

THE PARANORMAL: Part II

**Mechanisms
and Models**

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To Gyser Lafrenière

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Preface

Sooner or later a method reaches its limits, and then it is replaced with one which is more useful and has greater limits. In the early years of man's scientific thought, armchair philosophical methods for analysis of natural phenomena were adequate. This was before the time of precise equations and elaborate measurement apparatus. But as knowledge increased, and more detailed measurements could be taken and more accurate predictions made, the discourse method of philosophy was no longer adequate. The science of physics emerged, with a new methodology.

Parapsychology is in a similar transition stage. At one time it was sufficient to speculate about all the tremendous "mind boggling" implications if psi phenomena really existed. This was an important step, but was limited to "mental" gymnastics and sensationalism. Now more detailed methods must be used, and predictably, these methods are often not popular to the populace or to the layman. This text was not written to be sensational or to stimulate fantasy. Instead, it was constructed to give systematic explanations to "paranormal" reports from known behavioural and physical laws.

15 July, 1974

Preface

Workable, practical models are difficult to obtain in many disciplines of science. The matter is further complicated when the subject area is composed of many phenomena only related by the label applied to them, and not in mechanism. Parapsychology is faced with such a dilemma. Parapsychology includes the unusual, from apparitions to precognition. If the "final analysis" ever does occur, we will find that what has been called "paranormal" ranges from deluded reports of borderline psychotic human beings to transient changes in our real, but complicated physical environment.

This book demonstrates some of the models and mechanisms which can explain the various types of paranormal reports. Primary emphasis is given to understanding what people say about unusual things in terms of known laws of learning, conditioning, physiology, and physics. Principles and hypotheses are generated which can be tested in the laboratory or with correlational data. Perhaps then, with such an approach, we will be able to replicate this elusive phenomena in the laboratory. The experimental control of such phenomena in a manner similar to the way it is reported to occur spontaneously, will be a very powerful control mechanism.

September, 1973

CHAPTER I. INTRODUCTION: THE PUTATIVE PHENOMENA

The term parapsychology has been applied to those experiences which include so-called "haunts, telepathic communications, clairvoyance, out-of-body experiences, precognition, retrocognition, apparitions, psychokinesis, post-mortem experiences, forces" and a variety of other unusual reports. These reports must be considered only as unusual verbal behaviour until both the private experiences and ostensible physical changes are replicated in an experimental paradigm, as a consequence of a testable model. This text will deal with those models and mechanisms that may be involved with the report of paranormal experiences and which may result in their experimental duplication.

Traditionally, there has been a tendency for researchers in the area of parapsychology to favour non-physical hypotheses for the explanation of unusual experiences. The problems associated with this approach have been discussed in The Paranormal Part I: Patterns. In the present text, paranormal behaviour and occurrences will be defined as those phenomena which involve operations in the organism and its environment not clear to date, and do not seem to involve processes which are predictable from the known laws of nature. The phrase "seem to involve" is important, since the mechanisms involved may be quite predictable once more data has been collected or other natural relationships have been elucidated.

Regardless of the most careful control, experimenters have biases in their approach to problems. This emphasis is usually a product of their reinforcement history or in other terms, a consequence of what they have experienced. This experimenter's emphasis is that which people report as "paranormal" may be extensions of known physical processes in living organisms and the physical environment. Even though the relationships may not at present seem obvious, this does not mean we have to eliminate a physical explanation. There are many variables which become obvious or distinguishable only when enough data has been collected. For example, earth scientists are beginning to discover the functional relationships which only are visible from the global analysis of meteorological and geophysical data. Real and consistent contributions from the sun's disturbances and earth's geomagnetic reaction upon our weather and physiology have become just recently apparent.

Perhaps we will find that ambient contributions from our everyday geophysical and meteorological environment are a primary co-factor with a death stimulus for the occurrence of an experience that a person may label "paranormal". Such relationships would only become apparent by first collecting large amounts of data and completing pattern analysis. Such analysis was completed in The Paranormal Part I: Patterns. A short summary of the results of this study will be discussed below.

However, several colleagues have displayed doubts about the

validity of considering verbal reports as primary source data. They would prefer analysis to be completed on the experimental studies concerned with card guessing. This is an important criticism and may have some relevance. But until more data is shown, it is not possible to conclude that statistical fluctuations in card guessing in the laboratory are quantitatively related to the same mechanisms controlling the report of spontaneous experiences. A woman reports that her husband appears to her in a bloodied apparition at the time of his death. Is this the same kind of phenomena as a person guessing Zener cards correctly significantly more than chance expectancy? When a young man reports he was "thinking" about his girl friend just before she appeared, is this the same mechanism as guessing a greater frequency of wavy line cards that a person is staring at in the laboratory? Or if objects move around a pubescent boy, are these phenomena actually comparable to the "influencing of the fall of dice" at statistically significant confidence levels in the laboratory?

Some experimenters have insisted that what happens in the laboratory with card guessing and dice controlling show many patterns similar to spontaneous cases. Unfortunately, the relationships that are shown are of the same order of magnitude as that between declines in sexual behaviour with age and decreases in the humour evoking effects of a joke. Both show similar patterns within

their own time intervals, but both have different mechanisms. Their apparent similarity depends upon how you graph the data and exists because both are behaviour. Until demonstrated otherwise with quantitative statements, any relationship between spontaneous reports of paranormal experiences and statistical fluctuations in card guessing should be considered spurious.

What about the validity of verbal reports concerning paranormal experiences, are they reliable? The answer is no. The usefulness of studying what people say about unusual experiences is in the data patterns that are generated. Once these patterns are found, experimental duplication may allow replication of the phenomena. Only in their potential to guide experimental paradigms lies the validity of studying what people say they have experienced.

Patterns and Phenomena

One of the most consistent findings in The Paranormal

Part I: Patterns which impressed this experimenter is that what people are supposedly saying about paranormal experiences are remarkably consistent from source to source. The differences between reports noted in "authoritative" journals as opposed to those recorded in less respected magazines are small. Several hypotheses may be optionally chosen to explain this result. First, the phenomena of paranormal effects are so strong that they show up regardless

of the person. Second, what people say about paranormal experiences, regardless of the person's reputation or the investigator that completed the verification, are uniformly misleading and inaccurate. Thirdly, people who supposedly experience these phenomena read the same books or have a similar data source. Other hypotheses could be generated in a similar fashion. Nonetheless, a number of patterns can be isolated.

Telepathy-Clairvoyance. The detection of or response to a stimulus beyond the normal detection limits of known sensors in the body is the primary operation involved with telepathic and clairvoyant (T-C) reports. Traditionally, telepathy implies that the stimulus was a human or something associated with human behaviour. On the other hand, clairvoyance implies response to a stimulus with which a human subject is not immediately associated. For example, if a mother is sitting in the living room watching television and she suddenly feels that her daughter has been injured by a car, then the label "telepathy" or some synonym is applied. On the other hand if a person is walking along the road, hears a voice say "there is money buried beneath this soil" and upon digging finds a bag of quarters, then clairvoyance is the usual descriptive word.

The report of telepathic-clairvoyant (T-C) experiences is more frequent during the summer months. A great majority occur during the night time hours (as high as 85% in some samples), and

between midnight to 0400 hours. The phenomenon is certainly an indoors occurrence since more than three-quarters of the time the percipient (the person who reports the experience) is inside the house, especially in the bedroom. The distance between agent (the putative stimulus) and percipient is distance dependent, although this relationship is probably artifactually related to a more central factor. The agents in T-C experiences are predominately members of the immediate or peripheral family, which by social conditioning live in closer proximity anyway. The percipient's sex is usually female, although the actual male/female split seems to reflect heavy social expectancies and is role determinant. About half the percipients are asleep before the T-C experience and often report that they suddenly awoke. Automatic behaviours, such as washing dishes, staring at television, or driving, which require little concentration for significant intervals are also frequent antecedent conditions for the report of many T-C experiences.

The mode in which the percipient experiences the T-C event may utilize any of the senses, although visual and auditory channels are by far the most popular. Waking apparitions, voices and strong hunches are among the most frequent experience formats. In situations where the subjects hear voices, the call of the personal name is primary.

On the other hand, the putative agent or individual that

seems to be functioning as the stimulus for the T-C experience is invariably in an aversive situation. Death and near-death crisis conditions for the agent accounts for about 75% of the cases analyzed by several authors. It is noteworthy that although immediate members of the family and friends are the most frequent putative agents, strangers or unknown human sources are also reported.

Precognition. So-called precognitive experiences differ from usual T-C experiences on the time-axis. Whereas T-C events are most frequently typified by unaccountable distance disparities between the stimulus (the agent) and the response (the percipient), the stimulus in precognitive reports is presumed to be somewhere in the future. Although certainly among the most fascinating of paranormal reports, the logical and empirical substantiation of events in the future affecting the events in the present, is extremely difficult. For every event interpreted as precognitive, there are equal options that the responsible stimulus is present before the "precognitive experience". Consequently precognition is merely a special case of T-C. Many science fiction writers and theorists have postulated time-dimensions, distortion vortices, and a number of other fantasies to explain precognition. However, the actual evidence for the existence of an uncontaminated precognitive stimulus in precognitive reports is non-existent.

What people call precognition can be depicted by a few examples. Suppose a wife dreaming one night awakens in terror

from a nightmare in which her husband has been killed in an auto-wreck. She relates the dream to her husband the following morning. He soothes her anxiety by promising not to leave town. However, he is given an "unexpected" business task two days later. While driving to the destination, the husband crashes into a bridge and is killed. This experience would satisfy many investigators as a legitimate precognitive experience, especially if the dream had been written down before hand. Other types of precognitive experiences are not quite as dramatic. For example many reports include situations where "a strong hunch" or a "voice" instructs the percipient to move his or her body from an area just a few seconds or minutes before an event takes place that might have killed the percipient.

In The Paranormal Part I: Patterns, a number of interesting results were found. First precognitive experiences are again night predominate and reflect the high occurrence of dreaming in which these experiences are most likely to be reported. Repetitive dreams with the same theme are noted about 20% of the time, although again this figure varies with data sources. The subject of the experience is invariably human related, usually being a member of the immediate family. Again, as with T-C experiences, death is the dominant theme in precognitive experiences. A major discrepancy between T-C and precognitive experiences is that the dreamer himself may be the subject about which the dream

is centered.

From a theoretical perspective, one of the critical aspects of putative precognitive phenomena is the time between the precognitive experience and the occurrence of the "precognized" event. Different authors usually concentrate on different sample types, so usually there is some disagreement on absolute values for experience-event time intervals. In general the dream-event time is less than two weeks. Some analyses indicate that more than half of the precognitive cases involve time lapses of less than three days. A plot of spontaneous data indicates a possible exponential relationship.

Apparitions. The apparition stands out as the most detailed and dramatic of paranormal experiences. Apparitions of dead or dying people have been included in art works, plays and literature. Usually four to five types of apparitions can be classified as a function of the situations in which they occur as well as their putative source. The post-mortem apparition is the most commonly reported category. An example of this type of experience would be a son suddenly awakening and seeing the apparition of his mother, who has just died, beside the bed. When he reaches for her, the apparition disappears.

The other four types of apparitions can be termed crisis, haunt, precognitive and "wish-projection". Crisis apparitions, as the name suggests, usually take place when an agent is exposed to

near-death or painful situations. The percipient usually sees the apparition in conjunction with the background in which the event is taking place. Haunts are slightly different from post-mortem and crisis apparitions in that they are often repetitive, associated with other physical phenomena (noises, etc.) and seem to bear no familial relationship to the percipient. Further subdivision of this category can be made into "classical ghosts" and "retrocognitive" events. "Classical ghost" cases are typified by the usual reports of repetitive but aperiodic occurrences of images, smells, noises, knockings and peculiar sensation by the percipient. Each event is in some way different. The retrocognitive experience shows marked stereotypy with each occurrence, and seems to reflect an actual scene from the past. Traditionally the event was associated with death or intense emotional content. Precognitive apparitions are a small category that usually involve religious or dead figures bringing information to the percipient about an oncoming tragedy, personal or public. The most infrequent event is the report of an apparition of a person who is still alive. Although these types are discussed by many authors, the actual accounts are rare.

Patterns in phantasms or apparitions show similarity to both T-C and precognitive experiences. This is not surprising in many ways since apparitional experiences can be evaluated as special visual modes of T-C or precognitive occurrences. Night time is the

predominant time of report. For the post-mortem cases, antecedent experiences of "feelings" or "sudden awareness of something in the room" are noted. If the person was asleep, the phrase "suddenly awoke" is often reported before the apparition is consciously noted. The vast majority of post-mortem apparitions occur in the sleeping area within the peripheral boundaries of the percipient's bed. Very few percipients report seeing the apparition actually form. If the percipient is awake, he sees something out of the corner of the eye or feels something at his back and turns around.

What the apparitions reportedly do is also pattern specific. Smiling apparitions are common, in fact the appearance, smiling and immediate disappearance of the apparition is a common report form. The apparition disappears quickly but while it is present appears markedly solid. Few cases note any obvious transparency in the image. Again, more than half of the cases involve members of the immediate family as the apparitional stimuli. The time interval between the established death and the appearance of the apparition to the percipient is less than five days for most of the cases.

Other Post-mortem events. The sudden withdrawal of a continuous reinforcement situation is frequently associated with aggressive, frustrative and other expressions of emotional behaviour. When a member of the immediate reinforcement hierarchy is suddenly removed, it is not surprising that emotional behaviours are generated

as well as anticipatory responses associated with the old schedule. Death, in the human hierarchy of reinforcements, is one of the most aversive schedule changes. Consequently it is not surprising that death is associated with a wide variety of peculiar behaviours. Within this category of peculiar behaviours falls a varied collection called post-mortem events.

Post-mortem experiences are reported in every sense modality. Their most conspicuous property is that they are interpreted by the percipient as being a sequence typical of the deceased when he had been alive. "Feelings of familiar touch on the shoulder, hearing an idiosyncratic whistle, smelling an odor, or suddenly feeling a presence", are often reported as proofs that the deceased has returned or is giving a sign. Very often the experience takes place shortly after the death of the immediate family member or friend when the percipient is in a situation with which he normally associated the deceased.

A significant number of animal cases are reported in this category. Reports of feeling the warmth of a cat in its usual place on the bed following the animal's death are examples. Associated smells or noises for which the pet was most well known is another common report form.

Out-of-Body-Experience. Traditionally called astral projection or thought projection, out-of-body-experiences (OOBEs) have been closely investigated in the laboratory. Reports of

OOBEs are rather stereotyped and include variations of "consciousness" leaving the body, floating near the ceiling, seeing one's physical body asleep on the bed or operating a table from afar, thinking of a distant place and then suddenly moving there, and seeing dead relatives in the context of various types of Judeo-Christian heaven backgrounds. Perhaps the most distinguishing aspect of OOBEs is that the experience is primarily and centrally concerned with the percipient, himself, and not another person or object.

Fatigue, drugs, shock effects, or major surgery are frequent antecedent conditions for the occurrence of this report. During the experience the person, by normal measurements unconscious, later reports that he was aware of various sequences taking place outside his body. The assumption that some people who "astral project" can respond to stimuli some distance away has led to a few experiments, but the results have been tenuous and difficult to systematically replicate.

Unusual Sensations. Within the category of unusual sensations, the irregular paranormal experiences are often placed. They also can take place in any of the sense modalities and include reports of diffuse lights in the room, sharp rays of light, voices from the corner of the room, sounds of chanting, feelings of evil forces hiding behind doors, and smells of roses or incense in a particular area. The phenomena are rarely repetitive and as usual are associated with the death of something or somebody by the per-

cipient. More recently UFO experiences have shown strong resemblance to this category.

Unusual Kinetics. Unusual kinetics include reports of poltergeists, kinetic haunt sequences such as doors opening or sudden drops in temperature, curse-induced sickness or alternatively prayer-induced healing, forces which immobilize the percipient, electromagnetic peculiarities such as bells ringing, lights exploding, cars stopping, and apports (the ostensible materialization or dematerialization of objects). The major property of these phenomena is that something other than the person's private behaviours are influenced. Instead changes are taking place in the environment which in principle could be measured with instrumentation.

This category forms an interesting interface with similar phenomena which traditionally have little parapsychological association. The fall of objects, especially rocks, on the roof of houses has been reported in other contexts. Mysterious etchings of glass, cars stopping and electromagnetic peculiarities in certain areas have been discussed from other points of view. The most famous men to consider these "oddities" of the physical environment have been Charles Fort and the late Ivan T. Sanderson of the Society for the Investigation of the Unexplained. Recent data collected and mapped by Gyslaine Lafrenière and myself have indicated that a significant portion of the geographical distribution

of the unusual kinetic anomalies can be explained by normal but unusual environmental stimuli.

Every century is typified by a favorite explanation for the occurrences of misfortune or unexpected physical phenomena. Lights in the sky during one century may be caused by dragons or in another century by a curse from the local satan-worshipper. In this century, the unprecedented spread of UFO reports has filled this gap. The physical phenomena and private experiences by percipients associated with UFO landings or close approaches, share many of the patterns of the traditional parapsychological experience. During UFO flaps or space-time periods when there are a large number of UFOs reported, experiences of seeing unusual apparitions, immobilization by forces, "mental" contact, messages from the future and a variety of other phenomena are increased. In fact the description of UFOs and the presumed humanoid occupants within UFOs show striking apparitional-like movements and properties. Interestingly the contact from UFO life-forms is sometimes highly personal and may include relatively trivial data such as informing the percipient that a friend across town was in a car accident.

The time distribution of unusual kinetic phenomena is aperiodic but frequent within a short time as in poltergeist events, or aperiodic but infrequent within a longer interval as with the haunt events. Aperiodicity in this context most likely reflects our ignorance of the controlling variables. Commonality exists in

their spatial dependence, either with an organism or with a particular geographical locality.

Comment

The categories discussed in the previous pages are arbitrary, based upon apparent similarities in stimulus operation and do not indicate that all the phenomena reported within a category have the same mechanism. Instead the categories are only useful in their facilitation of pattern isolation. An apparent homogeneous category system should not be confused with the approach for solving the mechanisms.

CHAPTER II. CONDITIONING AND LEARNING

IF paranormal experiences can be shown not to be largely a product of fraud, psychological disorder, social reinforcement, or known difficulties of brain chemistry, there is still no reason to assume that their sources are necessarily non-physical. There is still significant evidence that known principles of behaviour operate and physical changes in the environment take place.

In this chapter, paranormal reports will be discussed in terms of extension and modifications of known behavioural and brain operations. A brief introduction to fundamental learning principles and their applications will be reviewed. Paranormal experiences will be discussed as consequences of infrequent reinforcement conditions between the organism and the environment or as side-effects of normal conditioning procedures under situations of organismic stress. It will be assumed that the actual stimuli for producing the experience or the report of the experience are totally within the brain and normal behavioural environment.

The possibility that the source of paranormal experiences may actually be paranormal stimuli existing outside the body of the reporter will also be discussed. These possibilities will be investigated in the section concerned with interesting speculations based on extensions of conditioning models. This section is included

to demonstrate that even unusual behaviours can be discussed in terms of known behavioural principles. Predictions from conditioning models will be made and tested with the available data. For those who prefer a physical mechanism to mediate stimulus-response connections, the role of natural electromagnetic fields of biological frequencies are discussed.

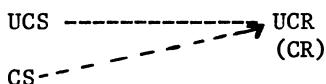
There is no one explanation for all types of paranormal reports. No doubt even the wise men of the twentieth century have placed many behaviours with different operations under the same rubric: "paranormal". Some kinds of reports may have their roots in chance occurrence, while some kinds may be artifacts of hormonal imbalance. Still other kinds of paranormal experiences may be due to changes as yet unmeasured in our "universe". Regardless of their source, it is assumed that they follow the laws or the extensions of laws applicable to normal behaviour. For then they can be measured. If they can be measured, perhaps they can be predicted, and if they are predicted, they can be controlled. It is for this slim chance but unlimited consequence that this chapter and book were written.

Introduction: Learning Principles and Applications

The understanding of paranormal behaviour demands a conversant knowledge of the mechanisms for normal behaviour. Experimental psy-

chologists have found that the occurrence of a response can be expressed as one of two fundamental operations: $S \rightarrow R$ or $R \rightarrow S$. These two logical combinations are called respondent (classical) and operant (instrumental) conditioning, respectively. Changes of response frequency in respondent procedures involves the previous presentation of the appropriate stimulus while changes in the response frequency in operant situations demands the consequent presentation of the appropriate stimulus. Stated in another manner, the two procedures differ with respect to when the appropriate stimulus is presented in relation to the response. These two procedures, separately or in combination, have been helpful tools for understanding and predicting normal behaviour.

The respondent situation ($S \rightarrow R$) is most often depicted as the following:



Basically three procedures are employed:

1. $[UCS \rightarrow UCR]$: the presentation of the UCS (unconditioned stimulus) and the occurrence (elicitation) of the UCR (unconditioned response). Their association is presumably innate.
2. $[UCS_{NS} \rightarrow UCR]$: the presentation of a neutral stimulus (NS) before or contiguous with the presentation of the UCS for several trials (Presentation of the neutral stimulus by itself has no effect).

3. [CS→CR]: after several pairings (presentation of the UCS and neutral stimulus), the presentation of the neutral stimulus by itself. If the presentation of the neutral stimulus by itself elicits a response (CR or conditioned response) that is similar to the UCR, then the neutral stimulus is considered a CS (conditioned stimulus).

One example of respondent conditioning in the rat can be shown with shock. Electric shock (UCS) delivered to the leg elicits the flexion of the leg (UCR). If a buzzer, which by itself does not elicit the leg flexion, is paired several times with the occurrence of the shock, the presentation of the buzzer by itself can also elicit a response (CR) similar to that elicited by the electric shock. In this situation we can fill in the operation blanks as follows:

1. shock -----→ leg flexion
2. shock buzzer -----→ leg flexion
3. buzzer -----→ "leg flexion"

It is important to point out that the CR is not exactly like the UCR, but similar to the UCR.

In human beings similar conditioning takes place. Suppose the father often slaps his son. The usual result of the slap (UCS), if sufficiently forceful, is pain and crying (UCR). These patterns

are presumably innate in the human organism. If the father also consistently makes a frowning face that is discernible to the child at the same time or just before the slap, these facial expressions can take on the role of a CS. Consequently presentation of these facial expressions alone can elicit responses which are similar to that of the UCR, e.g., whimpering, which would be considered CRs. One property of life forms seems to be that a suppression of ongoing behaviour often occurs during the time interval between the onset of a CS and the occurrence of an aversive UCS. Several names have been applied to this operation such as conditioned emotional responding or conditioned suppression. Private responses e.g., thoughts, may also be suppressed during these periods and the person may experience what has been termed anxiety or fear. In the vernacular, a person might say "he can't think" when he's anxious or upset. Anxiety can be defined as a conscious experience reported in a period between the CS and an aversive or painful UCS. Such periods are associated with the anticipation of "pain". The above situation between the father and his son could be depicted as:

1. slap (UCS) -----→ crying, pain (UCRs)
2. slap (UCS) frown or similar expression (NS) → crying, pain (UCR)
3. frown (CS) -----→ whimpering
"anxiety" (CRs)

In the respondent situation the delivery of the reinforcer (UCS)

is not dependent greatly upon any behaviour from the organism. Instead, the delivery of the UCS is dependent upon pre-existing patterns in the environment.

Contrary to respondent conditioning, operant conditioning involves the situation where the behaviour of the organism is influential upon the delivery of reinforcement. One might write this relationship as:

R -----> (UCS -----> UCR)

where the occurrence of response "R" is followed by a UCS --> UCR sequence. When this occurs, the probability that the response "R" will occur again is increased. Some authors prefer to say that the response is strengthened. Suppose a rat, due to a number of non-specified or chance variables, presses a lever which results in the delivery of food. In this situation, the probability that the response will occur again is increased or strengthened. Examples with the human animal are numerous. Suppose a human infant, due to a number of innate or accidental factors, emits a cry (R) which is quickly followed by the delivery of milk (UCS-UCR) by the mother. The probability that the crying response will occur again is strengthened. As the times the response is quickly followed by milk become more numerous, the frequency of the response increases.

