III

BEYOND PARAPSYCHOLOGY

The following point should be made:

Phenomena evoked experimentally in telepathy and clairvoyance tests, even with subjects who are not particularly gifted, have proven statistically the existence of the psi faculty.

We have called these results paranormal, as they draw on latent faculties which have not been previously revealed and which seem to obey certain psychological, physiological and, perhaps, even physical constants.

Beyond these phenomena are others even more spectacular but which are apt to be more contested, which we should include in our discussion of the immense domain open to human investigation.

These are the spontaneous, rare and unusual cases which attract our attention. They imply extraordinary subjects, commonly known as "mediums." These phenomena surpass the paranormal ones which, as we have seen, run parallel to the normal conditions.

Phenomena such as the colors of the aura and ectoplasm seem to be outside of our purpose, as sight can participate directly in perceiving them; but we must stress the fact that they are visible only to certain eyes.

It is equally true that their conditions for appearing in often half-dark rooms can easily lead to fraud and trickery as Robert Tocquet has so well described, and their rarity implies that we should mistrust further the testimonies supporting them.

Nevertheless, most of the time these testimonies were *indisputable*, as they came from physiologists and famous physicists who had

studied certain great mediums and had applied strict laboratory techniques.

It seems rather unfair to eliminate, a priori, the testimonies of scientists who are admired for their discoveries in fields recognized by science and to reject their observations derived from other experiments made in the same seriousness, under the pretext that these concern phenomena going beyond our present understanding.

There even more so exists a transition between paranormal phenomena and those that go beyond, just as there exists a transition between ordinary synesthesias and the paranormal phenomena we have studied.

Our present investigation will not extend from the vision of invisible colors, as those of the aura, up to the projection of colors which can be materialized. Starting from sensory transpositions, this brings us to the actual research into dermo-optic sensitivity in which the scientific explanation underlines the fact that we have passed beyond parapsychology.

I. *Sensory Transpositions*

Let us say a few words first on *sensory transpositions*. In discussing them, the expression "paroptic perception" is also used, by which we understand vision by means of other intermediaries than sight, such as the top of the head, the hands, etc.[10]

These transpositions are—and rightly so—considered as far above the normal. But we can readily see that they can be evoked and even explained. One is able to develop them in selected subjects.

In other words, in certain privileged cases objective colors could be perceived by means other than by the usual optical channels. Such cases have already been related to us from the 19th century and are considered as a transfer of vision from one sense to another: for example, to the sense of touch, which explains the term "sensory transposition."

As these phenomena could be evoked especially by hypnosis, Jules Romains considered that hypnosis did nothing else but put into evidence a capacity inherent in all human beings. He advanced the

10. We wish to stress here again the fact that these phenomena occur very rarely and depend on very particular physical and mental conditions. (We shall see later that training can evoke analogous phenomena with ordinary subjects, i.e., without any particular characteristics.)

hypothesis that there could well be a veritable paroptic sense which permits seeing without the eyes.

Similar observations were made, particularly in the USSR, indicating that there could exist not so much a vision proper but an induction of color by impressions comparable to those of touch. For this, the term "dermo-optic sensitivity" was created in the USSR.

1) *Spontaneous Cases in the United States and Britain*

Now, for further detail, we shall report certain facts which have been minutely described by Father Herbert Thurston in his book *Physical Phenomena of Mysticism.*

Miss Mollie Fancher, born in New York in 1848, after having finished her studies, did not leave her room for thirty years. An incurable invalid, she became completely blind and suffered from nervous disorders.

A number of witnesses swore that she could, just by touching, distinguish with infallible exactitude, the colors of wool for tapestry, of wax and other items she used in her work.

For a period of nine years, her right arm remained up in a rigid position bent in back of her head. She had retained some control of her thumb and index finger and, to be able to do her work of sewing and making aritficial flowers, she had to raise her healthy left arm to the height of her right hand up over her head.

When she selected a skein of wool and wanted to "see" it, she placed it behind the nape of her neck. A number of witnesses observed her and the reports made by Judge Abraham H. Dailey were confirmed by the attending physicians.

She was able to analyze all her impressions and her faculties seemed to be "natural." The attending physicians noted that for many years she consumed practically no food.

An oculist confirmed her blindness and stated that, day and night, her eyes were wide open without producing any tears or secretions. He found that neither her crystalline lens nor pupils reacted to anesthesia or light tests.

A friend of Miss Fancher, Professor Charles E. West, the director of an important seminary, also believed in the gifts of this "sincere and convinced Christian" whose "double sight" confirmed

her faith, rejecting thereby the popular explanation of a demoniac possession.

"She had," he wrote, "but one sense, that of touch. With that she could read much faster than with eyesight. This she did by running her fingers over the printed pages with equal ease in light or darkness. With her fingers, she could distinguish the photographs of persons, the faces of callers, etc."

As a point of interest, she "saw" and "read" with greater ease when the room was dark and the other people present had great difficulty in distinguishing the characters.

