparent PK phenomena (or detecting elaborate methods of fraud).

The use of instrumental aids involves an initial cash investment and a commitment to use as much of it as possible in each case that comes up. These difficulties seem more than compensated for, however, by the likelihood of discovering fraud very quickly or, if fraud is not discovered, obtaining data of considerably more value than can be obtained with conventional techniques of investigation. What would be the relative value, for example, of a single photograph of an object in midair in an empty room, compared to a dozen statements from typical cases now in the literature to the effect that a crash was heard in the next room and an object subsequently found on the floor?

Some minor disadvantages of the use of instrumental aids center around the possible annoyance of persons involved from restrictions on handling protected objects or entering protected areas; moreover, some persons are bothered by "gadgets." However, a tactful investigator should be able to handle these problems. Indeed, the use of "gadgets" may enhance his "scientific" status, with consequent psychological advantages.

Finally, it must again be stressed that the use of instrumental aids does not make fraud impossible: the investigator's conscientiousness and skill remain the final (albeit fallible) safeguard. But the evidence obtained with the use of instrumental aids in the hands of a competent investigator should, in most cases, be solid and clear, whether it indicates a normal or a paranormal explanation of the apparent PK phenomena. Once this basic question is answered, we will be in a much better position to evaluate the relevance of these phenomena to the question of survival.

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