Even the more complex behaviours of the human being can be expressed in terms of either respondent or operant conditioning. Some words may take on their "meaningfulness" by a complex extension

of fundamental respondent conditioning. The presentation of milk (UCS) to the infant can elicit various satiative behaviours (UCRs) which have been suggested to include private representations. (Private representations or responses have not been measured directly in the infant since it lacks the most frequently used measuring tool: overt verbal behaviour). One of the conditions of our environment, however, is that the milk is not given in and by itself; there are other stimuli occurring with it in time and space. Perhaps the most consistent stimulus complex which accompanies the presentation of the milk to the infant is the mother.

The situation can be expressed as:

1. milk (UCS) -----> satiative behaviours (UCR)
2. milk (UCS)
mother stimuli (NS) -----> satiative behaviours
3. mother stimuli (CS) -----> satiative behaviours (CR)
1. "feelings of security"

Mother stimuli would include the "milk deliverer's" shape, smell, voice, touch and other perceptual characteristics. If the mother stimuli frequently accompany the presentation of milk (UCS), which invariably they do, then soon the mother stimuli themselves elicit responses similar to the UCRs. Those responses would be similar to but not totally like the UCRs and may include private experiences of security, quiescence and other semi-conscious experiences. To date recording techniques have not allowed the measurement of the presumed private behaviours, only that of the overt behaviours, e.g., decreases in motor activity.

Once the association between mother and public-private satiative behaviours has been made, further "higher order conditioning" can take place. Another previously neutral stimulus can be paired with the presence of the mother. After a number of pairings between mother stimuli and the new neutral stimulus, the latter can also begin to elicit the CRs of motoric quiescence and "security", etc. One group of stimuli which initially have no major private or public behavioural effects on the human organism are vocal noises (words). However after numerous pairings of such phrases as "mother loves you", "I love you", "mother does this because she loves you", in the presence of the reinforcing mother stimuli, the word "love" can also begin to elicit the CRs. The diagram could be drawn as such:

1. CS (mother stimuli) -----> CRs
2. CS₁ (mother stimuli)
|
CS₂ ("love" word) -----> CRs
3. CS₂ ("love" word) -----> CRs

One can say that the mother stimuli and later the love words are reinforcers since their occurrence increases the probability that the CRs of "security" and quiescence will occur.

Operant examples are also numerous in the social environment. A young man walks down the street and smiles at the pretty woman walking towards him. She smiles back. If the latter is a reinforcer, then the probability that the young man will smile at her again or even generalize his behaviour to verbal contact,

increases. By definition any stimulus which comes after a response that increases the probability that the response will occur again is a (positive) reinforcer. If the stimulus does not increase the occurrence of the response, it is not a reinforcer.

The above examples of conditioning-learning principles have been supported and suggested by experimental evidence. But we do not have to stop here. More complex private behaviours can also be considered as consequences of demands by the conditions of the environment and the organism. What we label "conscious-awareness" behaviour can be viewed as just another type of behavioural pattern. A person places his hand on a hot stove (S) and quickly removes the hand (R). The teacher asks a question (S) and the student answers (R) with a verbal pattern.

Conscious-awareness behaviour can be understood as another response pattern to various stimulus complexes in the environment. However awareness behaviour is a bit more complex and has some interesting properties. Whereas the movement of the hand from the stove involves changes in sensor input, motor fiber output and programmed changes in the spinal cord and upper brain, the consequences of evoking awareness behaviour includes various constituent verbal responses which have been labeled "experiences of self" and feelings of "awareness". To question stimuli like "are you awake?", "were you thinking?", the person responds in some predictable verbal pattern. Other responses which are evoked as a part of the awareness behaviour pattern are reported experiences

of "self control", "the existence of 'me' as an independent thing" and experiences of "identity". These properties are not causal factors of behaviour as has often been speculated by philosophers and humanistic pseudopsychologists. Instead they occur whenever conscious-awareness behaviours are displayed, simply because they are a part of the conscious awareness behavioural pattern. In a more objective scope, one could interpret such responses as artifacts of awareness behaviour in the human organism. When a car is driven, exhaust fumes are produced. The exhaust fumes are a property and side-effect of the mechanisms that make the car run. It would be ridiculous to state that the exhaust fumes are responsible for the car's movement. Feelings of "self and I-ness", like exhaust fumes, are a concomitant property and side effect of a more fundamental behavioural system in operation at that time.

Organisms behave. Behaviour has a high probability of occurrence. Different species have different innate and learned propensities to engage in some behaviours more frequently than others. The rat's most frequent behaviours are grooming and gnawing. The fish's most frequent behaviours are movements of the caudal-pectoral fin (swimming). Human beings most frequently engage in a behaviour which they have loosely labeled "awareness". This type of behaviour is mainly composed of response sequences which have been labeled as "thoughts".

Thought-responses often compose the complex sequences of the awareness behavioural pattern. Topographically the human organism responds to the changing external and internal environments by awareness behaviour. But the more precise responses to specific stimuli occur as thought-responses. This does not mean that thought-responses occur only in sequences of awareness behaviour. They may also occur as part of other behavioural sequences. In an analogous manner, the movement of the hand may occur as a part of many different behaviour patterns: movement away from a hot stove, writing with a pencil, or playing badminton. Thought-responses may be included in behavioural sequences that are not necessarily related or even commensurate with awareness behavioural patterns. Since the "awareness" behavioural pattern is only one of many elicited by environmental and systematic conditions, thought responses could be included in other "non-aware" behavioural patterns. Our experience, that is the display of the awareness-behaviour pattern, is not the total behaviour of the organism. Many other behavioural patterns contribute to the human animal's behaviour at any given time.

It is important to emphasize that thought-responses can be elicited or emitted by stimuli in whatever pattern they were incorporated, depending on the original conditioning situations. The appropriate stimulus may elicit thought-response in either an awareness behavioural pattern or non-awareness behavioural pattern.

Thus a stimulus which elicits a thought-response in a non-awareness behavioural pattern may set in progress a series of responses which may not include conscious behavioural patterns. Yet, the overall behaviour, including awareness behaviour, would be affected. Such stimuli are called subliminal, since they would presumably initiate thought responses in other behavioural patterns without simultaneously eliciting responses which are a part of the awareness pattern.

The above statements depend upon the property of thought responses not only to be conditioned but to act as stimuli to produce other responses in the behavioural chain. These conditions demand that thoughts can act also as stimuli to elicit not only other thoughts but other private responses as well, such as physiological changes.

Several experimenters have shown that through conditioning procedures, "thoughts" can act as stimuli. Dollard and Miller (1950) instructed human subjects to pronounce the letter "T" or the number "4", as they were presented. The presentation of the letter "T" was always followed by an electric shock while the number "4" was never followed by shock. Eventually the subjects discriminated between the two symbols as was indicated by their GSR responses. GSR (galvanic skin response) is a measure of the change in skin resistivity, associated with sweating, and often used operationally as an index of fear. After a number of trials

the GSR for the "4" stimulus (no shock association) was very small while the GSR changes for the "T" stimulus (shock associated) were very large. To test if just "thinking" about "T" could initiate a GSR response, the subjects were presented with a series of dots. They were instructed to think of "T" when the first dot appeared and "4" when the second dot appeared. The dots were used in case any conditioning had taken place just to the visual presentation of "T" or "4". Miller and Dollard found that when the subjects just thought about the letter "T" a strong GSR reaction took place. However just thinking about the number "4" did not produce this reaction. Other information on this type of conditioning has been discussed by Tucker (1970).

Thoughts can be elicited and emitted by stimuli or themselves act as stimuli to produce other verbal consequences. Sometimes these responses may be a part of a conscious-awareness behavioural pattern, other times they may not be. Experiments have demonstrated that responses can be evoked or emitted in a non-awareness behavioural pattern. Hefferline and Keenan (1963) report that covert responses were operantly controlled by delivery of a reinforcer that was also capable of modifying the display of awareness responses. They found that small muscle twitches could be reinforced by presenting information concerning the number of tokens delivered. The awareness behavioural pattern, whose occurrence is typified by such response sequences as "I think I am a

person", or "I am an individual", also responded to these reinforcers. However the delivery of the reinforcement was not dependent upon the occurrence of awareness responses which were at most superstitiously acquired. The experiments discussed by Levitt (1967) also showed that internal responses could be elicited without simultaneously affecting awareness behaviour. Electric shock-induced changes in ACTH, a stress-responding hormone, were associated with the experimental room. Hypnotic suggestions were then given to forget the experience. When the subjects were re-exposed to the experimental room some days later, without shock, the ACTH systems of their bodies intensely responded to the shock associated stimuli of the room. However, there were few reports of an "awareness" of these changes.

Several important points have been discussed: (1) both simple and complex behaviours can be understood in context of operant or respondent conditioning principles or their extensions, (2) the behavioural condition loosely labeled "awareness" is another behavioural pattern which is frequently displayed by the human organism, in response to environmental stimuli, (3) both private and public responses and sequences of responses (behavioural patterns) can be conditioned, (4) depending upon the manner in which they were conditioned, thought-responses may be elicited as a part of an awareness behavioural pattern or (other non-awareness behavioural patterns, (5) thought responses elicit

as part of awareness or non-awareness behavioural patterns can also act as stimuli to evoke other response sequences. These principles are intrinsically involved with the understanding of paranormal experiences.

CHAPTER III. PARANORMAL EXPERIENCES IN TERMS
OF NORMAL BEHAVIOURAL MECHANISMS

In the laboratory, a response can be modified by manipulating the stimulus by which it is controlled. A rat may frequently press a bar if it is associated with the delivery of a stimulus (food). A human subject may increase the number of times she says "I" if that verbal response is followed by a reinforcer. When a similar question is asked about paranormal responses, it is seen that the most frequently associated stimulus is death or crisis events. A modest estimate indicates that 70% of the paranormal experiences reported were primarily concerned with death and trauma. The degree to which environmental events classified as trivial or non-crisis were symbolically or psychologically associated with death cannot be stated.

The change in frequency of a rat's bar pressing response to the delivery of food is related to antecedent operations performed on the organism. Food deprivation is an essential condition for food rewarded learning to take place. Paranormal responses also share the propensity to occur under specific conditions in the organism. Dream or sleep states were associated significantly with many paranormal experiences. Normally people have hundreds if not thousands as many experiences in the waking

state than they do in the dreaming or sleep condition. Yet the data indicate that at least half of the paranormal experiences took place during the latter two conditions. Even in those situations where the experience took place during the waking state, there is some evidence that sleep-like conditions in the organism may have been taking place. Consciously, such states may have been experienced as "day dreams" or deviations from normal experiences of concentration.

Paranormal experiences as accidental reinforcements.

The occurrence of a response followed by a reinforcement increases the strength of the response. This operation is no doubt primarily involved with many of the "everyday" and less spectacular types of T-C and precognitive behaviours. Occurrences (see The Paranormal Part I) such as (a) a mother having an intense feeling about her son's health and (b) the receipt of a letter one day later about his illness, would fit this category. Precognitive reports of mothers worrying about their children a few days before the fatal car crash are others.

It is difficult to estimate how many thought-responses are displayed by the human organism in a given day. Many of these responses may be included in awareness behavioural patterns, while others will not. There is some likelihood that some responses will

occur more frequently than others depending on the presence of their appropriate stimuli. In the family situation, the most frequent stimuli are those from the immediate family, the peripheral family and less often the friends and acquaintances. Since thought-responses are evoked more frequently in the presence of associated stimuli, one would expect that thoughts of the immediate family would be considerably more frequent than of other individuals both in non-awareness and awareness behavioural patterns. If the thought response is not reinforced by a consequent event it is less likely to occur again as a part of the awareness behavioural pattern. If a reinforcement does occur, the thought-response may become a sequence in the awareness pattern and the person reports conscious experience of the event.

Incorporation of responses acquired in one pattern into sequences of another behavioural pattern is not uncommon in the human being. For example, you may acquire the response of pressing a trigger of a shot gun during the behavioural sequences related to hunting. If you then investigate a novel apparatus such as a mix-master, your hand may subtly and ever so slightly press the trigger-switch and activate the machine. The press response is now sufficiently reinforced to be displayed as a part of the new behavioural pattern associated with working the mix-master.

One property of the human behavioural system is that many

responses need only be reinforced a very few times before they become a part of awareness behaviour. Thought-responses are no exceptions. If you read a paragraph from a book one week, some of the information about the paragraph may not still be a part of the awareness behavioural pattern on the following week. A thought-response is emitted and if it is followed immediately with some reinforcement, like reading the paragraph to see if you are "thinking correctly", the thought is quickly reinforced. Described by another nomenclature, "feedback" was given. Interestingly, the type of reinforcer is very often the stimulus analog of the response. Common place T-C reports seem to involve this operation. Thus if Mike is thinking about Gyslaine her appearance strongly reinforces the thought about her. If Gyslaine had not appeared after the thought response was emitted, the thought about her may or may not occur again as a part of the awareness behavioural pattern.

Apparently there are various types of reinforcers that influence behaviour by varying intensities. Death stimuli and their associations ("symbols") historically and cross culturally have been shown to be intense modifiers of human behaviour. It is no spurious circumstance that death and paranormal experience occur hand in hand. In some instances a response followed by the withdrawal of an aversive stimulus can increase the responses

occurrence. Such avoidance behaviours are the types of response patterns most frequently displayed by human organisms in the presence of death stimuli. On a cultural level, death avoidance responses are manifested in the almost obsessional response sequences concerned with the development of medicinal techniques required to keep their fellow organisms alive. On an individual or group level death avoidance responses take the form of prettyfying the corpse in order to reduce the aversive stimuli of putrification and its implications. However these stimuli may simultaneously evoke in the awareness behavioural pattern such statements as "father looks so peaceful, he must be smiling at us from heaven". Culturally such statements as "medicine for the betterment of mankind" are often emitted. As B.F. Skinner points out what we say may be in no way related to the actual contingencies which control behaviour.

In other instances death stimuli following a response acts as a positive reinforcer, since by definition the thought-response increases its probability of occurrence. The mother thinks about the child's death and the death occurs a few days later. The actual death event is a reinforcer since it increases the number of times the mother talks about that precursive thought, and privately displays the thought. Why death stimuli act as reinforcers is not critical to the understanding of how it affects behavior

The number of times parents consider the death of their children and immediate family must be numerous. Investigations by this experimenter indicate that worry about the health or well being of children, is a frequent response displayed by mothers. Usually these daily responses are forgotten, and the ones that never are included in awareness behavioural patterns are by definition never realized. But if the thought-response of death of a child is followed within the optimal conditioning period by the actual event of death, then the response is reinforced to spectacular strengths. Not only does the parent forget or not even realize the numerous times that response-thoughts about the child's death were elicited and nothing happened, but he may attribute emotional significance to the thought and the experiences following the death. Thus the parent may respond to random noises after the child's death as evidence of communication from "beyond the grave".

Paranormal experience as superstitious reinforcement

The human organism is a quickly conditionable system. Depending upon the intensity of the reinforcer and its occurrence in a sequence, a single stimulus-response pairing can modify other responses even though they may in no way be related with the delivery of the reinforcer. This procedure is called superstitious conditioning.

We laugh at the cat staring at the door knob as if "waiting for the door to be opened". Opening of the door (unless the cat's owner responds to the cat) is not dependent upon the cat's staring behaviour. The etiology of this behaviour is exemplary. During the cat's reinforcement history it was "staring at the door" and "meowing" when it was opened. The "meowing" is the actual response which resulted in delivery of the reinforcement (door opening). However since the "staring behaviour" was emitted in temporal proximity of "meowing", "staring behaviour" was also reinforced (even though delivery of reinforcement was not contingent upon it). The human engages in similar behaviour. Culturally there are rain dances or prayers to a local god. One often hears about those drowning individuals who called out for a god's help and were saved accidentally by other humans. Because the response "god save me" was emitted very close in space and time to the actual response (swimming) which saved the person from death (reinforcement), the response "god save me" was also reinforced. What one does not hear about are those human beings who asked for god's help and drowned.

Typically, if the response was emitted again and no reinforcement was delivered, the response would attenuate or extinguish. However in the human situation this is not easy. Ironically, the stimulus-response events which are most likely to be susceptible to superstitious conditioning, such as death and crisis, are also the ones most likely to be avoided. For a response to be extinguished, it must be repeated in the situation or similar situation

in which the original conditioning occurred and not be reinforced. Death and crisis are aversive situations and are avoided. Unfortunately there are few people who have been saved from death by a paranormal experience, who have the experimental tenacity to re-expose themselves to the exact situation again in order to test the reliability of the presumed escape-avoidance response "god save me".

In situations of emotional arousal and quick learning, other interesting behaviours are displayed by the human organism. If a person randomly or quasi-randomly displays a thought-response and within an optimal reinforcement period the stimulus analog (reinforcer) occurs, another more profound type of superstitious behaviour occurs: the person may think he causes the stimulus to have occurred. As an example, the husband has a dream or thought about the wife's death. In terms of actual frequency these thoughts are probably very numerous. By chance the death event occurs, the wife dies, and the husband's previous thoughts or dreams are suddenly reinforced to a conscious behaviour. At the same time the husband may think he caused the death. Why such private experiences of "causality" should take place is not clear. Wahl (1959) argues that "feelings of causality" probably relate to early conditioning experiences in the infant. The infant, with just the bare rudiments and precursors of what will later become the awareness behavioural patterns, lays helpless in the crib during those early dark neonatal-infant days. Innately,

in response to the sudden fall in blood sugar correlated with food deprivation or cortical stimulations from pain receptors of the myenteric plexus, the baby cries. The cries bring the mother stimuli with her warmth, food and contact comfort. The cries are reinforced, but so are the private responses which occurred just before the cries that actually delivered the mother reinforcer. Later these superstitiously conditioned precursor responses to awareness behaviour may include thoughts of wanting food and images of the mother. Because of their close proximity in time to the actual response (crying) which delivers the reinforcer (mother-food), they are also reinforced. From these early associations, the child may develop the idea that his "thoughts" which often preceded the crying were controlling the environment. Later such "magical thinking", as it is called, could occur when the infant becomes an adult. The conditioning is still there, only the adult would substitute adult language and say his thoughts "caused" the event.

In the adult world, language systems explicitly or implicitly impute that changes in the environment are caused by the events immediately preceding it. A match lights because it has been struck. A car ignites because the key has been turned. These are mundane examples. But in situations where potent reinforcers are involved such as death, other responses preceding the death event may also be reinforced and be interpreted as causes. A response which can occur before a death is the thought of the person's death. Such an

association may determine the person to report that his "thoughts" in some mysterious way caused the death. Alternatively, other events which occurred immediately before the death may be reinforced and be interpreted as causal sources of the death. Contiguous pairings of this order are especially likely if the events were also in some way aversive or anxiety arousing. Thus if the person yelled at his wife, committed an "immoral act", or showed some other non accepted activity before the death, the behaviours before the death could be interpreted as its cause. If the person had a long history of committing evil acts or was labeled a bad person, his death would be interpreted as "getting what he deserved". The fact that the person showed the same "bad" behaviour for years and was never punished does not seem a discrepancy.

That much of paranormal experiences could be interpreted in terms of accidental reinforcement mechanisms is suggested by the time latencies between the event and the paranormal experience. In Figure 1, curves from the post-mortem, and precognitive types along with usual decay curves for normal memory mechanisms are shown. The precognitive cases have simply been flipped over the Y-axis so that comparisons can be made. What we see is the strong role of some process which is markedly similar to normal memory-retention effects. For nonsense syllables, it can be seen that the longer the time between the occurrence of the behaviour (responding to seeing a nonsense symbol) and the "recall" of the symbol, the

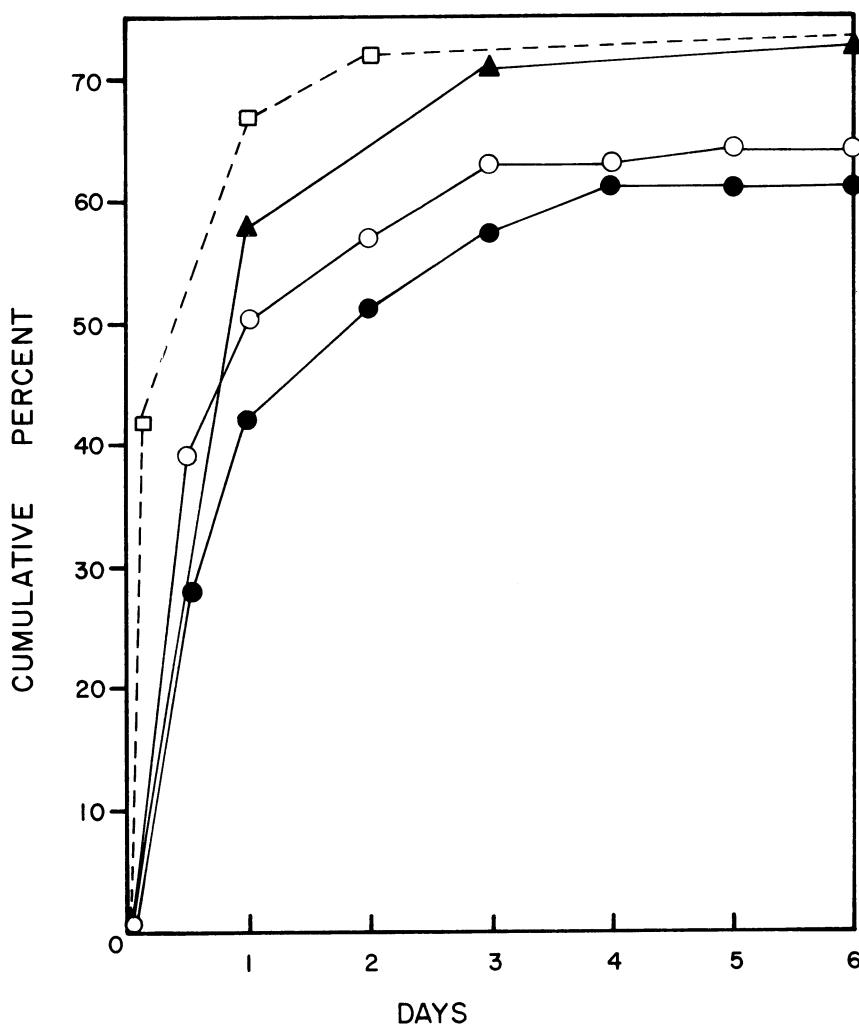


Figure 1. Cumulative percent of precognitive reports (○), post-mortem apparition reports (●), and non-apparition post-mortem reports (▲) as a function of time in days between the event and experience. Cumulative percent of retention loss for nonsense syllables (□) is given for comparison.

less likely the symbol is to be recalled. This ability falls off rapidly within the first twenty four hours and approaches an asymptotic recall after 4-5 days. The paranormal responses show basically the same shape. The "meaningfulness" of the paranormal stimuli would attenuate the rate of exponential fall off.

In the context of such an interpretation, thought responses displayed as a part of awareness or non-awareness behaviour are maximally reinforced if the event occurs within a twenty-four hour period. The occurrence of the appropriate event (death or crisis) which corresponds to the thought-response during this period is sufficient to reinforce the thought to such a degree as to influence awareness behaviour and verbal behaviour (by virtue of the fact it is reported). Longer delays between the experience and the event reduce this possibility. With so-called precognitive behaviour the thought or dream presumably occurs first and the event later. Accidental reinforcement of thought behaviour seems likely in this instance. However in post-mortem events, the stimulus death occurs first and the experience appears afterward but in the same time span. The occurrence of these features suggest that a more fundamental process of memory consolidation is involved, which will be discussed shortly.

Paranormal Experiences as Verbal Avoidances to Anxiety Stimuli

The sudden occurrence of death stimuli is anxiety provoking.

Anxiety, which is the label given to the experiences which occur in the time between the presentation of a CS and the occurrence of its aversive UCS is incapacitating to the organism. When a stimulus is presented to which the latter occurrence of electric shock is associated, suppression of behaviour takes place. Rats pressing on a bar for food reinforcement will completely suppress bar pressing when a CS is presented which has previously preceded an electric shock. If the CS period is four minutes long, the animal completely suppresses that behaviour during the CS period. Once the shock has been delivered, the rat immediately begins to respond again. Human beings engage most frequently in thought behaviour. When a CS occurs in the environment and precedes an aversive event, thought behaviour is also suppressed. In these situations the person may report that he "cannot think, but only stare into space" or he "loses the train of thought" and analogous verbal labels. One common source of aversive control is the teacher. Often the sight of the teacher (CS) is followed by the delivery of aversive stimuli (direct punishment, withdrawal of recess, failing grades, etc.). It is not surprising, therefore, that students often report a suppression of thought behaviour when the teacher stimuli are presented. The student may suddenly report "an inability to concentrate or think" when the teacher stands near him.