When asked how she was able to see, she always replied that she saw from the top of her head. The sharpness of her perception, however, did vary considerably according to the state of her health, the temperature and other factors. But this sensitivity was not uniquely due to hyperesthesia of touch since, according to one observer, all she had to do to know the time was to pass her hand over the crystal of her watch.

Dr. Henry Parkhurst, another observer, published in the New York *Herald* a report of a decisive controlled experiment into checking Miss Fancher's faculty to "see." A printed slip of paper, chosen at random without anyone knowing its contents, was handed to her in a carefully sealed envelope. She stated that the paper dealt with "Court." She then "read" that it contained the numerals "6, 2, 3, 4." The envelope, the seal of which was intact, contained an extract from a legal project. The word "court" was mentioned therein four times, and it contained the numerals 6, 2, 3, 4 and 5 and no others.

One could then conclude that there may exist a second "seeing faculty," independent of that of telepathy, the simple reading of minds.

Miss Fancher's purely paranormal faculties were also found to be highly developed. At a time when she was most sensitive, she was able to name the colors of objects which were, for example, in the pocket of another person and which witnesses had not seen (thus definitely excluding any possible telepathic influence). She could even describe precisely events that took place in faraway cities or foresee future events.

One day she informed a physician that he was in danger of

being burglarized and advised him to be on guard. Sure enough, very shortly thereafter, he was robbed of a kit of very valuable instruments.

A similar observation is reported by Father Herbert Thurston in the chapter "Extra-Ocular Vision" of his book. This time it concerns an English woman, Miss Croad, who in 1870 became totally blind, deaf and dumb, and, in addition, her left arm became paralyzed.

Her physician, Dr. Davey, submitted her to a number of tests and found her capable of perceiving, by touch alone, a variety of small and large objects on any card or photograph. For example, she placed a postcard or a photo on her chin or around her mouth or moved it over her forehead, and in doing so examined it thoroughly with the fingers and palm of her right hand. These various gestures were generally followed by a moment of intense and silent concentration, after which she drew or described the stimulus.

During these experiments, all carried out before witnesses, Miss Croad's eyes were carefully bandaged with cotton pads which an assistant pressed on. Results obtained in total darkness were just as convincing.

2) *Russian Experiments*

In Russia, at about the same time, Dr. A. N. Khovrin,[11] a specialist in mental diseases, discovered that one of his patients, Miss M., was capable of detecting drawings or letters enclosed in sealed envelopes, and investigated experimentally what he thought to be a kind of hyperesthesia and not a paranormal or supernormal faculty.

This patient belonged to a family in which psychotic disorders had been hereditary. Dr. Khovrin treated her by hypnosis when she was in her thirties. She was a very cultured and intelligent person and extremely capable of analyzing her impressions. She had even been a school principal for seven years.

She had studied brilliantly without the need to "memorize," which most of us generally do with great effort. When questioned by the examining professors, it was sufficient for her to imagine t

11. Ludmila Zielinski: "Dr. A. N. Khovrin and the Tambov Experiments," *Abnormal Hypnotic Phenomena,* Vol. III. Edited by Eric J. Dingwall. London: J. and A. Churchill, 1968. Pp. 33-75.

page on which the answer was printed—a gift, by the way, possessed by certain audito-colorists. When in a normal state, she could easily distinguish colors although she sometimes confused blue with green.

During treatments for neuroses, she became color-blind, and could just distinguish light from dark, but at the same time, she "saw" colored circles in her field of vision.

It was then that Dr. Khovrin discovered that Miss M. could read what was written inside sealed envelopes. She visualized the contents by holding the envelope between her fingers or against her head.

Her tactile sensitivity was extraordinary, especially the palm and fingers of her right hand, the middle finger being the most sensitive. She was capable of detecting drawings or notes in closed notebooks, and also colors of various objects without seeing them directly.

In October 1892, small skeins of differently colored silks were placed one after the other into the hands of Miss M., but under a thick blanket in which she was wrapped. It was, therefore, impossible for her to discern the colors, unless by touch. Several observers surrounded her. She concentrated intensely on the object in her hand and tried to visualize its color on some wall or screen placed in front of her.

In the course of the tests, she perceived with increasing clarity each color and, after a moment, named it correctly. There was only one confusion in the course of a multiplicity of tests with various colored materials: confusing orange with yellow.

Dr. Khovrin asked himself whether this particular gift was not due to the thermal or chemical properties of colors and whether luminous rays could not influence receptive organs in her fingers without there being any contact with the objects. Thereby, he became a precursor of the research carried on in the USSR at the present time.

Miss M. was capable of detecting the different colors of luminous rays by using her hands which she placed behind her back; she could do the same by inserting her hand into a long tube into which various colored disks of glass were successively pushed and lighted. Precautions were taken to prevent the subject, as well as the experimenter, from knowing what color was to be detected.

The colors awakened tactile reactions. The sensations most distinctly perceived were heat or cold, and oiliness or stickiness induced by yellow and blue respectively, red being in between.