Both the effects and experiences of anxiety stimuli are aversive. Human organisms attempt to avoid them. When death stimuli are presented, avoidance behaviour is also attempted.

Publicly, the person can motorically avoid funerals and dead bodies. Privately, this is more difficult. Usually thoughts which induce anxiety responses are avoided. We just do not "think" about anxiety-provoking things. Common behaviours are "forgetting" to visit a person who has publicly shamed you, "forgetting" to pay a bill, and "forgetting" the name of a previous boy friend who was in competition for a newly and not totally acquired wife.

In the above situations avoidance behaviour is possible because the stimuli associated with them are not frequently presented. Death stimuli are different. When a person dies, death stimuli are all around. There are the exposures to the corpse, the funeral and the deviation from the normal routine of behavioural patterns. Even when these have been eliminated and the corpse is in the ground, there are stimuli which result from the withdrawal of the dead person's behaviour. There is the lack of warmth in the bed at night, the absence of conversation. Everywhere the bereaved turns, there are symbols which evoke responses concerning the deceased: old hats, fragments of a personal note, a television program which had been the deceased's favorite. Stimuli are all around. How can the human organism avoid thinking in response to these stimuli?

When avoidance is not possible, living organisms display behaviours which compete with the undesired behaviours. Thus a response may be evoked which has been associated previously with positive experiences. One such response is the word God or its

various ramifications, e.g., heaven, eternal life, etc. The initial conditioning of these words seems to follow a classically conditioned paradigm. By procedures described in the first portion of this chapter, "words" take on their "meanings" by becoming secondary and n^{th} order CSs to more fundamental mother stimuli. After repeated pairings of words like "God" with stimuli which typically evoke responses of quiescence, satiation, and other positive behaviours in the young infant, these words can also elicit similar sensations. Later, when the child becomes an adult, phrases like "feelings of peacefulness" and "feelings of tranquility" are used to label the experience or occurrence of these responses.

Once a word becomes a CS to the elicitation of fundamental reflexes and responses laid down during the preverbal years of the infant, extinction is difficult. Generally, a response is extinguished when it is emitted in the situation in which it was acquired but without reinforcement. However, the situations in which the basic conditioned responses were established in the preverbal infant, cannot be re-attained. Because of various maturational processes, the reversal to infantile learning situations is not possible. Thus when the appropriate CS-word is presented, the appropriate responses will be elicited even if the initial reinforcing stimuli do not immediately follow.

If aversive death stimuli cannot be directly avoided,

their effects can be attenuated by emitting a competitive response in their presence. When death stimuli are imminent, the attenuation can be accomplished by saying a word like "God" or engaging in a long series of responses such as "when a person dies he goes to heaven and God takes care of him". Functionally, these words evoke the conditioned responses associated with infantile quiescence and later adult feelings of "security and tranquility". As a result the aversive aspects of death anxiety are reduced and by virtue of this reduction the words are more likely to be stated again. It is not accidental that the most anxious individuals are often the most religious, depending upon the source and conditioning procedures of the anxiety experiences.

If words can be used as responses to avoid or escape from the aversive-painful consequences of death stimuli and their associations, then it is possible that entire sequences of thoughts and vocal responses can be used in a similar manner. Verbal behaviour can be evoked by the human subject in order to remove the aversive stimuli. There are many available symbols which represent the escape from death. These include stories about angels, spiritual forms and a variety of folklores that vary from culture to culture. Such stories are often acquired during childhood and remain a part of the person's repertoire. They are likely to occur shortly after the occurrence of the aversive stimuli.

References to Christ's resurrection and eternal life increase their frequency of occurrence following a death in the family.

Organisms are not "choosy" over what responses they will display to avoid aversive stimuli. Rats will bite their tails, monkeys will attack themselves, dogs will jump on two feet for hours to avoid electric shock. There is no reason to assume that human beings would not increase thought and other verbal behaviours to avoid anxiety. As a hypothetical example, let us assume that a wife has just lost her husband in a violent air collision. While in grief she lies on the bed, an area associated with the husband. She recalls her husband's face vividly and the anxiety associated with his absence momentarily subsides. The response occurs again, only this time the image is more vivid and again the anxiety is reduced. Finally the images occur again until they seem to take on the intensity of an immediate sensation and the person "sees" an apparition. If the apparition is interpreted as evidence that the person is not really dead, death anxiety can be reduced. These conditions compounded with the distortions of the dream and semi-dream states could result in some unusual experiences.

Paranormal Experiences as Distortions in Dream and Memory Consolidation

The interpretation of paranormal experiences as accidental reinforcement of verbal behaviours has many applications on a strict

behavioural level. However there are other natural processes in the human organism which may also be correlated with the paranormal. One such condition is the interesting bio-electrical and biochemical condition which has been labeled dreams. The data presented in this book indicate that a large proportion of paranormal experiences take place during the dream state. Evidence has been given in previous chapters that people who have a predisposition to report dreams also demonstrate more frequent paranormal behaviours. The correlation between paranormal experiences and dream states are very interesting. But how are they related? Does one create the other? Or does a third factor induce both dreaming and paranormal experiences? Perhaps some light can be shed on these questions by first considering the recent research on dreaming.

The underlying reasons for dreaming have been speculated for centuries. Ancient Greek philosophers hypothesized that dreams were the periodic emergence of ideas from submergence beneath the blood's surface. A later reformulation of the basic idea by Sigmund Freud, stated that dreams were fantastical expressions of wishes. What the dreamer wished, he dreamed about. These poetic interpretations have had their place in the development of science, but are now archaic.

Modern techniques and facilities have allowed new and unexpected facts to be found concerning dreaming. Jouvet (1967)

and his colleagues have found that specific parts of the brain stem and midbrain contain serotonin and noradrenalin which are important antecedents for dreaming. When experimental intervention takes place, parts of sleep, dreaming and the various physiological concomitants (such as REM, rapid eye movements) can be fragmented and no longer appear in unison. Dreams may occur without REM or dream-like behaviours may occur during periods when the animal is presumably not sleeping.

These factors in themselves could lead to sufficient fragmentation of dream-sleep behaviour that might initiate a paranormal experience. However several articles by Torda (1969, 1968) on normal dreaming suggest a more basic source of paranormal experiences. Torda completed massive studies on the role of various biogenic amines on sleep and dream behaviours. Essentially she found that the dissociation of EEG patterns during paradoxical (dream) sleep depends, at least in part, on the relative concentrations of serotonin released in the hippocampal cortex. The release of norepinephrine in the midbrain reticular formation, associated with gross activation and deactivation of the organism, is another factor.

Hippocampal involvement strikes to the guts of the human organism. For it is in this part of the temporal lobe that consolidation of memory takes place. It is here, in the hippocampus, that information is coded and stored and later retrieved (by as

yet unclear processes) to allow the individual to experience what he calls memory. Damage to the hippocampus can result in amnesia or loss of memory.

The actual storage of memory is associated with protein synthesis. Injections of various drugs, such as puromycin, which interfere with protein synthesis, also interfere with the recall of memory. Puromycin effects do not always interfere with a specific memory, but only when the drug is given within a discrete time after the memory or behaviour has been acquired. Collectively, research in brain chemistry and psychochemistry indicates that learned information exists in a certain labile pre-protein stage before it is stored in protein form. This stage is presumably short, depending upon the specie and may last for only a few hours to a few days. Interference with protein synthesis during this period can permanently modify the storage of the memory.

Existence of the labile stage for memory at first glance shows little of survival value. But it is necessary. During the waking condition the organism must respond to a myriad of ever changing stimuli which impinge upon it. The average person is exposed to many new learning situations in a given day as well as thousands of incidental stimuli that are not verbally-consciously responded to by the individual. No doubt protein synthesis is still progressing during the waking state. However it is clear that not

all learned and experienced information can utilize the protein synthesized during the day. If it did, people may not only become aware of what they were seeing in the immediate environment, but also of the images of what they had just seen in the recent past. Some process in the brain must inhibit this process from occurring so that the human organism can maintain the survival-valued behaviour of responding to the immediate environment. Again the hippocampus seems responsible for this role. In fact people who have damage in this part of the brain, report, as would be expected, images which are not a part of the current stimuli complex. Torda (1968) points out that shortly after bilateral lesioning to the hippocampus, human patients constantly envisage engram formation. They are inundated with images that they cannot control. Traditionally, if the images were associated with epileptic foci, they were called hallucinations. With temporal lobe foci, patients would report visual sequences or actual events that had occurred a few seconds to hours before (s.f.e., Crosby, Humphrey and Lauer, 1962).

Recent evidence now indicates that there are times when protein synthesis is enhanced. This enhancement is associated with dream sleep. Normally during REM there is a high rate of metabolism and neural activity in the nervous system. Blood flow in the brain is often at levels equal to or greater than those seen during high arousal states of the waking animal. When protein synthesis is inhibited by various drugs or environmental events, REM sleep

decreases. On the other hand when protein synthesis is increased by drugs or when it rebounds after inhibition, an increase in REM and dreaming occurs.

Even with these higher protein syntheses during dream sleep, awareness of these conditions might not be possible in the suppressing mechanism if the hippocampus was still in operation. But during dream sleep discrete electrical changes in the hippocampus occur. Torda mentions that dream initiation is always coincident with low frequency (2-4 Hz) theta activity regardless of whether dreaming coincided with REM sleep or with panicked awakening from non-REM sleep. Theta activity in the hippocampus region of the brain has been described as a type of inhibitory process from other parts of the brain. When such inhibitory processes are in operation, the person can conceivably have access to the normally suppressed processes associated with the storage of memory. To quote Torda's hypothesis, "dreams represent, at least in part, visual concomitants of processes involved in consolidation of long term memory, entering awareness through decrease of pertinent inhibitory processes serving to prevent perception of these consolidation processes" (Torda, 1968).

That theta activity, specifically from the temporal lobe, is associated with an inhibition of the systems which keep consolidating memories out of awareness is a crucial point. This means when theta bursts do occur, vivid visual images can be incorporated into the awareness behavioural pattern. Occurrence of

such images would be difficult to differentiate from actual stimuli in the environment and the perceiver might interpret these images as a real stimulus but with peculiar characteristics.

Hypnagogic imagery, which can be increased by biofeedback techniques, is associated with the occurrence of theta activity. The vividness of the imagery is the most striking feature of the reports associated with this particular brain frequency. Typically, hypnagogic imagery has been reported to occur during various antecedent states of the organism, but is usually associated with changes in sleep-wake conditions. During the waking state, the occurrence of such images may be preceded by "mind wandering" or "unaware" reports quickly followed by a very vivid image.

Collectively, these descriptions are reminiscent of the basic qualities of psi-behaviour. The occurrence of paranormal experiences coincident with or shortly after dreams, sudden or panicked awakening from sleep and following automatic behaviours has been a common pattern. Even in the laboratory, the flimsy evidence available suggests that alpha activity, specifically the change in alpha activity, is associated with high psi scores. Where variations in alpha ranges occurred so that lower frequencies were included (alphoid activity), OOBES were reported. Hypnosis has also been known to produce unusual spikes in the theta band.

(Biochemical-electrical distortions may not at first glance explain how psi information is presumably increased in the laboratory where changes in card guessing ability take place. Without

holding the possibility that the experimenters who report significant changes from chance in DT situations are not just faking, another possibility is raised. If a single run of 25 cards is used as the score for psi ability, then greater deviation from chance in the alpha or low alpha frequency state may be accompanied by a change in the guess pattern. Mischo and Grunzig at the XV Annual Parapsychological Association Convention in Edinburgh reported that the psychic dove-tail shuffle is not random. Consequently deviations in guessing ability may merely reflect changes in guessing patterns).

The possibility that peculiarities in dream and hippocampal inhibitory phenomena are the essential cause of many paranormal experiences can be supported by the data. As mentioned and emphasized, there is not a single experience of the paranormal which has not been included as a symptom or syndrome of neurological diseases. There is also strong evidence that we may be looking at stress-induced perturbations of the recall of memory. Optimally, such events would require direct endocrine-hippocampal connections.

A relationship between the hippocampus and the endocrine system has been discussed by Green (1964). He noted that hippocampal involvement was involved with the adrenal cortex and its production of glucocorticoids. Hippocampal-adrenal cortical interactions are important since glucocorticoids are known to be elevated in human patients under subjective distress (like death grief, post crisis reactions, etc.). Elevations in these hormones may reciprocally

affect the hippocampus. Gillan, Jacobs, Fram and Synder (1972) noted that experimentally induced levels of glucocorticoids decrease the amount of dream-REM sleep in human subjects. The decrease in REM sleep would presumably be mediated by some direct or indirect inhibiting of protein synthesis. Stress due to sleep-dream deprivation is known to be associated with hallucinations. Webb and Agnew (1973) reported the case of one male subject's marked behavioural change after 168 hours of sleep deprivation in a laboratory situation. Suddenly his heart rate increased from 90 beats per minute to 160 beats per minute and his brain waves showed unusually high amplitude alpha activity. The subject screamed in terror and ran from the experimental room. Later it was discovered that coincident with the electrophysiological changes the man had hallucinated a gorilla on an oscilloscope he was watching. Such clarity and unusual realness of visual sensation during high amplitude alpha activity is reminiscent of alpha-associated eidetic imagery, although the relationships between this phenomena and induced hallucinations is far from clear.

What relevance does the above relationships hold for paranormal experiences? Their existence leads to two important hypotheses: (1) paranormal experiences, specifically visual impressions are associated with the rebound in REM images following their inhibition by the stress of grief. (2) that the memory of the precise event sequences existing in the labile state before consolidation,

is disturbed by the biochemical effects of death stimuli.

The first hypothesis is held with specific reference to post-mortem phenomena in general, where the individual reporting the experience knows of the death and is suffering the grief consequences. News and knowledge of death and crisis are immobilizing stimuli. In response, the organism's heart beat increases, blood pressure goes up and a variety of other physiochemical changes are initiated. Simply stated, the organism is in stress. During this time the protein synthesis associated with dreaming and memory consolidation are inhibited. But the inhibition cannot continue and there is some point, most likely when the protein synthesis would have normally increased, that the stress-induced inhibitions of dream protein are broken. A sudden rebound occurs. Concomitant with the sudden rebound in protein synthesis the heart beats faster, blood flows quickly through the brain and the visual images associated with memory consolidation are more intense. If the grieving subject is asleep recuperating from the strain of death stimuli, he may suddenly awake in response to these intense physiological stimuli. For a few seconds he experiences the vivid real-like images of memory storage before they fade. Not surprisingly, the image seen is associated with the very stimulus complex which produced the stress: the deceased person.

The second hypothesis is generated by the conspicuous time relations between the paranormal experience and the real event for several paranormal types. As noted in Figure 1, the

cumulative percent curves for cases occurring over time for pre-cognitive, post-mortem apparition and non-apparitional post-mortem events are similar. All three curves begin to asymptote by the sixth day after or before the objective occurrence of the event paranormally experienced. Within this time period 64% of the precognitive cases take place while 61% of the post-mortem apparitional cases are noted. The non-apparitional post-mortem reports show a 75% cumulative occurrence frequency by the time this time period is over.

Collectively, these data strongly suggest that the sequences of actual serial memory events are disturbed within six days before or after a death or similar crisis. Experimental work has indicated that normal memory exists in a labile stage for some time before it is consolidated for long term storage. Disturbances of protein synthesis during this labile stage interferes with recall. Evidence from animal experiments indicate that this labile period may be as long as six days. Harber, Domagk and Muller (1968) trained rats on a Y-Maze to a criterion level. Puromycin, the protein inhibiting drug, was then injected one day to six days after the Y-maze learning. The animals were then tested for retention ("memory") of the maze. Animals which had received the puromycin up to three days after the initial learning, displayed difficulties in retention, relative to controls. On the other hand, the rats that had been given the puromycin six days after the initial learning showed minimal deficits compared to the controls.

These experiments are compatible with a number of investigations (e.g., Gaito, 1971) which indicate a labile stage of memory storage. If gross interference of memory can occur following inhibition of protein synthesis by drugs, then it is likely that small deviations from memory sequences could be produced by stress-induced changes in protein reactions of the human brain. Death stimuli could initiate the stress-induced decrements in protein synthesis associated with memory and consequently interfere with recall of the exact sequence of events happening either six days before or after the memory disturbing event. Such an explanation must be entertained in those paranormal reports where the reporter was the only witness of the event. As the data also indicate, the actual report of the event can be delayed up to 20 or 30 years, ample time for subtle changes in memory sequences.

People put an absolute faith in the immutable and absolute reference of their memories. Perhaps this is reasonable since memory is our primary reference point for both old and new events. Changes in reference coordinates, even in physical systems, is difficult to perceive unless another system is used as reference. Many of us normally have distortions in memory and recall; it seems to be a part of being a human being. Usually there is some traumatic event associated with it. One great scientist mentioned in his memoirs that as a child he used to run past a grave yard on his way to school. When this story was checked some years later

by interviewing his peer group of the time, it was found that no grave yard existed in the area. Apparently, a large ferocious dog of which the scientist as a child had been frightened, had been there instead.

These are normal small changes in memory and the sequences of events played in the past. More severe distortions become clinical problems. Korsakoff's syndrome sometimes occurs as a sequel to chronic alcoholism. Symptoms of this syndrome are distortions in time and space, hallucinations, and illusions. One amplified feature of problems in memory recall has been termed confabulation. Chronic use of many drugs, including alcohol, can interfere with if not suppress protein synthesis. In such situations the patient attempts to fill in the periods of memory lapses by imagery and fantasy. When this occurs, the person may have difficulty distinguishing the imagery from the reality of the past. Why this occurs is not clear. Perhaps these patients are responding to the demand characteristics of the social-clinical situation. Doctors and social workers ask questions and the patient must, to simulate normality, respond. Or perhaps this propensity to fill in missing memory gaps with something, whatever it is, is more fundamental and generalized in occurrence. Intuitively one could see how inabilities to recall the absolute yardstick we call memory could be anxiety-invoking. Through experience the human organism learns that the unknown is unpredictable and the unpre-

dictable can be aversive. Synthetic memories to fill in the gaps may be a means of reducing this anxiety behaviour.

The two factors of (1) stress-induced deviations in protein memory storage, and (2) the anxiety associated with the death-stress and the difficulties in memory recall during those periods around death, are intrically related with other para-normal types. The stress of hearing about a loved one's death is sufficient to deprive a person of sleep and inhibit memory processes, so that the exact sequences of events before or after the death are changed, ever so slightly. In situations where sequences are not recallable, fantasy could quickly be instituted to reduce the anxiety. If these fantasies reduced the anxiety behaviour, they would be reinforced. Seeing the apparition or having a dream about the death of a person with whom emotional associations have been conditioned may be such fantasies. If these fantasies furthermore reduce anxiety by confirming one's belief system such as "proof of afterlife", they are reinforced. The more recalled the disturbed sequences, the more they would reduce anxiety behaviour, and the more "real" they seem to become.

T-C Phenomena: Autonomic Peculiarities?

T-C phenomena are usually stated with the connotation that the mechanisms which allowed the relationships between the T-C

stimulus (e.g., death of person), and a T-C response (report of apparition), were not clear in terms of known processes. To be thorough, alternative explanations should also be entertained. It has been suggested that people may be lying about these events, or these reports might be indicative of an infrequent transient "psychosis" in certain members of the human species. These options should be held as very definite possibilities. In the remaining parts of this chapter, some of the collected experimental data and spontaneous data will be reinterpreted in terms of known physiological-behavioural phenomena.

Some people assume that descriptions of paranormal behaviours are unique. However there is not a single type of paranormal description which has not been given as a part of known pathologies in the nervous system. Apparitions or images of people can be prodromal symptoms to an epileptic seizure. Feelings that "someone is in the room", or that the self is out of the body", or that a "presence is touching the body", have all been reported with varying degrees of parietal lobe damage. Transient experiences of "voices" and "visions" are frequent features of certain psychotic disorders. I am not saying that all people who report paranormal experiences are undetected epileptics or brain damaged or mentally disturbed. What is being emphasized is that these reports are not unique to parapsychology and can be associated

with other phenomena. Possible contribution of these other factors should be studied. An assumption of one stimulus for one response is not warranted. In a sample of putative T-C experiences, the stimuli may have involved transient epileptogenic sources in one case, deviant internal chemical changes in another, or the actual death of a person is still another.

Many paranormal experiences are strikingly similar to infrequently reported medical problems. Recently, a subject reported an unusual episode that happened about 0230 hr. one morning while he was participating in a dream experiment. He recalled that upon waking from a dream he was completely paralyzed; he "could not move a muscle" and sensed a "presence". The presence was not visible to the subject, yet he felt that it was a personality and that it was a threat to him. At this point he clenched his teeth in hopes of producing artifacts on the EEG records that were being taken. The next day the subject persuaded the attendant to look over the ECG (electrocardiographic) records of the previous night. Apparently, during the time of the paralysis the subject's heart had stopped for 10 seconds. He concluded that he had been under a psychic attack. Such periods of nocturnal akinesis have been associated with other unusual phenomena such as UFO "flaps", or mysterious "gassings".

Disorders of magnesium or potassium metabolism are correlated

with a syndrome called periodic paralysis (Klein, 1969).

This syndrome is characterized by episodic, flaccid weakening to quadriplegia with minor masticator (jaw) movements still possible. Attacks are often accompanied by feelings of apprehension, and vague discomfort with occasional paresthesia. One kind of periodic paralysis is also associated with sudden irregular beating of the heart (cardiac arrhythmia) and high amplitude EEG activity in the alpha-theta rhythm band. The predisposing and precipitating stimuli of this type of paralysis are situations of increased activity followed by rest, fasting or emotional stress. These symptoms are markedly similar to those reported by the person who felt he was under psychic attack.

The primary difference is the individual interpreted these signs according to a belief system other than that of medical science.

The nocturnal predominance of T-C and other paranormal experiences has been an impressive feature. There are also some medical syndromes that occur only at night. Usually it is assumed that they are state-dependent and require the preconditional dominance of the parasympathetic nervous system. The manifestation of complex autonomic-brain disturbances may influence more of the human population than we expect. They would not be often reported because of the relative infrequency of occurrence to, or misinterpretation by the individual affected. An example of such a

syndrome is the micturitional syncope complex (fainting while urinating), an example of which was recently reported by Donker, Robles de Medina and Kieft, (1972). The following sequence of events were recorded. A 37-year old male subject sleeping in the laboratory awoke between 0100 and 0200 hrs and signified that he had to urinate. He started voiding, during which time there were no EEG changes. The ECG showed an increase from 72 to 130 beats per minute, which then dropped to 60 beats per minute when voiding was complete. At that moment theta activity and a few seconds later high amplitude delta (1 to 3 Hz) activity appeared. The patient complained of dizziness, staggered and fell unconscious. However he regained consciousness, felt a slight weakness-tiredness, but could easily go back to sleep. Apparently these sequences only occurred during the night.

Note that the dominant prodromes of these autonomically related syndromes are slow-wave activity and cardiac arrhythmia which is followed by perturbations in consciousness. One must ask if these changes in consciousness might also in some instances be associated with amnesia effects or mental confusions that are associated with epileptogenic stimuli. Such periods of confusion or fainting might alter the ability to discriminate dreams from reality or to place experiences in temporal orders. Consequently, an emotional response to hearing the news of a loved one's death

or the crisis of a close friend, might be incorporated in a later dream, whose real temporal order could be distorted. The position of the dream in the serial order of stimulus-response events may be recalled as occurring at the time of the aversive death-crisis stimulus.

The measurement of the alpha and theta rhythm activities associated with the above syndromes and experimental evidences of T-C must also be closely scrutinized. Alpha levels are related to thought-modes which seem to be associated with reported T-C. But increased alpha abundance is also associated with greater susceptibility to hypnosis. People who are hypnotically susceptible show more alpha activity than other people (London, Hart, and Leibovitz, 1968). Recently it has been found that during hypnotic trance there is also a marked increase in activity in the alpha band (Ulett, Akpinar, and Itil, 1972). Deep hypnosis was especially associated with an increase in alpha wave abundance.

These are powerful data. Do they suggest that people with more abundant alpha rhythmicity and hypno-susceptibility are also more likely to distort environmental stimuli? Such individuals would more readily interpret an incidental or unrelated event as a meaningful part of their experience. In the spontaneous cases, there were many experiences which followed periods of redundant-boring stimulation, an optimal antecedent condition for the sponta-

neous induction of hypnotic trance. We have seen in demonstration and in the lab that recall of information obtained during hypnotic trances can be distorted with respect to both time and space of occurrence.

Furthermore, the dynamic influences of hypnotic-trance related behaviour are not clear. Does this mean that a person who shows high trance-related alpha activity can influence the experimenter as well? There are anecdotal instances of experienced researchers "detecting objects during seances" that are not recordable by instruments. The experiences were quite real to these scientists and were recorded by them as such. Typically, these experiences occurred when they were in the presence of other human beings who exhibited paranormal behaviour so frequently that they were called "mediums" or "sensitives". If spontaneous and especially laboratory T-C are associated with hypnotic trance-associated and electrical changes in the subject, information of just how much these states can influence the experience and data recording of experimenters must be collected.

Paranormal Experiences as Epileptiform-like Changes in the Brain

It has been mentioned that stress-induced changes in endocrine chemistry may initiate modifications in dream sleep.

Glucocorticoids from the adrenal glands have been demonstrated to affect the nervous system by influencing brain electrolytes. Electrolytic species of sodium, potassium, magnesium and calcium are known to be the chemical correlates of electroencephalic activity. Whereas sodium ions seem implicitly involved with the active propagation of neural impulse-information along the axon, potassium ions maintain a more static function related to the resting activity of the axon. Changes in relative potassium concentrations between the inside and outside of the axon, increase or decrease the probability that it will fire. When the potassium ion concentrations show certain unusual distributions, very little stimulation is required to initiate active impulses through the axon. The role of other electrolytes in the brain exert control by apparent competitive or complimentary action on sodium and potassium levels.

One would predict that the part of the brain with greatest susceptibility to the effects of stress-associated steroid and neuronal activity should show the primary effect. That part of the brain has been termed the limbic system, and is associated with emotional behaviour, arousal and memory. Anatomically the limbic system includes the hippocampus, olfactory connections, the amygdala, septal nuclei, several connections with hypothalamic and thalamic bodies, and other brain structures.

Now suppose a human organism has just lost a loved one or is undergoing a crisis. Stress chemistry has started its influence and local changes in brain electrolytic concentrations take place such that depolarization and mass activity in that area is possible. The limbic circuit, already over-taxed with the correlates of thought behaviour following the stress, randomly starts a progressive depolarization over a cortical area. The change is accompanied by conscious experiences.

If the depolarized area includes connections to the dorso-medial thalamus and frontal cortex, the person simultaneously experiences a disruption in time estimation and feelings of well being. Collateral effects to the hippocampus and proximal temporal structures results in visual hallucinations and elicitation of memory sequences. Less intense chemical changes in distal areas related to somesthesia would result in private experiences of a "presence" or of "leaving the body". If simultaneously or consequently the amygdaloid structures are stimulated, the person feels that the previous events are somehow deeply "meaningful". Presumably, even if the antecedent events were mundane creaks in the house, stimulation of the amygdaloid structures would result in intense feelings of "meaningfulness" about the event. Sensations of unreality may accompany the stress-induced stimulation and the person may report that "everything seemed unreal".

The above sequences of private experiences are known to be reported during epileptic episodes where seizures typically follow. Such episodes are known to be associated with "epileptic foci", areas of unusual electrical configurations in the brain. However similar private experiences can occur by artificial stimulation of the brain, without consequent seizure. Penfield and Perot (1963) have reported that brain stimulation in human patients results in reports of a multitude of experiences, depending upon the structure affected. Visual sensations elicited by this means are hallucogenic-like in that they seem very real. Delgado (1970) using, radiotelemetric devices has induced reports of "peculiar feelings", "meaningfulness", "thoughtful concentration" and visual impressions by stimulating amygdaloid and hippocampal structures.

Epileptic experiences overlap private behaviours labeled as paranormal events to a conspicuous degree. Excluding the more spectacular visual components, even "minor" epileptic auras are strikingly familiar in content. MacLean (1970) mentions one subject who began limbic seizures with weird feelings that someone was standing beside him, just within peripheral vision. How many times would such an experience be interpreted as due to an evil force if it were not followed by a seizure? How many times

have simple olfactory sensations or tactile stimulations been accompanied by transient epileptiform changes in the amygdala and consequently interpreted as being extremely "meaningful"?

The hippocampus is the most unstable part of the brain and in addition to its peculiar angioarchitecture it also has the lowest seizure threshold (MacLean, 1970). It is here that stress induced changes could tip the delicate chemical balance in sufficient magnitudes to produce emotional and sensory experiences without motoric concomitants. The effects would be transient, elsewise the depolarizing effects would cascade into a full blown seizure. Autonomically labile people, or people with "paranormal prone" reinforcement histories, would probabilistically more often initiate those precipitating events which start the localized change in hippocampal chemistry. It is no accident that the periods of waking, falling asleep and drowsiness so often reported before paranormal experiences, are also associated with increased seizure susceptibility.

Two clinical examples readily exemplify the similarity of epileptic and paranormal experience.

A 43 year old woman, with a history of headaches, two seizures and transient aphasia became liable to nocturnal fantasies. According to Critchley (1971), "she would wake up in the night with the very intense feeling that someone was in the room -- a person she knew; indeed, with whom she was very familiar ... The impression was so vivid that she would leave her bed and

go from room to room on tip toe trying to surprise this familiar interloper." Later it was found that her condition comprised atrophy of the parietal cortex. Crosby, Humphrey and Lauer (1962) give an illustrative example of visual hallucinations associated with temporal lobe epilepsy:

"A young woman who had agreed to care for some plants in a friend's apartment during the latter's absence from the city started out from her home to fulfill her promise. As she was about to enter her car, she discovered that she was being followed by a very tiny little man, dressed in a frock coat and striped trousers. Aside from the diminutive size, he had normal appearance. He entered the car, accompanied her to the friend's apartment and followed her to the door of the apartment where he disappeared."

Could similar private sensations occur with only transient changes in brain chemistry precipitated by dietary changes following grief over the loss of a loved one?

Paranormal Experiences and Effects of Shared Conditioning to
Similar Stimuli

Discussion of this mechanism has occurred in previous chapters, and will be only briefly discussed here. In experimental

psychology, the role of so-called subliminal perception has been a periodic source of controversy. The possibility that people can subliminally perceive, that is respond to something and not be aware of it, has been clouded by conceptual issues typical of psychologists. However the organism can respond to external stimuli without being "aware of it". Stated in different phraseology, some stimuli may not evoke changes in the awareness behavioural pattern of the human organism, but can evoke changes in other behavioural sequences. Experiments by Levitt and Hefferline are examples of such conditions (see The Paranormal Part I).

From this point of view, we could argue that paranormal experiences occur among members of immediate families or close friends simply because they share similar responses to the same stimuli. They have had shared conditioning or a similar reinforcement history. An example of the use of this model is in order. Let us take two human beings, a mother (M) and daughter (D). They both frequently drink tea. This results in the following conditioning paradigm:

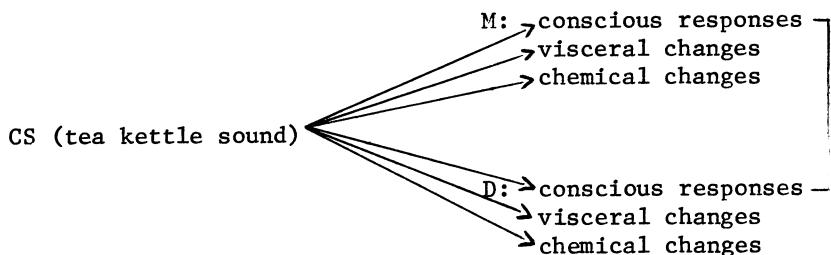
M: tea (UCS) ----->UCRs (Private behaviours
chemical changes)

D: tea (UCS) ----->UCRs (Private behaviours
chemical changes)

Both the mother and daughter have been exposed to similar tea stimuli and share genetic and learned responses not only to the tea but also the labels associated with these sensations. The

private behaviours may include visceral changes as well as images of tea while chemical changes include changes in blood sugar, etc. Now suppose both usually drink tea while in the kitchen so that both have repeatedly heard the shriek of the tea kettle before the tea was drunk. In this situation, the sound of the kettle becomes a CS so that it can elicit behaviours similar to the UCRs (CRs). It is important to note that the CS can induce changes in both the awareness behavioural pattern (so that the person becomes "aware" of the shriek) as well as responses in other behaviours that are not a part of this behavioural pattern, e.g., visceral changes, chemical changes.

The mother and the daughter, not familiar with the laws of conditioning sit at the kitchen table. They are busily talking to each other, which requires a high rate responding of the awareness behavioural pattern. On the radio which is turned down very low so that they can talk, a tea commercial is in progress. At one point the sound of a tea kettle is produced and the following sequences take place, which can be depicted as such:



Since the mother and daughter are talking and already engaging in

conscious-awareness behaviour, the weak CRs evoked by the tea kettle sound cannot compete with the thinking-talking responses. However the CS can still elicit changes in the visceral and chemical changes which have been laid down by classical and reflex-like conditioning. Both visceral sensations and images associated with the tea are evoked in both women because of their shared conditioning histories. The mother reports her "impulse" to suddenly have some tea and the daughter responds, surprised, that she also was "just thinking" about some tea. Telepathy is announced and these two women naively conclude some type of "mystical" connection between them.

From this point of view, one would predict that the more similar the conditioning history, the more frequently such "paranormal" behaviours would be reported. Thus members of the immediate family who share a great many conditioned responses and identical twins which also share genetic predispositions to acquire behaviour, would be expected to report T-C occurrences more often. Many of these conditioning patterns may not necessarily be conscious. In fact many of the shared behaviours of families are not immediately obvious to the family members. Shared speech patterns and shared responses to political and religious stimuli may not be obvious to members of a family, but are often used as discriminators by other people not in the family.

Since many of the conditioning patterns in families are laid down in the children since youth, they are difficult to

extinguish. By the time parents have children, they are usually sufficiently old enough to have stabilized their behaviour and their sequences of behaviour. Thus the children are exposed to a pattern of conditioning that will remain both in them and the parents for a long time. Many of the conditioning patterns are subtle and may not directly involve the awareness behavioural system. Responses to dinner stimuli and death stimuli are only two examples.

The fact that human behaviour at any given time is determined by many behavioural systems, of which what we call "awareness behaviour" is only one, is a critical variable for paranormal experience. People can respond to stimuli without being aware of the stimuli. If the stimuli are sufficiently strong, they may also influence the awareness behavioural pattern. Everyday instances of clairvoyance can be seen in this manner. One common report is the sensation of "suddenly having a tune run through your mind". Hansel (1966) points out this example in his book. He was walking along one day and began singing a tune for "no reason". Then he suddenly realized that the tune was being played on the radio. Such instances are frequent and can be manipulated even in laboratory conditions.

The finding of lost moneys or objects could be interpreted in a similar manner. Clairvoyant cases are full of instances where a lost object, which the person cannot find in the waking state, is discovered by using information in the dream state. But these

cases do not emphasize that the awareness behavioural pattern is only one aspect of the organism's "awake behaviour". No doubt the position of the lost object was detected or responded to by other systems in the body which, because of their small intensity, were masked by the predominate behaviours of "thinking" or concentrating. Later in dreams or relaxation states these weak response systems become dominant. Within the dream condition, smaller autonomic responses which could easily have occurred to the presence of the lost object, can influence the behaviour of the organism.

Subtle and weak responses to environmental stimuli during the day may also be involved with various "precognitive" behaviours. In those cases where the supposed agent dies of natural causes, there is still the possibility that the percipient perceived fine changes in the agent's behaviour that were associated with sickness. During the waking state which is oriented mainly towards talking and private behaviours in response to word stimuli, subtle responses to small stimulus changes in the person about to die would be masked. When the dream sequences that night occurred, this information would have a greater probability of stimulating other behavioural patterns so that the person could become "aware" of it. Thus the dreams of death due to sickness, may merely reflect the subtle detection of cues from the person who is about to die. This information could be gathered during the day initially, or may be detected during dream sleep of the precognitive reporter. Although the mechanisms are at present not clear, it is quite

conceivable that the percipient-reporter's precognitive dream may be a response to sickness-associated stimuli of the spatially close agent. The possibility that dreams may contain information about the state of one's health has been reported by Beigler (1957). He found that certain types of dream content become manifest in subjects that were about to die of natural causes a few weeks later. In many respects this is not surprising. Weak and small magnitude prodromes to more degenerative physical conditions, could indeed be reflected in the subtle-detection systems of dreams.

Comments on Reflex Systems Under the Control of Various Behavioural Patterns.

An interpretation of what we call "consciousness" or "awareness" as the display of a complex behavioural pattern evokes some interesting consequences. The awareness behavioural pattern is characterized by many typical response sequences. If the human organism is displaying this behavioural pattern, he responds to questions like "are you awake?" with more or less predictable word sequences. Even though he may be motorically inactive, the presentation of a stimulus "what are you thinking about?" will result in responses like "I was thinking about yesterday's meal". One of the most typical response sequences is the reference to some private behaviour which the observer cannot directly measure.

Conscious-awareness behavioural patterns are frequently displayed by the human organism. Most of the time the occurrence of this behavioural pattern is in response to stimuli in the external environment. When one awakes in the morning, the situation is analogous to deprivation. Waking behaviour has not been engaged in for some time. Consequently once a certain "warm-up" period has passed, the display of awareness behaviour may occur at a high rate. The person reports he "is thinking fast", or reads much information. However after a few hours of the repeated and protracted presentation of similar environmental stimuli, the human organism begins to satiate. The response frequency goes down. There are periods when he reports a decrease in ability to "think" or respond quickly. There may be times when the awareness behavioural pattern is completely suppressed and the person may report that he does not know what he was thinking about during the last few minutes. Presentation of novel stimuli, such as leaving the office and visiting the tavern can increase the responding once more. A person might describe these behaviours as "a required break" or "getting away from it all".

Like all behaviours, daily awareness behaviours and verbal behaviours show satiation as the day progresses. Unless some particular reinforcement schedule is in effect, people talk less and report they engage less actively in private behaviours as the day and night progress. In fact during these conditions, if the person is left in the room by himself with no external stimulation,

conscious-awareness behaviour may be completely suppressed for long periods. Later stimulus questioning about those periods may result in answers like "I cannot remember", "I don't know". By definition, if the awareness behavioural pattern has not been displayed, the person cannot report one of the components of that behaviour: memory.

Responses from various parts of the organism can be incorporated into the awareness behavioural pattern. Parts and fragments of behaviours like reflexes, physiological changes and biochemical variations may all be incorporated. How each segment of the awareness behavioural pattern is acquired involves classical and operant methods of reinforcement. When a rat learns to press a bar, a number of different responses may become incorporated into the pattern. Movements of the paw associated with running, standing on the hind-legs associated with grooming, and licking of the food-dish a concomitant of drinking, are chained together in a new sequence. The probability of how often the precise sequence will occur depends on their spatial and temporal proximity to reinforcement. Those response sequences closest to the reinforcement in space and time would remain most constant.

Awareness behavioural patterns would be built along the same dimensions. Those reflexes and fragmental movements which were quickly followed by reinforcement (milk) become probable. Babble sounds, once associated with forcing air through the larynx, jaw movements previously paired with eating and a variety of

other fragmental behaviours become established as a consistent response chain of "talking".

The initial complex and confusing masses of response segments of awareness behaviour are acquired in this manner. Because of their close proximity in space and time, responses become incorporated into the entire sequence. The more frequent the reinforcement, the more fixed the sequence.

Development of the complexity of awareness behaviour takes time. The child first reports very little conscious behaviour during the first years when the various segments are just beginning to be sequenced. Later the adult can display this pattern for long periods of time and report statements of "being awake", "remembering" and the "feeling of being a self". This pattern dominates the total behaviour of the organism.

Awareness behaviour patterns are reinforced as a consequence of demands in the internal and external environment. But those very reflexes and response fragments that are incorporated into its patterns can also be incorporated into other patterns that may not include awareness behaviours. If the behaviours do not involve the awareness pattern, then by definition the latter is not evoked and the person reports "no recall". A rat's paw movement initially associated with food may also be incorporated into other patterns associated with running, copulating or grooming. The same principle holds for many of the responses so often assumed to be predominately a part of awareness behaviour.

One such response is talking. The occurrence of talking requires the intactness of simple reflex systems. The vagus nerve performs part of this function. This nerve is so influential in controlling parasympathetic function in the autonomic nervous system, that some authors describe parasympathetic effects as "vagotonic". Much of the parasympathetic contributions to emotional behaviour are governed by this nerve. Heart rate changes, respiration effects, gastrointestinal manifestations as well as capillary constriction-dilations are controlled by various components of the vagus. One of the seven components of the vagus, the nucleus ambiguus, sends special visceral outputs to innervate the muscles of the laryngeal and pharyngeal apparatus. The larynx is responsible for talking while the latter muscle complex allows dilation and lifting of the pharynx. Usually stimulation of this vagal component and consequently "talking" is under the control of awareness behavioural patterns. However there are times when the talking muscles can be a part of other behavioural system that are "non conscious". Examples are mumblings during sleep and the fragments of speech that are often displayed during dreams, for which the person has no recall.

There is considerable possibility that talking reflexes may also come under the control of still other behavioural systems. These behavioural systems would respond to their conditioned stimuli without necessarily evoking any awareness responses. A

person in such a condition might respond with more or less stereotyped speech patterns. If he has not been conditioned to discriminately evoke his vocal responses to different stimuli questions, he may keep repeating the same thing over and over. When asked the questions such as "are you awake?" "what are you thinking about?" and so forth, he may respond with whatever verbal pattern that had been reinforced in that particular behavioural pattern. Different questions would be indistinguishable since no particular reinforcement was associated with them. This situation would be analogous to exposing a novice to several variations of cells. If the novice had not received specific reinforcement with each different type of cell stimuli, he might not discriminate the differences and would respond stereotypically with the word "cell" to different stimuli.

There are instances of glossolalia where people "babble"; they talk in speech fragments during times when they do not also show behaviours typical of "awareness". People engaging in the babbling behaviour may not respond to such questions as "are you awake?" with any specific statement meaningful to the questioner. One could also state that because the verbal fragments are not a part of the usual awareness pattern shared by both the subject and the questioner, that it only appears to be babbling. Consequently, glossolalic behaviour may be considered gibberish because the word fragments are not placed in sequences which are commensurate with the listener's reinforcement history. Because of the

lack of shared experience, the listener does not understand the "meaning" of what the patient is saying.

But there may be instances where more understandable verbal sequences may be included as a part of another non-awareness behavioural pattern. Full-blown sentences of significance to the listeners could then be elicited with the appropriate stimuli. Example instances would exist transiently in seances where the medium, in "trance", displays behaviours which are not usually descriptive of her waking behaviour. More long-term effects might be found in attributed cases of "reincarnation". In the latter situation, peculiarities in reinforcement history have resulted in unusual verbal sequences being incorporated into the person's awareness behavioural pattern. Walking is another behaviour usually displayed when the person reports "awareness". However somnambulism, or sleep walking, occurs when the organism, frequently between the ages of eleven and fourteen, is in deep "stage 4" sleep. The sequence of behaviours are typified by the child abruptly sitting up in bed, with eyes open and a blank expression on the face. Following initiatory motor movements the child may get out of bed and walk around, mumbling and speaking incoherently. Amnesia of the experience is reported the next morning. This type of organized motoric behaviour would require (at least) independent action of the cerebellar and vagotonic components. Does this mean that entire sequences of behaviours can be conditioned to occur when the person is not "aware" of them?

CHAPTER IV. INTERESTING SPECULATIONS ON PARANORMAL REPORTS BASED
ON EXTENSIONS OF CONDITIONING MODELS: PARANORMAL
EXPERIENCES AS RESPONSES TO ACTUAL EXTERNAL STIMULI

Personally, I think that the vast number if not all of the reports that are considered paranormal can be discussed and explained in terms of mechanisms discussed in the last section. But what I "think" is irrelevant. What is important is the data and the patterns of the data. There still remains those few cases where paranormal experiences took place in situations where the operation of mechanisms in the last section is not likely. Example cases include precognitive experiences which are recorded and notarized before they occurred and post-mortem apparitions reported to other people before the news of an unexpected death was known. The paranormal stimuli would presumably actually exist independent of the organism or immediate environment. However, even these cases could be handled within the extensions of known laws of behaviour. In this section arguments for this point of view are presented.

Basic Assumptions for T-C Phenomena Types

Experimental and verbal data indicate that paranormal experiences involve the autonomic nervous system. One of the most

typical reports is the experience of emotional behaviours in an almost uncontrollable spontaneous manner. When the emotional behaviours are not included as a part of a person's conscious framework, experimental and spontaneous cases indicate reflex-like occurrences still take place on various non-awareness levels. Expression modes include changes in vasoconstriction to representation in dreams. These data indicate that the essential patterns for paranormal experiences are implemented by classical conditioning procedures where the delivery of reinforcer is independent of the organism's behaviour. The organism is a passive factor in the respondent paradigm, with little if any direct effect on the stimulus pattern delivery. In the human specie, classical conditioning procedures are predominately involved with learning during the early pre-verbal years of infancy and childhood. Later behaviour involves predominately operant learning.

The essential stimulus-response connection for paranormal experiences are laid down during the pre-verbal years of infancy by procedures involving classical conditioning. Since the response is classically conditioned, its elicitation by the paranormal conditioned stimulus will occur in a reflex-like manner, of which the organism will have no voluntary control.

Working on that assumption, the following hypotheses can be generated:

Hypothesis 1: The occurrence of a response from paranormal stimuli is likely to occur in situations similar to the conditions under which the response was acquired.

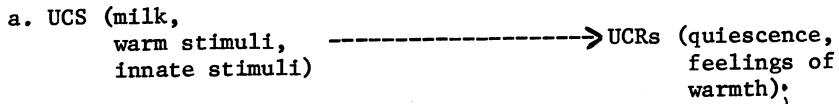
Hypothesis 2: The elicitation of a response by paranormal stimuli will be accompanied by responses that occurred contiguously in time and space during the initial conditioning of the paranormal stimulus and response.

Hypothesis 3: The elicitation of a response to any paranormal stimulus will depend upon its similarity to the paranormal stimulus with which conditioning was originally obtained (stimulus generalization).

Hypothesis 4: Although the elicitation of the response associated with the paranormal stimuli will occur in a reflex-like manner, the effect of the response will be dependent upon an interaction between the behaviour of the organism at the time of the stimulus application and the intensity and duration characteristics of the paranormal stimuli.

For the moment, the physical characteristics or correlates of the paranormal stimulus do not have to be identified. The manner in which they are conditioned can be described in the traditional manner. Beginning with the essential UCS-UCR connections, normal CSs can be conditioned such that CRs are evoked. These

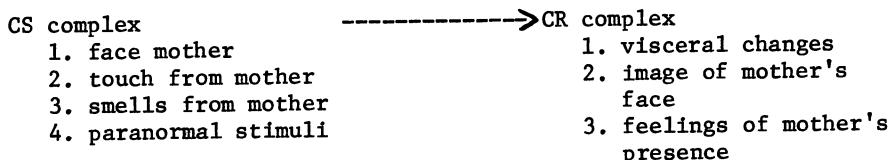
procedures can quickly be depicted as:



after conditioning, presentation of the mother stimuli (CSs) results in:



However in addition to the feelings of warmth, etc. associated with the presentation of the mother stimuli, there are also responses to the sensations of the mother that had been associated in time and space with the unconditioned stimuli. Images of the mother, images of her face, or feelings of her presence are example responses. The pattern could be depicted in the following manner:



Because stimuli which comprise the CS complex occur together in time and space with the unconditioned stimuli, they as a group elicit the conditioned responses associated with them. The presentation of one stimuli which makes up this initial CS complex can also lead to the elicitation of the responses in the CR complex. It is assumed that the paranormal stimuli were a segment of this initial CS complex. Expansion of the above suppositions will be

tested for different types of paranormal reports.

Post-mortem apparitions

This type of paranormal experience will be considered first since sufficient data has been given to allow a detailed analysis.

Hypothesis 1. If the paranormal CS was learned during the pre-verbal years of infancy, then the presentation of such a CS when the adult organism is in a state which simulates infancy should increase the probability of the CS effect. Certainly the adult human being cannot return organically or psychologically to those early twilight years, the maturational arrow is unidirectional. There are times when the adult human being is again placed in situations which simulate the helpless and relatively passive conditions of the pre-verbal child. During sleep and dreaming the adult lays passively, inundated with the complex stimuli of his internal and external environment. When dreaming takes place the person experiences uncontrollable sequences of images and sensations from which he cannot often escape.

Data from this and other texts indicate that almost half of paranormal experiences take place during the sleep-dream states of the reporter. It is clear that in some situations dreaming may accompany the paranormal experience more than is

reported. Many times people cannot recognize a dream unless it is sufficiently bizarre. In sleep-dreaming situations the presentation of a paranormal CS seems maximally effective. Generally the vividness, compulsion and reported emotional meaningfulness of the experience is amplified when it occurs during sleep-dream behaviour. These behaviours most closely replicate the times of the initial pre-verbal conditioning to paranormal stimuli. For it is during the night that the autonomic nervous system predominates the adult organism and affects the overall behaviour.

The presentation of a paranormal CS during the waking state of the adult organism is less likely to be effective. During the waking state the human being is predominately engaging in the awareness behavioural pattern, which is typified by private experiences of thoughts and public behaviours of word sequences. Awareness behaviour is a very potent pattern and maintains almost unbelievable stimulus control over the total output behaviour of the human organism. Less frequent or less intense responses, such as those associated with the autonomic nervous system and other non-conscious behaviours, are masked unless they are of necessary disruptive quality.

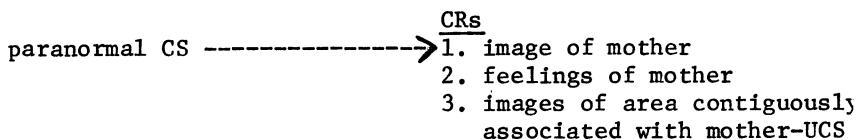
But there are times during the animal's active waking state that thought behaviour is suppressed and the frequency of both talking and thinking are decreased to a lower limit. After such times the person may report that "his mind was wandering" or "he just wasn't thinking". Since the awareness behavioural

pattern was not being displayed, not surprisingly the person cannot often report what he was thinking about during such periods. Data reported in this text suggest that during just these periods when the awareness behavioural system is no longer dominant, paranormal experiences take place. Reporters of paranormal experiences indicate they were engaging in some type of automatic behaviour such as cleaning the floor, washing dishes, staring at a fire, or just walking. These behaviours do not require the frequent display of conscious or awareness behaviour. During these periods other behavioural systems of the body can dominate the overall behaviour of the organism. Responses in the autonomic nervous system evoked by the presentation of paranormal stimuli can suddenly dominate the person's behaviour.

The implications of the above paragraph are two fold. First, during periods of "mind wandering" when the awareness behavioural pattern is functioning at a minimal limit, the overall behaviour of the organism can be controlled by stimuli of which he, by definition, is not aware. If these stimuli elicit responses in the autonomic nervous system, their sequences may occur in a reflex like manner to which the person has little "voluntary" control. In fact, the person may not necessarily be "aware" of the fact that momentarily his behaviour was controlled by stimuli other than those affecting the usual awareness behavioural pattern. Secondly, depending upon the intensity of the paranormal conditioned

stimuli, repeated presentations to the autonomic nervous system may continuously elicit responses at such frequencies that they may actually compete if not interfere with awareness behaviour for the control of the overall organismic behaviour.

Hypothesis 2. In post-mortem apparition cases, this hypothesis is most supported. A model has been presented to suggest that the paranormal stimulus which produces the report is a part of early CS complexes associated with mother (parental) stimuli conditioned during the pre-verbal years. If the model is correct, then it would be expected that a later presentation of the paranormal CS to the adult organism would elicit those responses which were initially evoked by the CS complex. Stated in model form, the operation would be:



The presentation of the paranormal CS, associated with the death of the parent, would elicit those initial images perceived by the reporter as an infant. There are several details from apparitional reports that indicate such a mechanism is involved. First, the most common facial expression of apparitions was the "smiling face", one of the earliest facial configurations discriminated by the infant. Many reporters of apparitions stated that the apparition just "appeared smiled and disappeared". Secondly, some

reporters noted that the apparition looked "younger". Although no data was given with respect to how much younger, this is predictable from the above model. The presentation of the paranormal CS, would elicit the images with which it has been initially conditioned during infancy when the parent was indeed "younger" looking.

A third feature which indicates that apparitions are private evocations of images of the parent and general spatial surrounding conditioned during infancy. The majority of apparitions were reported to stand along the side of the bed or at the foot of the bed, a position often assumed by the parent as he or she looks over the young infant. One of the most striking features of the post-mortem apparitional reports was that the deceased parent's face was looking over them. Such a position would be a common feature of the mother overlooking the young infant in the crib, and would be a frequent contiguous event to the presentation of milk, warmth and other unconditioned stimuli to the infant.

A fourth feature which indicates that apparitional experiences involve the elicitation of those images conditioned during infancy by the paranormal stimulus, is the report of hearing one's name. The hearing of one's personal name as an antecedent event was encountered in the data analysis. Indeed, it is the personal name that is one of the first "noises" discriminated by the young infant and associated with the presence of

the mother and milk. But the sound of one's name was not the only antecedent experience before the apparition's appearance. There are also reports of peculiar feelings or that someone was staring at the reporter. Are these remnants of early pre-verbal sensations that the infant experienced before or while the mother came and delivered the milk? Since these experiences occurred before language the person would have no memory of them and consequently have no verbal label. The experiences would be classified under the diffuse and non-specific labels of "peculiar" or "unusual but familiar". Indeed they are familiar. They have been experienced during the pre-verbal and pre-memory years laid down before language and no longer retrievable for adult awareness behaviour.

Hypothesis 3. The role of stimulus generalization in the response of the adult organism to a paranormal CS incorporates two important aspects of post-mortem cases: (1) the tendency for members of the immediate family to be the putative agents, and (2) how people, e.g., wives, husbands, who were not involved in the initial pre-verbal conditioning can act as CSs.

Stimulus generalization indicates that the organism will respond to a stimulus other than that which had been associated with reinforcement. Characteristically, the total amount of responding decreases as the presented stimulus becomes less and less similar to the stimulus associated with reinforcement. The apparent selective response to paranormal stimuli correlated with

members of the immediate family can be interpreted in this context.

Figure 2 shows the percent of the cases for T-C, post-mortem apparition, and precognitive experiences where various putative agents were involved. Agents were assigned to categories of either immediate family, peripheral family, friend-acquaintances, and strangers. The specific composition of each category has been described in previous chapters. As a comparison, a stimulus generalization curve for a pigeon pecking at a key in the presence of various wave lengths has been included. The second X-axis indicates the wave lengths of the light as it becomes less and less like that of the initial CS.

For all four curves, the pattern is basically the same. As the stimulus becomes less and less like that of the initial CS, the responding falls off quickly. In paranormal cases, members of the immediate family (which were primarily mothers and fathers), were the most frequent stimuli. Since they were presumably associated with the initial conditioning which allows the organism to respond to the paranormal CS, this is not surprising. Members of the peripheral family, which share the stimulus characteristics of the immediate family are the next most frequent class of stimuli for which a paranormal response was evoked. Finally, friends and acquaintances show a minimal effect. That they can elicit responses at all suggest that they share stimulus characteristics which are similar to that of the initial reinforcers. Although beyond the

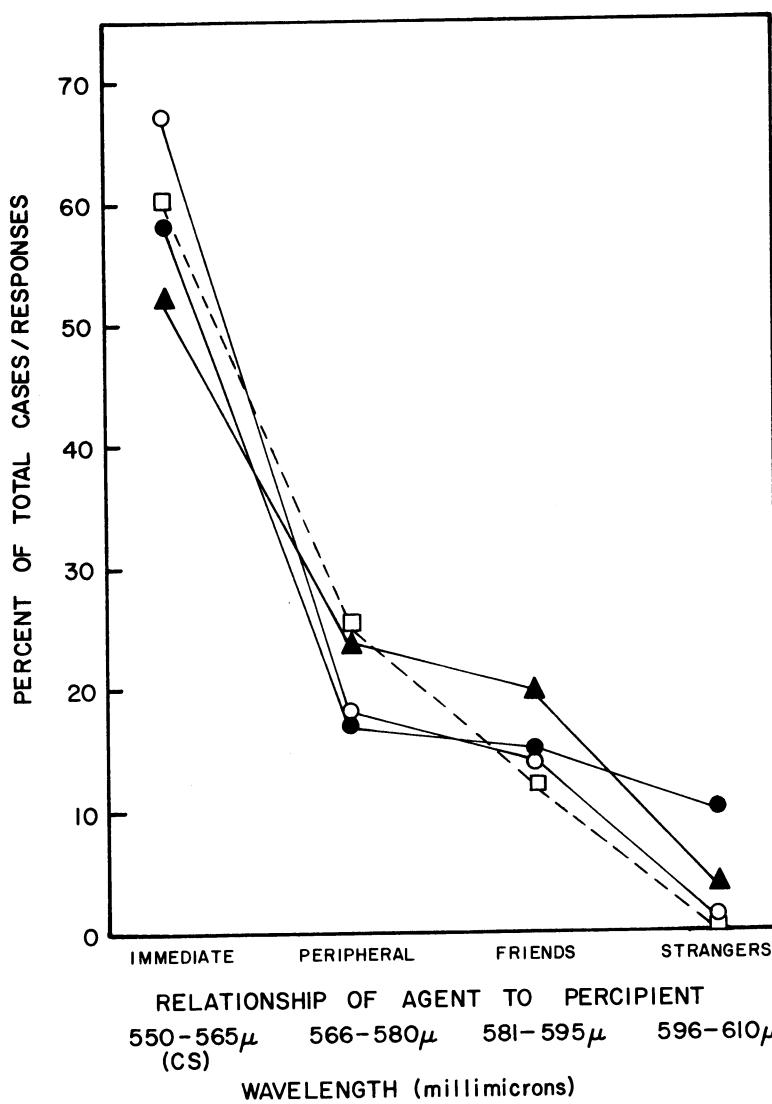


Figure 2. Percent of total cases involving putative agents from immediate family, peripheral family, friend-acquaintance, and stranger categories for T-C (●), precognition (○) and PM-apparition reports (▲). A stimulus generalization curve (□) for various wavelengths is given as comparison.

scope of this book, some evidence indicates that a person's choice of friends is strongly influenced by their behavioural similarity to the nuclear family.

The existence of stimulus generalization as a fundamental behavioural operation of the organism is of utmost importance in the normal situation. There is simply no survival value in responding to every stimulus, including those which are not in any way associated with reinforcement. On the other hand nature is so constructed that both natural stimuli and the receptors of the organism show variation. An all or none response to a fine increment of stimulation would also be of no value for life forms. There must be sufficient plasticity in the organism to respond to natural variations in the stimulus characteristics of the reinforcer.

The existence of stimulus generalization and discrimination for paranormal stimuli is also essential. For if paranormal stimuli do exist and are associated with death or crisis of human organisms, then the average person would be constantly bombarded by paranormal stimuli. If the operation of stimulus generalization did not exist, human beings would be almost indefinitely responding to the paranormal stimuli from thousands of deaths, assuming the person was engaging in the susceptible behaviours during the paranormal CS presentation. One theory of schizophrenia speculates some human beings no longer have the

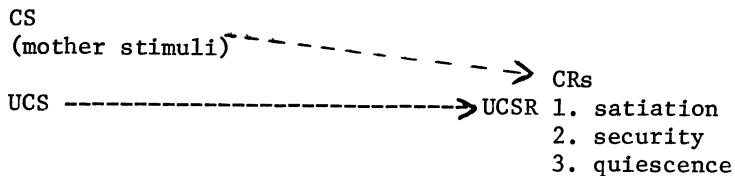
"behavioural insulation" of stimulus discrimination and consequently are constantly responding to the myriads of incident paranormal stimuli around them. Responses to these stimuli interfere with normal ongoing thought behaviour.

Existence of stimulus discrimination in the normal person would mean that he would respond only to the initial CS, or stimuli markedly similar. But there are still instances where strangers to the percipient are reported to appear as apparitions. A small occurrence frequency of these cases would indeed be expected from the above assumptions. Most likely there are only a discrete and finite number of stimulus properties which make up the paranormal CSs of the parent. By chance alone there will be some human beings, not related to the percipient, who share some of the parental stimulus characteristics. When such a person dies within an optimal time and space for the stimulus to be effective, the paranormal stimuli associated with the death (or crisis) of the stranger will be sufficiently similar to evoke the pre-verbal images conditioned in the percipient. Since the paranormal stimuli associated with the stranger's death are not exactly like those of the original CSs (of mother), the percipient would not be able to recognize the apparition, although it would seem "uncannily familiar". When word sequences are similar but not quite like sequences which have been reinforced and still appear within the area of the stimulus generalization curve they seem strangely familiar. In these cases, people report a "*déjà vu*"

experience.

The role of stimulus generalization is also crucial for understanding how a stimulus (e.g., wife) which was not present during initial conditioning with the mother can acquire properties similar to the original paranormal stimuli. This procedure is called fading. Fading involves the operation where a previously neutral stimulus can, by slowly shifting the stimulus generalization curves, begin to elicit conditioned responses.

Procedures by which people like the husband or wife can control the elicitation of pre-verbally conditioned responses can best be exemplified in a normal behaviour. We will assume that the subject is a young male. Again, the establishment of responses to mother stimuli are due to their association in time and space with the presentation of reinforcers (UCSs of milk, warmth, etc.)



The mother stimuli include her touch, warmth, facial configurations, smells and a variety of other modality sources. Mother CSs are extremely potent for eliciting the initial conditioned responses of satiation, quiescence, etc., since during infancy the organism is maximally responsive to classical conditioning. Voluntary autonomic control, due to insufficient maturation of the nervous

system, is lacking and autonomic emotional changes occur as all or none, full blown responses. Mother stimuli are the first environmental events to be associated with the high magnitude autonomic emotional behaviours. As the child grows older a number of things occur. The mother no longer holds him as close, changes his diapers, touches his body and genitals or displays the various stimuli associated with the initial conditioning. To use the vernacular, the boy is "too old" or "grown-up". The learning is still there. It has not been extinguished because the appropriate mother stimuli have not been presented in a situation where reinforcement was not delivered.

Those pre-verbal classically conditioned responses can again be partially evoked when the young man meets a stimulus which is similar to his mother. It is usually a girl. The girl does not have to look like the mother, but display certain behavioural patterns that are similar to the CSs associated with the mother. Many of these behavioural patterns incorporate modalities which have long since been suppressed by socialization. The girl may have smells, facial features, or touches which are similar to the initial mother stimuli specific to conditioned responses. The antecedent conditions for a fading technique are now in operation.

Maximum evoking of those pre-verbal classical responses to mother stimuli occurs in a situation which allows for similar stimuli to be presented. This condition is usually sustained in

coital behaviour. During first coital behaviours, there is a presentation of stimuli to the young man which he has not experienced since infancy. Genital stimulation, the closeness of warmth and contact, and visceral-proprioceptive sensations approach the intensities of infantile learning.

If social and economic situations allow the coital relationship to be maintained, each presentation of the coital stimuli evoke the above responses to a greater degree. But, every time the responses are evoked, novel stimuli which are now also present when reinforcement is delivered, will begin to take on reinforcing properties themselves. Novel stimuli would include the various idiosyncratic characteristics of the coital partner. Soon because of their association in time and space with the elicitation of the pre-verbal responses, these stimuli, which were not present during the initial pre-verbal conditioning, can act as CSs to elicit the early responses. Consciously the person may report a greater and greater "attraction" to the coital partner and emit such words as "I love you". His behaviour may change so that he remains more frequently in the presence of the coital partner. One could say that his behaviour is now under the stimulus control of various behavioural stimuli from the girl (wife). Consequent occurrence of paranormal stimuli associated with the girl's (wife's) death would also have stimulus control over the pre-verbal conditioning and elicit similar responses. Reasonably, modifications of those responses will

have occurred so that the apparition will appear like that of the dead spouse. A similar but less involved process would work for friends and acquaintances.

Hypothesis 4. This hypothesis essentially states that the detection of a paranormal stimulus will depend upon the information characteristics of the "signal" with respect to the "noise" characteristics of the organism. Stated another way, the more intense and greater the duration of paranormal stimuli, the more likely they are to be detected. Usually the response to the paranormal stimulus is expressed during sleep and dreaming when the autonomic nervous system is more dominant. However if the stimulus is of sufficient intensity, responses may be of sufficient strength to be included as a part of the awareness behavioural pattern.

From this point of view, it is apparent that death, especially sudden violent death is the most potent stimulus. Death of a more prolonged nature is next in line while crisis events are less intense. More than half (58%) of total apparition cases were post-mortem, while crisis types were much less frequent (13%). If sudden death of the agent is associated with intense paranormal CSs, then a response (or detection) to them should take place in the waking state as often as in the sleeping condition. On the other hand, weaker non-sudden death associated CSs or non-death CSs (crisis) should predominate during the more susceptible dream-sleep condition than during less susceptible waking behaviour.

Ad hoc analysis of the apparition reports confirmed this deduction. Sudden death apparitions occurred just as frequently during waking behaviour (55%) as during sleep behaviour (45%). On the other hand, non-sudden death apparitions predominated during the sleeping hours (75%) such that they shifted the average of the entire group of post-mortem apparition cases towards a predominately sleeping phenomena.

The time disparity is an important criticism here. In the majority of the cases, there is a significant time lag between the death (which has been assumed to be the primary correlated with the production of the paranormal CSs) and experience of the apparition. For time delays of up to five or six days, two mechanisms could be possible. First the exponential curve of experiences over time (see Figure 1) for apparitions may indeed reflect some type of energy decay curve. If such a curve existed, then maximum detectability of the apparition-evoking stimuli should occur at death or shortly thereafter. The presentation of the paranormal stimulus would presumably be continuous such that if the organism was not initially in a susceptible behavioural condition, stimulation could still occur later that night when the organism was more susceptible.

Paranormal stimuli presented in this manner would then stimulate the autonomic nervous system and evoke the appropriate responses. The energy-like decay curve may reflect the decreasing

energy of the paranormal stimuli and consequently the ability of the organism to detect it, asleep or awake.

The second possibility is a slight variation of the first. Instead of a continuous paranormal stimulus associated with death, the stimulus is more short-termed and immediately evokes changes in the autonomic nervous system. If more dominant behaviours are being displayed (awareness behaviours) at the time, the effects of the paranormal stimulus may be transiently stored in a system analogous to the labile stage of normal memory. Previous mention has been made of the labile stage of memory before more permanent consolidation takes place. There is some evidence that more than that which one is "aware" of may be stored and as such be reflected in the manifest content of dreams. Objects and images may show up in dreams which were not actively discriminated by the dreamer in the waking state. From this interpretation, the exponential-like fall-off over time between the death of the person and the apparition experience may represent the decreasing likelihood that the labilely stored responses to the paranormal stimuli will be incorporated into either dreams or awake behaviour. Even normal conditioned reflexes if not stored permanently, will attenuate with time.

Telepathy-Clairvoyance

Basically the same arguments can be stated for T-C cases

as has been mentioned for post-mortem apparitions. However comments applicable to these types of experiences can be made.

Hypothesis 1. About half of the percipients in T-C cases were asleep at the time of the experience, 40% of whom reported dream sequences. This is an important point since more than half of the subjects were not asleep during the experience. References have been made to the periods during the day when the awareness behaviour of the person is suppressed and other behaviours can become dominant. This idea has been discussed in the last section on post-mortem apparitions and will not be extended here. It is still assumed that similar mechanisms occur.

However features of T-C experiences indicate that still other environmental stimuli may facilitate the detection of paranormal T-C stimuli. Mention has been given to the normal behavioural process traditionally labeled "stimulus control". Briefly, some stimuli which have been present during the presentation of reinforcement to the organism, will increase the frequency of certain responses when presented again. Such a stimulus would be called a discriminative stimulus. For example, if smoking behaviour is reinforced while the person is in the presence of his peer group, later activities with the peer group will increase the frequency of smoking behaviour. Social behaviour is generally under the stimulus control of some specific place and time. We

are more likely to display humble behaviour in the church than the bowling alley. Cussing is more likely to occur where it has been reinforced, in the peer group, than in a formal gathering.

Data indicate that the occurrence of paranormal experiences shows some degree of stimulus control. When a paranormal CS is present, its influence on the total behaviour of the organism is dependent not only upon the ongoing behaviour of the organism, but the stimuli in the environment. For example, even during waking hours people report an increased tiredness in the bedroom (or conditioned sleeping area). Since the majority of the time people sleep in the bedroom, it is not surprising that the stimuli in the bedroom proper, can induce these effects. In the T-C reports, 83% of the percipients were in the bedroom at the time of the experience although only 47% reported that they were asleep. These percentages imply that when the conditioned human being stays for a time in the bedroom, his behaviour comes under the stimulus control of bedroom stimuli (color of the walls, the distribution of furniture, perhaps even the smells). Behaviours associated with sleep would then become more frequent and consequently make the subject become more susceptible to paranormal CSs in the environment.

Hypothesis 2. The elicitation of other responses which had been incidentally or contiguously paired with the responses to paranormal CSs, is conspicuously absent in T-C cases. This

could be interpreted in terms of hypothesis 4, where agent stimuli in many T-C cases might not have been sufficient to evoke responses other than those essential ones. Such features as "hearing one's name called" or "sudden feelings of compulsion" could be interpreted as stimuli responses that had been associated with earlier conditioning.

The unusual or compulsive feelings from this point of view are remnants of the visceral representations of pre-memory experiences.

Hypothesis 3. In post-mortem apparition cases, the possible role of stimulus generalization was discussed. It can be seen in Figure 19 that T-C occurrences also show the general trend of maximum occurrences between members of the immediate family. Peripheral family, friends-acquaintances, and strangers compose the other categories.

However if T-C experiences are responses to stimuli outside the environment, and are not perturbations of individual brain-behavioural systems, then another behavioural feature must be incorporated. Stimulus generalization does occur, but first there must be a stimulus (not just an environmental event) to be discriminated. This pre-assumes that both the agent and the percipient have shared conditioning histories. If they did not, then the presence of a paranormal CS would not elicit any response at all.

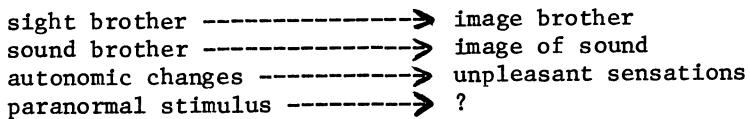
The immense specificity of the T-C report suggests that shared conditioning has taken place. If the paranormal CS was merely some aspect of the whole family or general conditioning history of the immediate group, then the presentation of such a CS would elicit only generalized responses. The putative percipient would presumably only feel that "something has happened to someone in the family", but not who in the family. Indeed this happens and people do report that they "know" someone in the "family" has died, although the specifics are not clear. Usually, the percipient precisely discriminates the person to whom the crisis or death is happening. Mothers suddenly feel that their daughters are sick. Sisters suddenly feel that their brothers have been killed. This requires a precise response to the paranormal stimulus and demands a shared conditioning history.

Establishing the shared conditioning patterns that would be evoked in the presence of paranormal CSs, would follow the same laws as normal CSs. Members of the immediate family are the easiest to "know". By "knowing" a person, we usually mean the person displays more or less the same behaviours in the presence of the same or similar stimuli. Siblings learn early to discriminate the behavioural patterns of each other in order to avoid painful consequences to themselves. Such discrimination of the other person's behaviour involves a reciprocal conditioning. Johnny

plays with a boat at which time Suzy can play with the car. When Johnny has a "disturbed" look on his face and approaches Suzy, she knows from previous experience (conditioning) that pain will follow if she does not drop the car. By similar procedures, siblings learn which specific facial contortions and expressions occur when one of them is hurt or in pain.

A child's perception of a sibling displaying an idiosyncratic pattern in response to pain is associated with images that can be elicited by various stimuli. For example, if a particular type of crying is associated with specific facial contortions from the young brother, then just the presentation of this crying sound can induce images of his facial features in the older sibling. Now suppose there is a paranormal stimulus associated with the painful experiences of the young brother. The conditioning, schematically presented, might be:

CS



Consequently an association is made between the various CSs and CRs. The presentation of only one of the CSs such as the sound of the brother crying, will elicit the full range of CRs. If a paranormal stimulus was also present during the many times of painful experiences for the brother, its later isolated presentation would also elicit the CRs. The physiological substrate of this

conditioning would be the autonomic nervous system since it is predominately involved with "emotional" behaviour. When the little brother later grows up and moves away, the conditioning is still there in the older sibling. Autonomic extinction to aversive stimuli is difficult. Now suppose the brother is crushed by a steam roller and the various stimuli associated with pain are evoked including the paranormal one. If the paranormal CS is presented to the older sibling while in the optimal behavioural situation, the CS will again elicit those images of the brother in pain.

It is interesting that many of the cases reported in the T-C section of this text made allusions to experiences that support the above suppositions. Regrettably few people reported the specific image or experience they felt when the paranormal experience was presumed to occur. However in some cases (not all) percipients reported feelings about their siblings in terms of images associated with childhood experiences. Is this evidence that conditioned responses laid down during childhood are being evoked? The data are not sufficient in homogeneity or detail to allow a definite answer.

The cases of friends as agents may add support to this possibility. Cases where friends were implied as the putative agent almost invariably involved people with whom the percipient had "grown up". It is these close friends of youth, when the

effects of reciprocal conditioning would have been longest and most enduring, that are reported as agents in T-C cases. "Close friends" is a key phrase. This label is usually reserved for those few instances in childhood and youth where two people spend a great deal of time together and share many interests. Restated, they share more conditioning patterns than people of an acquaintance level. Anecdotally, statements have been made of how brothers and sisters or two friends who remain close or who "were very close" are the ones most likely to be "aware" of the other's health. Predictably, this condition shows up most frequently among twins, who share not only behavioural patterns but genetic characteristics. Even their dream time patterns, a period of T-C susceptibility, are similar.

Quite reasonably, an obvious deficiency in the above assumptions is the lack of consideration for maturational effects. People change, their behavioural patterns are modified. Superficially this is so, but fundamentally clinical studies have found that the basic patterns by which people respond to basic stimuli (e.g., pain, reward) do not change. The content may change according to the dictates of social expectancy and, whereas the child sucks his thumb, an adult sucks a cigar, the pattern remains similar. Siblings and friend who remain close, by definition, usually retain reciprocal conditioning patterns so that they can communicate with each other and "be in touch".

Later learned behaviour is displayed in specific situations. Experimental psychology has shown us that the early child never really dies. His responses to the environment are still there. Human beings do acquire more sophisticated and adult avenues of coping with stress and frustration, but under severe stress they often display the behaviour of an earlier developmental period. There is ample experimental verification of this tendency.

One experiment showed that if students had learned early to tie a rope in a certain way, they could be taught to tie other types of knots. But under the stress of no sleep, they would regress back to earlier knot-tying behaviours. Regression is a frequent means of combating insoluble problems and often involves returning to a behavioural time when the problem was solved. The events which are associated with paranormal reports do just that. During periods of death and crisis, the person to whom these events are happening displays the behaviours of earlier times. The soldier cries for mother on the battle field, the brother sobs for big sister when the steam roller crushes him. Tragically, those stimuli with which paranormal experiences are associated, induce behaviours in the person similar to those early years when early conditioning was laid down. Under these conditions the paranormal CS is most likely to be displayed in a manner which can most effectively elicit the conditioned responses in the percipient.

Hypothesis 4. The existence of stimulus signal-organismic noise ratios can be clearly assumed in T-C phenomena. Table 4 demonstrates that the most frequent behaviour of the agent at the time of the percipient's experience is death. Crisis events are the next most frequent experiences of the agent. Situations where some emotional behaviour is imputed or implied occurred next. Agents who were exposed to trivial or miscellaneous stimuli were reported least of all. In other words, as the stimuli applied to the agent are more intense the likelihood of detecting or responding to the paranormal CSs are increased. Why death should be the most intense paranormal CS is not clear. Many things do take place at death which, within the individual reference, are the greatest changes ever encountered by the organism with the possible exception of birth. Near death the heart stops or becomes bradycardiac, the brain waves become massively synchronized and large changes in biochemistry take place. The more sudden the death, the more sudden the change and consequently the more abrupt the appearance of paranormal CSs in an impulse-like manner.

One could conceivably rationalize why pain during crisis experiences in the agent may be associated with the occurrence of paranormal CSs. Some conditioning has occurred in both the agent's and percipient's past when analogous crisis events took place. There is no reason to assume that pain to the child is less effective than pain delivered to the adult. What is difficult to understand in context of a learning model is the role of

death as a CS. Death, by definition, has not previously occurred so conditioning would not be possible. Yet even in death situations, CSs would be emitted that are associated with maximum pain to the agent. In situations where myriads of paranormal CSs are associated with many deaths (e.g., Titanic sinking), a few CSs may be sufficient in characteristic to initiate a generalized vague response in non-related individuals.

Conditioning during Dreams?

For both post-mortem and T-C occurrences strong emphasis has been laid upon fundamental conditioning patterns established in the nervous system during the pre-verbal, pre-memory years of infancy. However the possibility of continued reciprocal conditioning between members of the immediate family must also be considered. No doubt some modification takes place between the fundamental conditioning patterns and the stimuli of the spouse and friends. Possible mechanisms for these difficulties have been discussed. Suppose the conditioning still continues?

If conditioning of paranormal stimuli occurred in later life, it would most likely be displayed during those periods and conditions of the human organism which are most often reported during spontaneous cases. Sleeping and dreaming are times when the body responds to a variety of subtle stimuli originating both inside and outside the organism. During the day these small

magnitude stimuli are masked by the more intense stimulus control of awareness behaviour and the environmental events which evoke that behaviour. During sleep and dreaming less intense stimuli, including those which were present during the day can elicit responses and be detected. Relatively weak stimuli such as those from the gastrointestinal tract can influence dream content and are often the correlates of "nightmares".

Experimentally, few instances have been shown where conditioning takes place during sleep. Unfortunately most of these experiments employed changes in the skeletal musculature as their measurement. One would expect that conditioning during sleep would most likely be mediated by the autonomic nervous system and be displayed in smooth-muscle-chemical changes. Furthermore, this conditioning would be expected to occur when the autonomic nervous system is most responsive: during dreaming or REM sleep periods.

Is there a kind of reciprocal learning which takes place between two dreamers in the same spatial proximity? Can some type of learning plexus be set up so that the presentation of para-normal stimulus to the partner dreamer elicits a change in his autonomic nervous system and consequently the dream? Such conditioning would pre-suppose that the two people in question would dream at about the same time every night. Identical twins do show strikingly similar REM sleep patterns. This has been shown

emperically. Some evidence indicates that husbands and wives may also begin to display similar REM sleep periods during the night. With the identical twins, genetic considerations are certainly major factors. Similar REM period sequences in husband and wives would be influenced by more environmental contributors.

Any synchrony between non-genetically related individuals could only reflect their responses to a similar environment. People sleeping in the same spatial proximity would be exposed to more or less the same incident stimuli such as periodic noise from traffic, clocks, temperature variations and other such incidentals that are known to affect sleeping. Organismic stimuli would also play an important role in this synchronization. Motoric movement, changes in body temperature and genital-tactile contacts of the spouse would be involved here. That they can be of sufficient magnitude to be effective is certainly implied (s.f.e. Hall, 1959).

When I first whimsically considered the possibility of reciprocal conditioning during dreams between individuals of similar spatial proximity, the idea was ludicrous. However, it is apparent that the dreaming organism can still respond to his name over other stimuli (Oswald, 1966). During dreams weak stimuli can evoke "meaningful" responses and it is in this condition that Krippner and Ullman have had their success. Just the slightest possibility that reciprocal conditioning among spatially close human beings can have an influence on behaviour is frightening.

For if such conditioning could take place, one organism would have the ability to evoke changes in another. There would be little voluntary control. With this type of learning paradigm, conditioning of the night-before could be manifested the next day during periods when the awareness behavioural pattern subsides and the autonomic nervous system momentarily controls behaviour. The role of such conditioning in so-called precognitive experiences could have drastic consequences.

Precognition

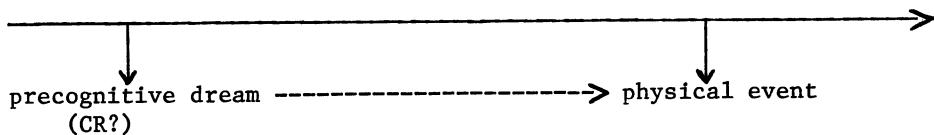
Mechanical distortions in a physical (mass-related) time is not feasible within the framework of a conditioning model. Indeed it is nice for those individuals who have the mental matrices to play with the various configurations that such an assumption produces. However texts by Fraser, et al. (1972), Fraser (1966) and Holubar (1969) dampen the enthusiams of fantasy for a more realistic appraisal of putative precognitive experiences. As mentioned in the beginning of this chapter I consider that most if not all precognitive experiences can be interpreted in terms of the memory-distorting effects of trauma and death to the perceiver and his peers. But, working on the meager possibility that such is not the case, and precognitive experiences involve external paranormal stimuli, two mechanisms are immediately implied. They are dictated by the two categories of events which are most

often precognized: natural-public catastrophies (earthquakes, land slides, aircrashes) and personal tragedies (car accidents, sudden death).

Mechanism 1: The precognitive experience and event as responses to a third antecedent and concurrent stimulus

This model can be depicted in the following manner:

Unknown physical stimulus



Restated, this mechanism assumes that both the precognitive dream and the event are evoked by the same physical stimulus of a prolonged duration. Since this physical stimulus has not been identified, the term paranormal stimulus is applicable. Mechanism 1 is especially relevant to the first classification of precognized events which involve basically natural situations. Tornadoes, windstorms, earthquakes, land movements and other such geophysical changes are included here. Air crashes, which were not emphasized in the text data are also of frequent report. In fact the "premonition bureau" in New York reports that the most frequently precognized events that occur with detailed specificity

are earthquakes and airplane crashes.

There is ample evidence that measurable stimuli exist in the environment hours or even days before physical forces are sufficient to produce major geophysical changes. Pressure build-ups in earthquake areas, stress along potential land movements, and electrical gradients before storm passages are frequent antecedent stimuli that impinge upon the organism. During the waking state, when the behaviour of the organism is under the stimulus control of awareness patterns, subtle stimuli would not be effective. However during sleep subtle stimuli may influence the occurrence or the content of dreams by operations of the organism not known to date. Sleeping percipients who later reported precognitive experiences remembered concomitant dream sequences 78% of the time. This is more than any other paranormal category.

The neuroanatomical substrate for detection of external stimuli that stimulates the dream (and the actual event), would be the autonomic nervous system. Reactions from this system are sufficiently diffuse to influence the visceral components (smooth muscle, blood chemistry) which are essential correlates of "meaningful" behaviour. Stimulation of autonomic functions is important since the proportion of events supposedly precognized are of an aversive emotional nature at least 90% of the time. Autonomic reactions are also noted to occur in response to very subtle stimuli, depending

upon the dominant state of the organism. Psychologically obscure events can have alarming reactions. Even "unconscious" stimuli as in the Leavitt experiments, can induce massive changes greater even than the events which initially caused the effect.

Simply, one would expect that two basic types of responses could be evoked by paranormal stimuli occurring before an event: (1) "diffuse feelings" and (2) images with specific content. The first case has often been reported, although percentages are not available. Percipients who report diffuse feelings use descriptive terminology like strange "foreboding", or "an uneasy feeling of depression and doom". Generalized autonomic activity would be expected to produce vague and non-specific experiences. Excessive vasodilation in the brain can produce general "headaches". Excessive parasympathetic stimulation can effect the pharyngeal musculature of the throat and induce subtle feelings of "a knot in the throat" and lead to statements like "all choked up". Autonomic visceral responses do not occur as discrete reactions, like skeletal movements. Selection of discrete words for them is discriminably difficult. By their very nature autonomic-visceral changes are diffuse and often demand the use of metaphorical phrases to be described.

Since precognitive events are most frequently of an aversive nature, the most frequent precognitive experiences are emotionally negative. Feeling of foreboding, impending doom, and

the such are reported. But such experiences involve an anticipation of an aversive event. Anticipation suggests the pre-occurrence of conditioning. The source and time of the conditioning are critical features for a conditioning model in precognitive experiences to have validity. We still assume that the essential conditioning patterns responsible for the paranormal experience were laid down during the pre-verbal years. During the night or few nights before the objective event, the subject is in a position which would simulate early conditioning and allow for the optimal acquisition of a respondent. However since the paranormal stimulus presented during dreaming to the organism has not been yet followed by the aversive event objectively, one explanation is there must be something aversive about the stimulus itself. Consequently, upon awakening the person has been exposed to many trials of the presentation of the aversive stimulus followed by the appropriate autonomic responses. In this manner anticipatory foreboding responses are established.

Why the paranormal stimuli should in themselves be aversive is not clear. If the aversion is not due to paired association, then logically we are forced with concluding that the paranormal stimulus which produces both the precognitive dream and the event is aversive. Such stimuli do exist, although mechanism of effect is not clear. Rodents presumably find high voltage electric gradients aversive, since they move their nests away from the high gradient area. An alternative explanation suggests

the stimulus in question may have aversive qualities because it is similar to properties of stimuli produced by socially related human organisms when they are in pain or near-death positions. The latter possibility assumes closer relationship between bio-organic processes and inorganic events than has thus far been established. From this point of view, diffuse reaction in the percipient to such a stimulus occurs because it is not exactly similar to the one associated with initial conditioning (stimulus generalization). Stimulus generalization depends on the existence of physically discriminable similarities associated with pain to an organism and the stimuli which precede natural cataclysmic events. The acquisition of responses to pain associated paranormal stimuli would follow the same laws as those discussed in the T-C section.

Precognitive experiences as diffuse, generalized and topographic autonomic responses to subtle natural stimuli are conceivable. The survival value in such detection ability is self-evident. Report of only these types of experiences would present little problem to the behaviourist or scientist. However, there are still instances when specific information is given. It is possible that some specificity in precognitive experiences could be merely a function of different paranormal stimuli associated with each type of natural event. More precise expe-

riences require reinforcement.

In order for a specific feeling or thought to be pre-cognitively paired with a specific event, the event must follow the thought or feeling. Reinforcement must take place in the expression as that which is dreamt occurs. By this means the precognitive dreamer obtains some cue by which he can discriminate the appropriate response from the multitude of others. In some cases the response (image) reinforced may have nothing at all to do with the event. The actual dream image elicited by the paranormal stimulus which also produces the earthquake may be "feelings of being covered by a blanket", "running without going any place" or some idiosyncratic learned memory like "a decaying dog". These images would have initially been elicited by the paranormal stimulus due to various personal learning and experiential aspects of the percipient. Why these images were present at all could be purely accidental. If these images were followed even once, by an actual event (reinforcement) their likelihood of occurring again when the paranormal stimulus was presented is strongly increased.

The limited range of dream symbols used by various "prophets" is indicative of the above mechanism. Various prophets have idiosyncratic symbol systems which are remarkably successful for themselves. Stevenson (1970) mentions how there seems to exist a sensitivity of individual persons to certain themes in precognitive experiences. Restated, it could be said that the display

of certain thoughts or experiences in response to normal stimuli occurring before the event is reinforced (probably spuriously) by the occurrence of the objective event. Consequent presentation of that paranormal stimulus will elicit the image to an even stronger degree.

However the same process which allows the hypothetical prophet to "detect" stimuli which are concurrent with the dream and which will later cause the event precognized, can also lead to errors. Any given response of the human organism is rarely elicitable by one and only one stimulus. Thus the presentation of another stimulus, like hot sausage before bedtime, could be sufficient to stimulate the autonomic conditions associated with the cue dream and elicit it. Because of the previous association of this cue dream with an actual event, the person may state, erroneously, that an earthquake will occur.

Mechanism 2: Precognition Experiences as Stimuli which Elicit Conditioned Responses in the Agent.

Sooner or later the subject of psychokinesis arises in the discussion of precognitive events. Men like Tanagras (1967), and Roll (1961) have argued that the dreamer, "psychokinetically" via some obscure mind over matter reaction actually precipitates or causes the tragic event. The implications from such statements

are staggering, but the mechanisms are weak. Essentially what they have predicted could take place, but would employ the fundamental processes of conditioning.

The basic assumption that essential classically conditioned responses laid down during the pre-verbal, pre-memory years is still applicable in precognitive cases which involve personal tragedy, e.g., death of spouse in a car accident. In summary, two basic patterns of classical responses emerge from infancy: those associated with the presentation of positive (rewarding) stimuli and those associated with aversive (punishment) stimuli. It is this latter pattern which seem applicable to precognitive behaviour. Presentation of aversive stimuli shape a variety of responses on the biochemical, physiological and behavioural level of the organism. One of these responses is "anxiety". Maintained, it is aversive and suppressive. The human organism finds some way to escape or avoid it.

Due to many paired associations between the behaviour and the consequent delivery of punishment, the behaviour itself becomes a CS or discriminative stimulus for the delivery of pain. During periods after the occurrence of a previously punished response, the person can experience "anxiety". Anxiety can be avoided by (1) not displaying the behaviour in question or (2) emitting a behaviour which is incompatible with punishment. Children learn early that punishment can be avoided by crying to their mother

that her vase was broken, hitting on self and saying "bad Johnny" and similar self-punitive behaviours. They are especially effective if, in addition to avoiding punishment they are followed by positive parental attention. As the child grows up similar responses take place which "punish" the child not only for behaviours but thoughts. Private experiences of guilt and self-punitive expressions, e.g., "I hate myself" are emitted.

Some mention has been given of the possibility that early conditioned responses may be especially accessible during dream states. The availability of the gut responses associated with self-punitive behaviour could have tragic consequences. If the optimal conditioning situation was established between the precognitive percipient and the agent while both are dreaming then modification of behaviour could take place in the latter. The modification would be mediated in the agent via the autonomic nervous system. In this case the dream of the percipient before the event is the paranormal stimulus which elicits a change in the agent (victim) dream behaviour that will determine his behaviour the following day.

The operation could be described in the following manner. Under optimal conditions the percipient dreams of the spouse's death. This very dream is the stimulus which modifies the spouse's behaviour via his dreams. Next morning the spouse awakes and begins to engage in awareness behaviour. Nocturnal behavioural patterns are suppressed. But there are times during the day when awareness behavioural patterns

decrease their frequency and the person begins to report periods of "not thinking". These are transient periods and the person may "suddenly be brought back to reality". During those transient periods, the other behavioural systems dominate the overall behaviour of the spouse. The conditioning in the dream of the previous night displays its effect, and the victim leaves the road, simulating the events of the dream.

Occasional speculation has been made about how the content of the dreams of the night before influences behaviour the following day. Research has shown that deprivation of dreams can increase the irritability of a person and contribute to some thought difficulty. In the vernacular, the effects of disturbed dream sleep may be "getting up on the wrong side of the bed". Unfortunately it is presently methodologically impossible to see how content in dreams of the previous night determines behaviour the following day. Waking up the person after each dream allows for the person to repeat the dream as a part of awareness verbal behaviour, thus contaminating any non-awareness effect. Not awaking the person gives no data at all. So until more sophisticated techniques are employed, the possible influence of the dreams of the previous night on the specific behaviour of the following day must remain speculation. Smith (1967) has suggested that a *déjà-vu* experience is the vague remembering of a dream of the previous night in situations that simulate the dream the next day. The possibility of a dream of the previous night actually

predisposing or controlling the behaviour of the "agent" the next day deserves some attention before being dismissed. Certainly this stimulus operation could explain the detailed precision of the percipient's dream. In actuality this very detail is the stimulus which causes the precognated event to occur. The agent, or more appropriately the victim, would be acting out behavioural sequences in a reflex-like manner that had been acquired the previous night. All it would take is one brief moment of transient suppression of conscious-awareness behaviour so that another behavioural pattern could become dominant. Predictably, it is just those instances, such as driving in a car over long distance, where non-conscious behaviours become probable. How many of us have driven for long distances and then "suddenly came to" realizing that several miles had unknowingly passed?

For such conditioning, organismic differences would be important features. Individuals who are not subject to frequent "urges", "impulses" or "obsessions" would be less susceptible to non-awareness conditioning. Those individuals who do report frequent occurrences of "something driving them" or "irresistable impulses" would be more susceptible. These factors compounded with predisposition towards depression, would allow weak stimuli like those obtained during dream to influence behaviour. Depression is typified by a marked suppression in both motoric and thought behaviour, thus changing the occurrence probabilities of other less frequent behaviours.

The percipient in such a model is forced into a malicious role. It is the percipient's dream and the psychological processes responsible for the dream that initiate the sequence of events which result in injury or death. Such statements seem intolerable since we all know that spouses and families and peers love each other. Not so. A statement of this platitudinous nature does not change the reinforcement history of human beings. By the nature of socialization and learning, certain people are responsible for both the delivery of positive and aversive reinforcement to the individual. In other words, the same spatial locus is associated with different extremes of stimuli. Initially fathers and mothers fill this role, later spouses fade into control. They deliver food, warmth and secondary reinforcers, but they also deliver spankings, painful stimuli and the withdrawal of positive stimuli. Life-forms usually respond to the latter stimulus operation with aggression. But the blatant expression of aggressive behaviour is not feasible. Display of aggressive responses is punished. More importantly free-display of aggressive behaviour (attack, killing) would also remove the person who is also a positive reinforcer. As a result the child learns to display approach behaviours of "love" and "good feelings" toward the parents under some circumstances and "hatred" following others. When the father gives Billy a toy, approach behaviours of "I love you daddy" are displayed. Responses

such as "I hate you daddy" or thoughts of killing the father occur at other times.

Generally speaking aggressive behaviours are suppressed during waking behaviour. Those aggressive responses towards the people who are most likely to be punishers (parents and spouses) are suppressed most of all. Since the responses are suppressed and not emitted during the waking state, they may be elicited as a part of other behaviours during the dream condition. From such a point of view, Figure 2 could be interpreted as a graph of those individuals who have been sources of frustrative-aggressive behaviour to different degrees. The immediate family is foremost and the stranger is least. During the night the suppressed aggressive behaviours normally display their effects, and, if the conditions are optimal, begin a sequence of behaviours that may end up as another report of a precognitive experience.

For this model of precognitive experiences to be applicable, precise induced changes in the "victim" or dreamer must occur during the dream sleep. Moreover, it must be demonstrated that certain behaviours may be learned during the dream condition and be executed only during the dream condition or similar state of consciousness. Recent experimental evidence strongly supports the possibility of this type of state-dependent learning and behavioural display. Evans, Gustafson, O'Connell, Orne and Shor (1966) have reported that complex instructions can be followed and exe-

cuted during dream (REM) sleep without wakening. In addition, instructions presented during one dream period of the night are "remembered" and correctly executed during later dream periods of the same night and during REM periods of succeeding nights. Johnson (1973), in an excellent general article, emphasizes the striking similarity between dreaming and awake periods, for many experimental variables. These data indicate that instructions acquired in the dream state could be followed when the conditioned individual re-entered the dream state or similar state the following day. How the person might "consciously" experience the execution of the dream-induced sequences is interesting. Would the victim of a precognitive dream feel a sudden compulsion or be "paralyzed" and unable to avoid the oncoming death event? How many of our daily sudden compulsions while alone driving a car or standing on the top of buildings may be a consequence of this unusual, but "unintentional" conditioning?

A significant number of cases often deal with instances of a wife ("percipient") awaking from a dream in which the husband ("agent") has just died. Upon investigation, the wife discovers that her spouse is dead or in the process of dying. Technically speaking this might be also called a "telepathic" experience. Could the "percipient's" dream have precipitated the death in the "agent"? Rosenblatt, Hartmann and Zwilling (1973) have reported that during all night polygraphic monitoring, human subjects with

known cardiac abnormalities show the greatest incidence of premature ventricular beats during REM (dream states). In addition, these ventricular peculiarities peaked during 02:00 and 06:00 (A.M.) local time. Ullman, Krippner and Vaughn (1973) have demonstrated some experimental evidence that even under laboratory conditions, one person may significantly influence the content of another person's dream when the latter is dreaming. If these experiments have general reliability, then one person's hostile dream may very well influence the dream as well as the already unstable physiology of another person.

CHAPTER V. POSSIBLE PHYSICAL MECHANISMS FOR PARANORMAL RESPONSES

Hypotheses on the nature of paranormal behaviour almost match the number of active researchers in parapsychology. But hypotheses are useless unless they can predict accurately. Attempts at isolating the physical mechanism of paranormal experiences have ranged from mathematical postulates of non-existent energy forms to fantastic schema about the structure of the universe. Unfortunately not a single one has been able to generate hypotheses that can be tested in the laboratory. In fact, very few have been tested with correlational data such as the verbal reports noted in the text.

Basic Assumptions

The problem for a physical basis to paranormal phenomena is conceptually a simple one. How does one get information from point A to point B without using conventional sense modes? Variations of this question can also be framed such as: "How can information 'inside' one person's head influence the behaviour of another over great distances?" The characteristics of the problem dictate the prerequisites of the physical mechanism.

For selection of a candidate mechanism as a causal or correlational source of paranormal phenomena, the following criteria

are required or implied.

1. natural occurrence: this is a primary feature. Unless the physical mechanism occurs normally in nature, a defense of its importance would be trite. If the physical mechanism does occur in nature, then its presence should be measurable by acceptable scientific methods.
2. penetrability: the majority of paranormal experiences take place inside dwellings.
3. low attenuation: because of the large distances involved with many T-C cases, where the agent and percipient are separated by hundreds of miles, the candidate mechanism must have significant propagational intensities with minimum attenuation.
4. bio-brain frequencies: paranormal responses are frequently associated with specific electrical wave characteristics of the human brain. A physical stimulus which is resonant or similar in frequency to those optimal paranormal-related brain frequencies (4-13 Hz), should facilitate effect (communication).
5. known biological effects: if the physical candidate occurs in nature, then artificial simulation in the laboratory should produce biological-behavioural effects. The effects should involve primarily the same general

features mentioned in paranormal reports, with major influences upon the autonomic nervous system. Exact reproduction of paranormal experiences would not be expected since the artificial signal would not be composed of the stimulus configurations that typify natural occurrences.

6. synchronous paranormal-natural variations. If the physical candidate is correlated with the occurrence of paranormal experiences, then measurable fluctuations of one should be reflected in the other. Consequently similarities should be found in daily variations, seasonal highs and lows, and other spatial-temporal, time-varying properties.
7. testable hypothesis: assumption that the physical candidate is highly correlated with occurrence of paranormal phenomena should allow predictions to be made about paranormal occurrences by knowing the properties of the mechanism candidate, *a priori*.

Previous mechanisms concerning the dynamics of paranormal information transfer have assumed, implicitly or explicitly, that the stimulus energy comes from the organism itself. From this point of view, the organism (e.g., agent) generates some type of energy through the environment and consequently to the percipient. Correlated with the energy generation, information about the nature

of the paranormal event is also transferred. From what science knows about energy functions, the above supposition is not realistic. It is highly unlikely that sufficient amounts of energy could be generated by the body-brain to any significant distance. Physically speaking the amounts of energy within the body-brain are much too minute. Most of the energy that does leave the body to any significant degree follows radiative laws (e.g., infrared, i.e., heat). The most probable sources of bio-energies, the neurons, demonstrate the usual attenuation effects with distances. Since the spatial dimensions of neurogenic energies are of the micrometer range, attenuation factors apply within this order of magnitude. Even with sudden surges in the brain, any known bio-energy fields would be severely damped by myelin sheaths and skull impedances.

There is a second option. Paranormal phenomena utilize the energy already available in the environment. Energy required for a paranormal event to take place does not originate within the organism but within the environment in which the organism is exposed. Such an option is palatable within the context of energy expenditure as well as within the realm of normal occurrence. Typically the human organism like other life forms, is sensitive to only a small portion of electromagnetic, gravitational or sonic energetic states normally available. We communicate visually because the eye sensors are sensitive to a small increment of the electromagnetic

spectrum. Perception of voices are possible because the ears are maximally receptive to a small band of mechanical vibrations in the air. Note that the human organism does not transmit these energies, rather it modifies the energies that are already present. Objects are seen because they block the light in a particular manner and pattern. Sounds are heard because movements of the organism through aired-space are carried by molecular collision to the ears of another. Information of a more paranormal nature might use the same principle.

It is strange that the role of the obvious is seen least often. The natural physical environment is replete with energy states in varying intensities, frequencies and configurations. Perhaps because they are so common or so global in perspective, they are ignored. Consider the hundreds of bars of stress available in areas where seismic forces cumulate even before a fracture. Think of the thousands of volts per meter created periodically between the capacitor-like plates of the ground and the masses of charged clouds. Ponder the electromagnetic field-waves in numbers of the n^{th} magnitude that bath the biosphere. Some of these natural forces have the intensities to generate waves that can travel hundreds or thousands of miles.

If communication between two members of the same species occurs at great distances by processes not known to date, then the answer must lay in the spatial-temporal interface between the two;

that interface is the physical environment. A few of those interfaces which meet the criteria as a possible physical mechanism of paranormal experiences will now be considered.

Extremely low frequency electromagnetic fields

Recent interest in psychophysiology and physics has been directed towards extremely low frequency (ELF) electromagnetic fields. A review of their physical characteristics, biological effects, and possible mechanisms of interaction has been completed by Persinger, Ludwig and Ossenkopp (1973). ELF-electromagnetic fields and waves occur naturally and show low attenuation, high penetrability, and configurational differences. By definition, they include frequencies between .1 Hz and 100 Hz, well within the major power outputs of the brain and body. Experimental application of ELF field-waves have suggested autonomic involvement.

Physical Characteristics

ELF fields may occur in nature as a pure wave or may be presented as ELF pulses from VLF carrier waves. In the latter case, VLF waves, e.g., 10 kHz, are received as short pulses lasting 10^{-1} to 10^{-4} sec., the number of pulses per second (pulse frequency) being in the ELF range. The sources of ELF and VLF

fields are primarily ionospheric above 4 Hz to 7 Hz and magneto-spheric below these values. ELF phenomena associated with local weather conditions seem to span the entire ELF spectra. Artificial sources of ELF also contribute to the electromagnetic noise.

Ionospheric origins seem to come mostly from lightning discharges called atmospherics or "sferics". The amplitude spectra of atmospherics show maxima at 30 Hz to 100 Hz and 10 kHz, with a minimum between 2 kHz to 3 kHz. At 5 Hz, the magnetic component is about 10^{-8} gauss while the electrical component would be about 2 mV/m. At the lower end of the ELF band, where the wavelength begins to approximate the circumference of the earth, a unique resonance system is produced called the Schumann resonance. Power spectra of Schumann resonances show maxima at 7.8, 14.1, 20.3, 26.4, and 32.5 Hz, with electric field strengths up to 1 mV/m. Power level decreases as the frequency increases, while the propagation parameters depend on the boundary characteristics of the ionosphere. The principal amount of ELF energy remains within the spherical shell between the earth and ionosphere. Consequently, ELF waves in this mode can travel around the earth without appreciable attenuation. A typical attenuation rate is .8 dB/Mm. This means that a 1 mV/m wave at the source will decrease to about .9 mV/m after traversing a million meters within the spherical wave guide. The frequency of resonance depends on the distance between the source

and receiver. ELF emissions are at times observed near 4 Hz to 9 Hz. They are so termed because of the difference between these frequencies and the fundamental Schumann frequencies at 8 Hz to 14 Hz.

These resonances as well as VLF waves originate primarily from thunderstorm activities in the active areas of equatorial Africa, south-east Asia, and in a belt running from southern North America to central South America. Increases of 25 Hz to 100 Hz waves, with 10 kHz to 25 kHz components have been correlated with peak thunderstorm activity in the Amazon Valley and Central Africa. The major sources for at least some areas can apparently shift, depending upon season.

The intensity and number of ELF waves and pulses show diurnal and seasonal variation. Konig (1974) noted that 8 Hz (Schumann) waves with magnetic and electric components of 10^{-5} A/m (10^{-6} gauss) and 1 mV/m, respectively, displayed amplitude peaks between 14:00 to 16:00 hr. local time and amplitude minima between 24:00 and 08:00 hr. Sudden relative increases occurred during the night period between 02:00 and 14:00 hrs. This variation was most pronounced during the summer months, during which time the peak magnitude was 3 to 10 times that of the intensity of the minima. Dampen values are only 0.5 dB/1000 Km in air. Pulses of 3 kHz to 50 kHz waves of .01 to .2 V/m exhibit a maximum between 23:00 and 07:00 hr. with a minimum between 10:00 and 16:00 hr. during January

through March. A second maximum occurred during May to August at 14:00 to 16:00 hr. with a minimum at 08:00 hr. The number of impulses rapidly increased in May and June, with a maximum in August. Reception frequency also seems to follow a day-night change. Attenuation for 50 Hz to 300 Hz waves is less at night than during the day. The exact value of attenuation depends strongly upon the local magnetic field dip angle. At night W-E propagation shows less attenuation than E-W propagation. However N-S and S-N directions still show the greatest field strengths.

ELF phenomena associated with disturbances in the earth's magnetic field (geomagnetic field) are often sinusoidal wave forms which occupy the frequency range from 3.5 Hz to 0.15 Hz and are often called pearls, hydromagnetic (hm) emissions, or pc 1 (continuous pulsations). On the average, these events last about 35 min. with amplitudes quite small, rarely exceeding a gamma (10^{-5} gauss). Waves in the outer magnetosphere often show higher intensities (3 to 8 gamma). Diurnal variations are apparent, but no seasonal periodicities have been noticed. It has been suggested that geomagnetic micropulsations originate from hydromagnetic waves in the magnetosphere which propagate down the earth's flux lines to the surface. Hm waves apparently originate from solar plasma-induced disturbances in the outer magnetosphere and are affected by varying refractive indices of the ionosphere and magnetosphere following local changes in current-carrying regions. Local disturbances in

the earth's magnetic field can reach as high as 10^{-2} gauss.

Several experimenters have shown a correlation between weather conditions and ELF electromagnetic waves and pulses.

Konig (1974) noticed that, unlike the 9 Hz waves (Type I) associated with strong lightning, 2 Hz to 6 Hz waves (Type II) were top-waved and were connected with rain and heavy, deep lying clouds. These frequencies did not show diurnal variation and were observed sometimes for hours with pulse intensities up to 0.1 V/m. Frequencies of 0.5 Hz to 3 Hz (Type III) were recorded with sinusoidal wave patterns, but their origin was unclear. Local lightning strokes were also recorded as impulses with about a half-second duration from trough to trough. During sunrise a unique 9 Hz wave which was later dominated by a 3 Hz to 4 Hz band occurred. During stable weather conditions, ELF pulse frequencies of 1 Hz to 3 Hz superimposed upon a 10 kHz carrier wave have been demonstrated. Local unstable weather conditions, such as the close passage of a cold or warm front, result in marked increases in the incidence of 30 Hz to 100 Hz pulse frequencies superimposed upon a 10 kHz to 100 kHz carrier. The latter fields varied from .01 to .1 V/m, and were propagated with retention of appreciable strength from 10 km to 100 km from the frontal or low pressure turbulence system. The lower end of the ELF band (3 Hz) may show greater weather specificity. An increase in this band's power spectrum occurs during cold front passages and labilization processes but a decrease

occurs during warm front passages, upgliding processes and influxes of subtropical air masses in the higher levels of the atmosphere. Wave patterns near the source area favor impulse cascades and statistical fluctuations in the contrast to a nearly constant frequency series for very distant sources, in which case the lower ELF resonances are more pronounced. In some areas the pulse frequency might vary from 100 Hz down to .01 Hz. Local factors can also influence the incident frequency and intensity of ELF fields. These include local water level, mineral content, topography and altitude. Gains as high as 60 db (e.g., from 1 mV/m to 1V/m) between water-poor valleys and higher plains with underground water sources have been reported. Changes of this magnitude have even been recorded between two points 100 m apart, a marked local variation.

Two other possible sources of ELF fields have been suggested. Defective electrical fixtures, such as a fluorescent lamp, can produce ELF pulses up to 1 V/m. These disturbances along with normal household electrical variations may summate with ambient natural ELF which enter the house via telephone and power lines. During earthquakes, seismoelectric effects in areas of high quartz concentration could result in ELF wave generation, with frequencies ranging from 10 Hz to well below 1 Hz and a spectral maximum near 1.5 Hz (Finkelstein & Powell, 1970). The seismic wave would provide an effective 1 km^3 antenna carrying a current of 1 A to 10 A at the spectral maximum. Any electromagnetic radiation from

1.5 Hz waves would, according to calculation, be of low power, although higher frequency transients could be more intense. With seismic stress changes of 10 to 100 bars, potential differences of 10^6 V/m could occur locally and produce bright luminosities or fluorescence in light fixtures.

ELF as Biological Stimuli

ELF electromagnetic fields may be important biological stimuli because of their penetrability and long range of propagation. In addition, their frequency and intensities are within the magnitude and range of living organisms. Compared to other meteorogenic stimuli, ELF-waves and charged ions have the greater capacity to penetrate the microclimate of the average house. Faraday cages, which can significantly shield out radio frequencies, have minimal effect on the ELF band. The transparency of brick-houses to 10 kHz ELF pulse carriers is about 95% of 100 mV/m while a large Faraday cage of 1-mm iron wire with 30-mm mesh-width is about 65%. A bunker, on the other hand, constructed of 60-cm of concrete shows a transparency of less than 1% at these frequencies. Lower frequencies and longer wavelengths would of course have greater penetrability, especially with respect to the magnetic component. Such lower frequencies would be characteristic of waves from more distant energy sources, typically from labile weather fronts two

or three days away. Consequently the living organism, even in housing, would be exposed to ELF pulses and waves from both distant and proximal sources.

ELF pulse frequencies and waves occur in the wave band of many electrical processes in mammals. Individual neural activity can occur between 100 Hz and 1000 Hz, while electrical activity in large areas of the brain (the EEG) ranges from about 1 Hz to over 50 Hz. Striking similarity in wave form and frequency between ambient Type I (10 Hz) ELF waves and the human alpha pattern and type II (3 Hz to 5 Hz) waves and delta-wave patterns have been mentioned. Changes in EEG frequencies have long been associated with modifications of subjective behaviours, including "consciousness". The possible influence of alpha frequency electromagnetic fields on alpha rhythm-related behaviour has been a major impetus for preliminary work in this area. Also in the ELF range are the d.c. or slow potentials of the brain which vary from less than .01 Hz to about a 1 Hz and have been implicated as important correlates for learning and storage of information. Even the micro-vibrations of the musculature of human organisms occur in this waveband, especially between 4 Hz to 12 Hz.

Biological effects

The behavioural and biological effects of experimentally

produced ELF fields are promising but no topic theory has been tested. This could be due in part to the many sources which are used to artificially simulate natural ELF signals. Apparatus which utilize rotating magnets to coils with pulsating currents have been employed. The ELF frequencies have been produced as synchronous slow wave-like signals or as short duration bursts. Quite logically, from what we know of other phenomena (e.g., ionizing radiation), the stimulus characteristics and sources of environmental energies are of crucial importance. Despite these limitations, a few general statements can be made. Prenatal and adult exposure to ELF fields of greater than normal intensities has been reported to be associated with autonomic changes. Non-human animals exposed to these fields showed greater emotional behaviours, endocrine involvement, and deviations in oxygen uptake. Human subjects have been known to complain of uneasiness, depression, and "foreboding" feelings when such fields are applied. Frey (1962) and Constant (1967) have separately reported that human subjects can "hear" radio frequency electromagnetic fields presented in short bursts with ELF range. Power densities were within the milliwatt range, intensities which are available in nature from commercial stations. Subjects presented with these pulsed radio frequencies reported sensations of "buzzing", "pins-and-needles" or dizziness. The exact report varied from person to person.

How such low energies from natural ELF field-waves could

affect the organism, let alone carry specific information, is not clear. There is no simple mechanism to explain an interaction with biological forms, if it does exist. Some type of special frequency and intensity specificity must exist in the organism's susceptibility to the environment. The situation would be analogous to the lock and key theory of drug interactions. Only, ambient natural electromagnetic signals must have the appropriate "frequency and intensity key" before the lock is opened and the organism responds. Frequency specificity has been demonstrated with ELF fields in the lab. Amplification of effects due to optimal natural level intensities remains to be verified. It is interesting that the electrical and magnetic components of the brain and heart are within the same orders of magnitude as naturally occurring ELF fields.

That life forms may show some type of frequency and intensity "key-hole" effect, has been suggested by the experiments of Brown and Rocard. Brown (1963) found that orientations of snails was maximally affected by magnetic field intensities similar to natural levels. Higher than normal intensities were not effective. Rocard (1964) demonstrated that individuals labeled as "dowsers" could detect very small variations in magnetic field gradients. Gradients as small as .01 gauss per meter were reportedly detectable by these people even in situations of experimental simulation. Such intensity fluctuations can occur during short time intervals or over subterranean conductive areas.

T-C type phenomena. In order for a physical phenomena to become eligible as a possible candidate for the basis of unusual verbal behaviour (paranormal experiences), variations in its characteristics should parallel variations in the verbal behaviour. The variables in which comparisons can be made include diurnal and seasonal variations.

Previous data demonstrate that T-C and apparitional experiences were reported to have occurred between 10:00 p.m. and 4:00 a.m., local time. Apparitional reports showed a secondary peak between 2:00 p.m. and 4:00 p.m. ELF pulses from VLF carriers show a marked similarity to this distribution. Peaks occur between 11:00 p.m. and 7:00 a.m. local time during the early winter months. During the summer a second peak occurs between 2:00 p.m. and 4:00 p.m. with a minimum at 8:00 a.m. Alpha-like frequencies of 8 Hz show sudden peaks between 2:00 a.m. and 4:00 a.m. as well as 12 hours later. These effects are no doubt related to daily fluctuations in the electric gradient of the atmosphere. Minimum voltage gradients occur between midnight and the early morning hours while the maximum gradients take place during the day.

Like T-C reports, the seasonal distribution of ELF pulses is a predominately summer phenomena. Sudden increases in these pulses occur around May or June with a maximum in August. Minimums

occur during the winter months. Phase shifting in peak pulses may occur along geographical latitudes in parallel with seasonal changes. ELF fields were reported to be heavily dependent upon the local magnetic dip angle of the earth's magnetic field. This was not surprising since ELF propagation is heavily flux-line dependent. Consequently increases in ELF signals should be inversely related to the disturbance in the magnetic fields. As the amount of magnetic field disturbance or magnetic storminess goes up, the number of normally propagated signals should go down. Data support this conclusion.

Similarly, if T-C experiences are in some way related to ELF pulses, the experience time should also be inversely related to magnetic storminess. To use a figurative statement, the greater the magnetic storminess of the earth (e.g., due to solar disturbances), the more interference with the paranormal signals associated with ELF propagation. Figure 3 illustrates the monthly variation of T-C reports (The Paranormal Part I: Patterns) in comparison with a geomagnetic storm index derived from data reported by Russel and McPherron (1973). The inverse relation is apparent. The correlation coefficient between the two variables is -.58, a value that is statistically significant ($p < .05$). The practical significance remains to be verified.

Reports also indicated, that if artifactual interactions were not responsible, some attenuating factor was involved. Most

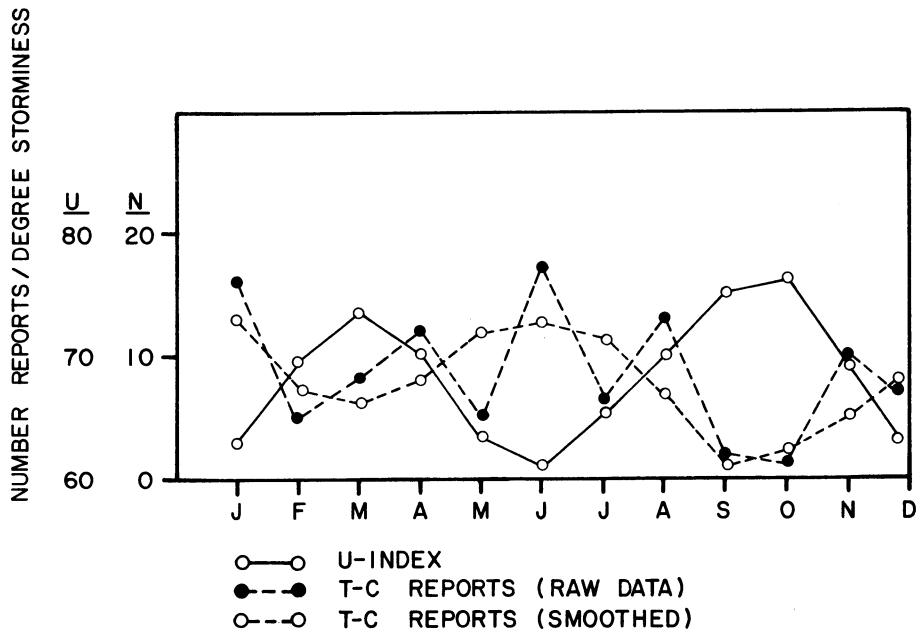


Figure 3. Fluctuations in numbers of telepathy clairvoyance (T-C) experiences reported to occur during various months of the year (●---●). A smoothed-best fit curve for monthly variations in the raw data is also presented (○---○). Global geomagnetic disturbances as measured by the U-index for active years averaged over the years 1872-1930 is also drawn for various months of the year (○—○).

of the cases involved distances of 100 miles or less between the agent and percipient. Locally generated ELF waves from weather sources show similar attenuating factors within a 100 mile radius of the source. However those frequencies which become incorporated into more conductive ducts can travel via the Schumann resonance wave guide to great distances. Such properties are essential prerequisites for any T-C related carrier.

Working backwards, the pilot data (see The Paranormal Part I: Patterns) suggests a directional bias in the compass distribution of the agent and percipient. West-east orientations of the agent and percipient, respectively, in this study showed a heavy loading. If the ELF hypothesis is valid, then propagation directionality preferences should be seen in ELF fields. The data are confirmatory. North-south propagation of ELF fields shows the strongest signal properties by factors of 3 to 12 over E-W or W-E directions. The position of the transmitter in either the southern or northern position does not seem to be a critical factor for night or day propagation. Nocturnal signals are still stronger. However E-W propagation does show a marked variation as a function of transmitter-receiver relations. Signals transmitted from the west (transmitter) towards the east (receiver) are three to ten times stronger than signals propagated in the opposite direction. Again, overall E-W, W-E propagated signals are stronger at night than during the day by at least a hundred percent. Theoretically, the

N-S direction of agent-percipient orientation should have had the greatest absolute number of T-C cases. The W-E/E-W peculiarity would then be secondary. Explanations for this discrepancy are not forthcoming.

Predictions by an ELF model for T-C related events. If ELF fields are involved with T-C type cases, then a number of predictions can be made. First of all, ELF waves show propagational preferences dependent upon local conductive features and geomagnetic distortions. Prediction 1: the geographical distribution of people reporting T-C experiences should reflect propagation patterns of ELF fields. In other words, T-C reporters should not be homogeneously distributed. Areas with higher relative dip angles should show increased T-C reports. Second, ELF waves can be within the range of the alpha and theta rhythms of the human brain. Prediction 2: people with dominant alpha-theta rhythms during night hours which are similar to local Schumann resonance values, show higher frequencies of T-C reports. This should occur probabilistically since these people would be in a susceptible condition more often. Third, ELF fields can act as zeitgebers for biological activity. Prediction 3: Electrical patterns of brains in individuals whose alpha patterns show marked range variability (plasticity) and hence are capable of being driven by external oscillating fields, should be able to resonate with these fields and consequently able to absorb energy from them. This ability would be facilitated by an

optimal relationship between the brain-spinal cord axis and local geomagnetic vectors.

An ELF model for precognition. References have been made to recent work by Finkelstein and Powell who indicated that large electrical voltages are built up around stress areas before seismic events. Anecdotal evidence indicate that high voltage gradients may occur even in areas where full-blown seismic activity does not materialize. Similar build ups occur during electrical storms.

Of the 128 case reports that were classified as "precognitive", 23% dealt with some situation where a person saved his own life by heeding some "hunch" in time to avoid a potentially deadly event such as a bridge collapse, earthquake or lightning discharge. In more than 60% of these cases, the event occurred within seconds or minutes of the avoidance movement. These behaviours may well have been initiated by the electrical build up before the leader stroke, or ELF propagation before earth-seismic fractures. Parenthetically, a frequent "wife's tale" relates how zoo animals act peculiarly a few seconds to hours before a large seismic occurrence. Electromagnetic prodromes to massive natural discharges could well be the stimulus of the behavioural change.

Since there was little seasonal variation found with pre-cognitive events, other modes are suggested relative to T-C types. The data imply that correlative ELF stimuli are more event-related, which may or may not show seasonal variation. Alternatively, other

mechanisms may be involved with precognitive cases such that any seasonal effects from an ELF-related mechanism would be obscured. Other mechanisms operationally seem more feasible in events concerned with deaths/crises in close human proximity (spouses, immediate family, etc.). For public behaviours, such as airplane crashes, attention should be paid to more global factors in the geomagnetic fields that could induce both the event and the so-called "precognitive experience" before the event.

Environmental-Individual Resonance. One of the most interesting reports by the Soviet parapsychologists (see Ostrander and Schraeder, 1971) was the increases in voltage output from the brains of certain people during spontaneous object movements. No doubt just the observation that the objects moved in the presence of a human being without apparent contact, is impressive. But to the scientist and theorist, the observation that when the objects moved there was a marked increase in the medium's electrocortical output, is an experimental handle. The spectra profiles of these "power bursts" were about 8 Hz, very near the local Schumann resonance. Two questions can be immediately posited. When the objects moved and the sudden power output from the medium's brain occurred, was the power source within the brain or was the brain only absorbing energy from the environment? Is the high amplitude 8 Hz frequency band from the brains of foci for poltergeist occurrences an indi-

cation of resonance (Palmer, 1974)?

From the assumption that some resonance is taking place between the environment and the percipient of a paranormal experience, predictions and experimental manipulations are possible. First those people whose brain (EEG) spectral profiles show bimodal distributions (during dreaming or awake) of about 8 Hz and 14 Hz (the first and second harmonic of the Schumann resonance), should report paranormal experiences more frequently. Biological conditions which adjust the power output of the brain to peak around the frequencies of the neighboring Schumann resonance, should also increase paranormal experience reports. Some metabolic conditions, e.g., thyroid abnormalities, aging and psychotic disorders would be important contributory factors.

It has been mentioned that people with high alpha abundance report psi experiences more than people with low alpha abundance. This relationship may only indicate perceptual or interpretation problems of unusual experiences since high alpha activity is also associated with greater hypnotic susceptibility. However it is important to point out, that unlike low alpha subjects, subjects with high alpha abundance showed enhanced spectral profiles between 7 Hz to 9.5 Hz when awake and peaks at 7 Hz to 9 Hz and 13 Hz during REM (dream) sleep (Johnson, 1973). During hypnotic trance induction, increases in electrical output are observed in the 9 Hz band of the brain (Ulett, Akpinar & Ittl, 1972).

"Good" hypnotic subjects display power decreases between 1 Hz to 7 Hz, but increases in frequency bands between 7.5 Hz to 13 Hz and 13 Hz to 20 Hz. Consequently if a resonance mechanism between the environment and the human organism did exist, high alpha people during dream or similar conditions would have the greatest chance of interaction.

Limitations of the Candidate. ELF-EM fields may meet the criteria for a transmitter candidate, but there are still conceptual difficulties regarding the means by which psychophysiological changes of the agent during the psi-precipitating event (as in "telepathy") can influence the ambient ELF-EM field-waves and consequently affect the percipient. A type of modulation must be expected. ELF-EM waves passing through or near the agent must be changed in some manner that is familiar to the percipient. Again, the importance of shared conditioning histories between the agent and percipient would be a fundamental prerequisite so that the percipient has been previously exposed to ELF-EM mediated changes from the agent.

Discrimination by the percipient of the agent's signal would involve a complex series of interactions. The accuracy or probability of detection of the agent's signal would certainly depend upon how closely the percipient's electrical changes are commensurate with the ambient signal. Since only a finite number of discriminable stimulus patterns can exist in an extremely large population, occasional paranormal situations may involve percipients

responding to agents who were not a part of the immediate family but do share (due to chance) similarities in stimulus pattern. Explanations and mechanisms of how this might take place and the consequences expected have been discussed earlier.

Another conceptual problem of paranormal stimulus detection is how the information could filter effectively into the immediate area of the percipient. Such dynamics require the limited number of ELF signals modulated by the small spatial area of the agent's body and periphery to concentrate near the percipient. A mechanism for focusing of signal waves into the percipient's geographical area would be mandatory. For psi-communication to occur in this manner either (1) precise alignment between agent and percipient (along the same ELF magnetic field guidelines) or (2) a large area that focuses ELF waves in the agent's immediate vicinity, would be required.

Infrasonic Stimuli

The corresponding ELF phenomena which are a segment of the mechanical vibration spectrum have been termed infrasound. Until 1960 very little was known about this possible candidate.

Physical characteristics. Infrasound includes by definition those sonic vibrations below the normal audible threshold. Typical periods of natural infrasound range from 4 to 20 seconds

(0.25 Hz to 0.05 Hz) while some waves reach near audible levels (0.1 second or 10 Hz). Precise frequency bands often reflect source types. Intensities of infrasound waves seldom exceed 50 dynes/cm² (Cook and Young, 1962), and consequently their measurement can be masked by irregularly fluctuating winds that can attain values of 500 dynes/cm² at 15 to 25 mph. Exceptions do exist, and when Krakatoa exploded in 1883, infrasound traveled around the world several times (Cook, 1962). Infrasound has the same propagation speed as audible sound, about 344 m/sec at 20 degrees C., yet has marked penetrability for objects in its path.

Infrasound propagation has been associated with distant tornadoes, volcanoes, earthquakes and magnetic storms. Because of their low frequency, infrasonic waves in air can travel 100s of kms with little attenuation. Infrasound associated with magnetic storms on the earth show interesting directional preferences from the north-east during the evening, north about midnight and north-west by early morning. Cook and Young (1962) have proposed the existence of a diffuse ELF sound source fixed in geomagnetic coordinates on the side of the earth opposite the sun. This would mean that about one quarter of the globe is simultaneously bathed in acoustic pressures of about 1 dyne/cm².

Behavioural-biological effects. Behavioural effects at intensities approximating orders of magnitude to nature sources have not been clearly demonstrated, although eels may use micro-

seismic range signals as migration cues. At higher amplitude frequencies between 5 Hz and 10 Hz subjects report sensations described as body motions while others experience visual effects. Lower frequencies can induce feelings of apprehension, nausea or dizziness (Stephens, 1969). Infrasound has been implicated in human experiences of depression and fatigue as well as headaches (Gavreau, 1968). Gavreau (1968) noted that ordinary man-made sources (e.g., defective air conditioners, fans) may produce similar effects, especially when the power output approached 1 watt. These sources could mask or accentuate effects produced by natural infrasonic stimuli. Significant correlations between natural infrasonic levels and traffic accident rates and school absenteeism have been reported by Green and Dunn (1968).

Possible contribution to paranormal experiences. Because of the instrumentation difficulties of infrasound detection, little public data has been available for comparison with reports of paranormal experiences. Infrasound, however, is an excellent candidate for at least some types of experiences, specifically those which involve the avoidance or detection of tornadoes, earthquakes, earth movements and other geophysical energies that involve low frequency mechanical vibration. One persistent tale that occurs in the popular literature is the peculiar behaviour of animals before major seismic events. Usually, such behaviours are apparent from a few minutes to an hour before the first shock. Out of the 128 cases

classified as "precognitive" for The Paranormal Part I: Patterns, 23% dealt with some situation where the person presumably saved his own life by heeding some "hunch". In more than 60% of these cases the event occurred within seconds or minutes of the avoidance behaviour. Could infrasound have been the stimulus that evoked the sensation that these people labeled as a "hunch"?

In this context, the ideas and concepts developed by Finkelstein and Powell (e.g., 1973), may have important application for some types of paranormal experiences. Attempting to understand the mechanisms involved with luminescences and lights which occur often before major earthquakes, they have calculated that values of up to 10^5 V/m may exist in stress zone areas. The exact voltage values depend upon local quartz concentrations, the intensity and direction of the stress and the temporal characteristics of the accumulating stress. Seismic waves could produce an effective 1 km^3 antenna carrying a current 1 A to 10 A at the spectral maximum which usually peaks around 1.5 Hz, with important contributions from frequencies between 1 Hz to 10 Hz. Since stresses of only 10-100 bars are sufficient to produce significant voltages, stimuli from slowly accumulating pressures could be available to the susceptible subject for some days in advance. Detection (e.g., an anxious dream response), of the geophysical stimulus before the objective event (e.g., an earthquake), occurs sometimes later when stresses have reached fracturing intensities, would then be

misinterpreted as an example of "seeing into the future".

Limitations of the candidate. As with ELF-EM fields one fundamental problem is involved with the dynamics by which weak ambient infrasonic waves interact with the body. It is unlikely that the ear directly responds to infrasound since Von Bekesy has calculated that pressures of 2000 dyne/cm² at 1 Hz are required for threshold values. A clue, perhaps can be gleaned by the experimental data. The human body vibrates between 4 Hz and 12 Hz with amplitudes of 10 μ ; under muscle tension the vibration amplitude increases to 50 μ . Rohracher (1955) has reported that these vibrations continue for about an hour after death and may normally increase their frequency or amplitude during fever, menstruation and other temperature-related changes in the human body. Most physical structures have a "natural frequency", which if approximated, can initiate positive feedback sequences that result in system destruction. Sustained external oscillations at natural frequencies of a system allow energy transfer to take place. If the oscillations are not damped or the energy dissipated, less plastic systems begin to collapse. Most experimenters agree that the "natural frequency" of the skeletal musculature exists in the Rohracher vibration range.

Weak infrasonic oscillations from ambient sources may not be sufficient to elicit full-blown symptoms but could evoke responses of a less severe nature. One of the most interesting

qualities of some categories for telepathy-clairvoyant or precognitive (depending on the time reference) experiences involved with natural physical events, is the lack of specificity in experience content. Reporters of these experiences do not say that they felt an earthquake coming, or a tornado nearby or the hill on the right side of the house about to collapse. Instead the reports include statements like "feelings of foreboding", "depression" or "impending doom". Verbal descriptions of these type are used to refer to the effects of diffuse autonomic stimuli which do not have the stimulus specificity to evoke specific responses of "content awareness" or more detailed images in the brain. These experiences can be so unpleasant that the person leaves the area before the possible lethal event takes place. In other words, inherent properties of the infrasound stimuli themselves are of sufficient quality to evoke an avoidance response in the subject. Experiments by Wike and Wike (1972) indicate that low frequency stimulation is aversive to rats since they will learn to select levers which terminate the vibration. The most conspicuous limitation of the infrasound candidate becomes apparent when living stimuli are the presumed agents. Although ambient infrasound might be available in the agent's immediate environment, it is difficult to see how any modulation by the agent would take place.

High voltage static fields

The coincidental occurrence of electrical storms during paranormal experiences has been a predominate theme in the popular literature. No doubt any reference to thunder and lightning may only reflect the significant psychological effects from the intensive and unpredictable auditory and visual stimulus presentations. However one concomitant of electrical storms, high voltage gradients, is of importance to psi-transmission models.

Sources. Electrical gradients from meteorological sources vary greatly in intensity. Normal gradients display values of only 115-140 V/m, with the larger voltage at the greater height. The existence of a positive potential gradient indicates the presence of a negative charge on the ground. During land rain the gradient is mainly negative while during thunderstorms there are larger fluctuations between positive and negative values. Tromp (1963) notes that values of up to 10,000 V/m have been recorded during violent electrical storms. Snow fall is accompanied by high positive and negative potential gradients also, while during fog conditions more stable potentials of up to 2000 V/m can be accomplished. The other major source of high voltage gradients, piezoelectric effects from seismic stress areas, has been mentioned. High static electric fields would show no essential propagation per se. Penetration would be possible where the field surface is much larger

than the area to be penetrated. Alternatively, electrostatic effects could be mediated through conductive materials (e.g., telephone lines, power lines) that penetrate dwelling structures.

Biological-behavioural effects. Anecdotal observations indicate activity changes of many species before thunderstorms (Altmann, 1969). Biometeorologists have reported correlational studies that indicate feelings of depression, uneasiness, restlessness and similar aversive autonomic experiences can precede approaching storm situations. At times the visual cues of cloud collection and decreases in sunlight do not accompany transient increases in electrostatic gradients, but the behavioural experiences of people exposed to these environments are similar. Human subjects exposed to gradients in the laboratory report comparable experiences.

Relevance to Paranormal experience. Effects of ambient electrostatic or biofrequency fields upon the human electrical systems have important implications for parapsychological research. For some decades now, a handful of men like Ravitz (1962) and Burr (1972) have been emphasizing the pervasive role of low intensity bioelectrostatic fields in life forms. Burr implicated bioelectrostatic fields associated with the organism as "blueprints" for developing fetal systems.

Biofields may also be more sensitive indicators of complex

cerebral phenomena than conventional tools. Ravitz (1962) noted that during hypnosis there was a decrease in the steady potential between the head and chest, yet no variation on the EEG records. More recent data by Friedman and Taub (1969) indicate that "attentiveness" as measured by reaction time is strongly related to shifts in the head potential polarities. Other experiments by Ravitz (1962) indicated that high intensity configurations of opposite than normal polarities occur during adolescence and that emotionally unstable patients showed the greatest variations in not only intensities but dominant polarities.

These fascinating data lead to many questions. How stable is the steady potential system of the body? Can polarity reversals or intensities of the d.c. system be influenced when the subject is exposed to high intensity static fields created in nature? Such an occurrence may not only affect the subject's ability to attend to usual environmental stimuli, but modify his suggestibility to relatively bland events. A person might, under these conditions, perceive a normal object in completely different context. He might experience a normal dream as a "real experience". Interestingly, one of the most electrically unstable portion of the brain (the hippocampus), is the very structure which would allow a rich series of images and memories to be experienced.

That vivid and extremely real images can be elicited artificially in the brain has been known since the classic studies of

smaller and lighter ones. The amount of potential energy is more or less constant and dependent upon deformation properties of the piezoelectric material under stress. Consequently, the amount of kinetic energy displayed within an event should be similar across events. This would mean that whereas a glass may move across the room, a chair may only tip over. The Roll data (e.g., Roll, Burdick and Joines, 1973) could fit such a model.

Certain paranormal phenomena like haunts and poltergeists share an interesting property with the high voltage ambient fields discussed here: both are transients. Both haunts and poltergeist events are remarkably short-termed in a particular manifestation. The number of haunt episodes can be frequent but seem aperiodic. Poltergeists, on the other hand, usually last a few weeks with events cascading as the termination approaches. Geophysical models would predict that areas of classical haunts reflect spatial locations of maintained seismic strain with minor variations in intensity, while poltergeist occurrences indicate rapidly accumulating pressures that are either attenuated or relieved in a short time. Such speculation could be empirically verified.

With an assumption that transient, ambient high voltage fields are in some systematic way related to paranormal kinetic and visual phenomena, predictions can be made for probable spatial locations of occurrence. Areas with the appropriate mineral and topographic architecture can be readily discerned with the massive

amount of geophysical information that has been routinely collected over North America for decades. Areas adjacent to conductive areas or current sources like some underground streams would be one probable locus. Surface areas near the crescents of hills which have underlying rock alignment at angles capable of producing geometries that facilitate coronal-like discharges would be another. As stresses across a crustal block increased, these areas would be proportionally affected. The particular objects affected would be predominately dielectrics and the direction of movement would depend upon vectorial features of the field.

An Environmental Peltier Effect

Whereas ionization of the air from high seismoelectric sources might produce diffuse glowing or other kinetic phenomena, more specific physical paradigms could produce other effects. An example of a hypothetical Peltier condition in nature is shown in Figure 4. Peltier cooling is easily demonstrated in the lab. For this effect to take place a thermoelectric material must exist between two conductive layers such that the only contact (junctions) between the two conductive layers is by the thermoelectric material. The material would have to be a substance like manganese silicate. Close contact between the upper conductive plate and the foundation of the house would be an important factor.

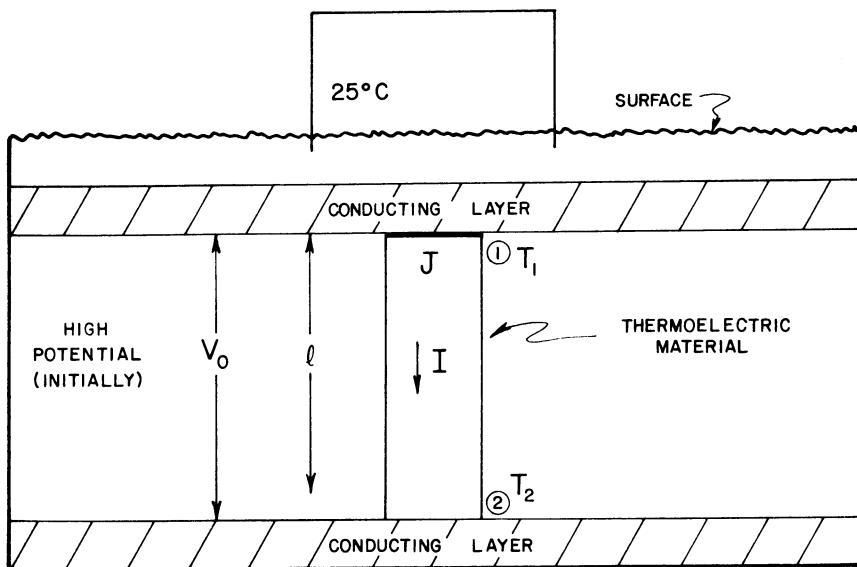


Figure 4. Possible Peltier condition beneath a house when conducting layers are separated by a thermoelectric material J of length l where a current flows for some time t after an initial high voltage V_0 .

In classical parapsychology cold spots or cold breezes shortly before or during a haunt episode is reported. If, following a voltage increase between the two conductive layers (plates) in Figure 4, a current was generated, then heat could be removed for a short time from the junction. The cooling would be facilitated in situations where the foundation was in good contact with the plate.

With this model, a number of predictions arise. First, older houses whose (deeper) foundations over the years have fused with the upper conductive layer (greater contact) should more frequently be associated with haunt experiences. This does not mean newer houses would be excluded, since the critical feature would still be the degree of foundation-plate contact.

Secondly, proportionally more cooling episodes should be experienced proximally to the conductive layer, such as in the basement or first floor areas. Noticeable effects in hallways would be artifactually related since the limited gas volume would have less access to heat compensation from adjacent areas of the house.

Third, the phenomena would by necessity be transient in most cases since the current source would be depleted once the voltage had discharged. Orders of phenomena time between one to 10 minutes would be expected. It is not possible to predict the periodicity of the occurrence unless information is known about

the voltage source. If the source is due to piezoelectric factors from seismic strain, the occurrence of the phenomena should be coupled with the increasing and decreasing strain. Consequently the phenomena might be (apparently) aperiodic but frequent. On the other hand, if the plates were charged from atmospheric electricity changes, as before thunderstorms, the phenomena would only occur during these intervals. It is important to point out that high gradient conditions are not characteristic of only thunderstorms.

The long term duration of the phenomena would also reflect local geoarchitectural and geochemical construction. Some areas are notorious for their unusual "haunt-related" events, with stories that traverse several centuries. In many earthquake regions the cyclicities of peak and trough activity may span centuries, which indicates that the fluctuations in phenomena reports merely reflect changing seismic stress conditions. Where the Peltier plates are charged by transient meteorological conditions, the reports over a long time interval would be more or less constant.

Since the sub-surface characteristics of the phenomena area are important, one would expect proportionally more haunt-type reports to occur in houses on tops of hills or proximal to under-water streams. Houses situated on hills or on sharp rises from the dominant local altitude could be influenced by coronal-like discharges. Consequently the voltage source would vary according to

induction from the coronal source. Current sources might also be tapped from local streams, which are generally good sources of clay potentials.

Other phenomena. Under slightly different conditions, a Peltier-type paradigm could result in the production of heat at the junction. A frequent, although unverified, report of "haunted houses" is that they are destroyed by fire. Conditions similar to those which produce cooling on the one hand could also produce heat energy in another instance. The key factor lies in the vectorial configuration of the current. Why cooling would take precedence over heating or vice versa is not clear.

Analogies are often the plague of new knowledge. However there are multiple comparisons between the glowing blobs of haunt experiences and the glowing blobs of "ball lightning". If, in the Peltier mechanism, a voltage built up but there was no current flow (voltage reduction), then local ionization of the air would occur. People in the observable area would perceive this stimulus as a function of a number of expectancy factors. Ball lightning has been reported to "come through glass windows", appear through doors and even to follow or approach the observer. Although the actual pathway of this electrical phenomena is dependent upon local conductivity values, the observer, who is also an electrical conductor and voltage source, interprets the movement of the lightning ball in anthropomorphic terminology. He might even report that the

"lightning attacked and try to kill him". The similarity between ball lightning behaviour and the reported patterns of glowing haunt phenomena suggest an important electrical similarity.

In haunt situations, it is traditionally assumed that the phenomena occur within a certain area because of "death-related" events which occurred in the vicinity. From the above model, the space-dependent property of haunt phenomena would only reflect the location of the sub-surface mechanism. The death association would be purely a spurious (psychological) relation. The precise spatial boundaries of the phenomena would be difficult to determine because of visual limitations by the reporters. Observers of haunt phenomena, e.g., an apparition or glowing light, perceive the stimulus only within the confines of the room. As the light source moves spatially, due to the changing flow of the sub-surface currents, the human observer perceives the "apparition" as "walking through the wall". Similarly, it would be expected that the spatial area of haunt phenomena would not be strictly located within the house. Depending upon the location of the mechanism, haunt phenomena may also occur outside the house. There is no reason to assume that the spatial area of a physical phenomena should be confined to the psychological boundaries of walls and rooms.

The observer, not having all relevant data in the above situations would make erroneous deductions. The conclusions of

humans are often confounded by emotional episodes from a single, unrelated traumatic event and by correlated but directly unrelated events. An alternative to the traditional statement that haunt phenomena are related to a previous death is that both are caused by a third factor. In other words, an area in which haunts are generated is also likely to increase death probabilities in the people living within the area also. The naive observer, not aware of the third variable, would conclude death -- a much more traumatic reinforcer -- is the real cause to the haunt.

Similarities of UFO experiences. In the last two decades, patterns in UFO reports are demonstrating many similarities with paranormal physical phenomena. "Glows of light" in a corn field, glowing blue balls near the top of mountains and similar luminosities are now considered examples of UFO occurrences. Historically, these same places may have been called the "resting place of a great chief's soul" by Indians, "dragon lines" by the Chinese, or just plain "taboo" areas. Before the understanding of electromagnetism in the western culture, the average human would have neither the intellectual equipment nor the apparatus to detect any electromagnetic correlate of UFO occurrences. Now, however, there are machines that require continuous electrical support. When alterations in the energy source takes place due to UFO appearances, there are many indirect measurement.

UFO flaps can be regarded in many respects as a large area

haunt. Whereas the mechanisms for haunt phenomena are usually contained, the mechanism for a UFO flap are: (1) spread over a larger spatial area, and (2) short-termed. Preliminary data indicate that the flap areas are proximal to seismic areas showing changes (increases) in local strain levels. One area is the New Madrid fault region in Missouri, southern Illinois, Arkansas and Tennessee. Seismoelectric phenomena, from such large magnitude sources, could occur over large areas of a crustal block, and indeed include hundreds of square kilometers.

Electromagnetic disturbances often take form in sudden stopping of automobiles, light failures, disturbances on T.V., radios, and even electromagnetic burns or physiological damage to the observer. In situations where the UFO "lands" and humanoids emerge, frequently these humanoids "float across the ground" and engage in other behaviours typical of so-called apparitions. During UFO flaps it is not unusual to find increased reports of haunts within houses as well.

In paranormal and UFO reports, direct effects upon the observer by the phenomena-producing mechanism must be considered. If indeed high voltage fields are responsible for the apparitional, kinetic or UFO reports, then the subject exposed to these fields may experience direct effects upon the brain. People who have high abundance of alpha activity are also hypnotically more suggestible. Would situations which increase the alpha abundance increase

their suggestibility? Could the mechanism which produces the unpretentious glow, also distort the person's interpretation of what he is seeing. If he is from a culture which believes in ghosts, he sees a ghost; if he is from a culture which believes in dragons, he sees a dragon. Indeed, one of the most striking aspects of UFO and paranormal reports is the differences in reports by different people looking at, presumably, the same stimulus.

A parting note. The above physical mechanisms are only suggested. Even if predictions made from them are internally consistent, proof is far from being established. Similar phenomena must be reproduced in the laboratory. But the existence of such natural forces allows more palatable options than speculations on non-physical processes. To me, it would not be at all surprising if infrequently occurring natural physical peculiarities were the source for many of man's cherished unusual experiences.

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