When Miss M. tried to recognize the colors of colored sheets of paper placed under glass into nonlighted test tubes, the results were identical.

She was equally capable either of detecting, with her skin, the taste of liquids from saturated paper pads placed on the inner surface of her forearm or of experiencing phenomena inverse to those of color hearing, the colors awakening in her auditive hallucinations.

The same experimenter determined that this faculty was linked in her with certain physiological conditions, her degree of concentration depending on the blood circulation in her sense organs. The hyperacuity of her hands, for example, increased when they were warm; her sensitivity decreased with a lowering of her circulation, as her circulatory system was generally deficient.

During her attacks, it was observed that only her left side was totally anesthetized. Her thermal sensitivity was reversed. Cold seemed to her hot and vice versa. In compensation, her right side acquired increased sensitivity. In addition, when her environment was not congenial, her attention was distracted and her faculty would disappear.

These tests were repeated before various medical societies; the reports were translated into several foreign languages. Of course, the experimental procedures as well as the theory of hyperesthesia were strongly contested. At least, these observations had the merit of showing what kind of tests were feasible.

3) *Observations in Italy and France*

But besides the sense of touch, there are many organs that can give rise to such transpositions.

A female hysteric, aged 14, observed by Professor Cesare Lombroso, became blind during her attacks, and—a remarkable feat—upon losing the faculty of eyesight, she saw instead, as clearly as before, with the end of her nose or with her left earlobe.

By means of these improvised organs, though blindfolded, she read a letter that had just arrived by mail, and was able to distinguish the numerals on the dial of a dynamometer.

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Another Italian professor observed identical feats induced by a state of somnambulism. A young girl could in this state distinguish colors shown to her in spite of the fact that her pupils were completely turned under her eyelids and that only the lower part of the sclera was visible. She walked with open, outstretched palms and it soon became evident that her palms served as organs of sight. She could read in darkness with her hands placed one or two centimeters from a book.

In France, around 1840, Dr. J. Pigeaire tried, in vain, to interest the Faculté de Médecine (Faculty of Medicine) in the performances of his daughter who, when put into a state of somnambulism by her mother and blindfolded, could read a book by placing her fingers over a glass plate covering the pages (this was done to avoid the objection that she might recognize the letters by touch). She could also recognize playing cards, and play, for example, *"écarté."*

All objections made to date regarding these observations boil down to discussions, rather ridiculous ones, one must admit, on the opacity of the bandage covering the eyes!

II. *Extra-Retinal Vision*

These observations concerning eyeless vision inspired Louis Farigoule, who had studied biology and was to become famous under the name of Jules Romains, to undertake an experimental study which made him a forerunner in the research, since it was only about fifty years later, after the publication of his experiments, that these phenomena were rediscovered and that their study was resumed more systematically in the USSR and in the United States.[12]

Right at the beginning of his book, *La Vision Extra-Rétinienne et le Sens Paroptique*, Jules Romains reminds us that psychology, after having been descriptive, has reached the stage of being studied correlatively with physiology and now is entering a third phase, that of detection. This detection consists of throwing light onto the working of consciousness (the expression used today is mostly "altered states of consciousness") and to learn about it by experiment.

12. When *La Vision Extra-Rétinienne et le Sens Paroptique* (Extra-Retinal Vision and the Paroptic Sense) was reprinted in 1964, Jules Romains stated in the preface that it was not without a certain amount of bitterness that he learned that foreign scientists had "trumpeted" (and almost excusing themselves for their audacity) certain results which represented at most a twentieth of those he had obtained and published in 1920. He added with good reason: "We certainly live in strange times. In certain sectors information is spread with insurpassable rapidity; the arrival of a music-hall singer at an American airport is flashed to us immediately and often shown on television. However, other events of importance to those of our contemporaries who, because of their special competence, should be first informed, only come to their knowledge with great difficulty."

It will suffice to point out that Jules Romains already considered it a lamentable prejudice to burden with pathology an unusual phenomenon such as a simple alteration of the state of consciousness capable of making other faculties emerge.

According to him, this is even an idle argument since physicists, in taking this standpoint, could say: "If smoke rises rather than falls as do all other bodies, let us not worry, it is pathological." Is it actually necessary in psychology to look upon everything that seems "abnormal" with distrust or to often even negate its existence?

Our usual state of consciousness is not the only one; hypnosis, for instance, is another state and many other mutations are possible which may provoke quite different states, causing the emergence of latent faculties in us. The subject then becomes more "alert" with regard to the outside world than to his "normal" state.

Jules Romains does not refer here to the hypnotic state, but to that which he calls "delta," which leaves the subject completely awake. And specifically in this delta state, training makes it possible for subjects to learn to read blindfolded. Later, we shall discuss the explanation offered by Jules Romains.

1) *Experimental Procedures and Results*

For now, let us say that he suspected this "paroptic sense" to originate in special epidermic cells reacting to purely luminous stimuli, therefore resulting in *true vision.*

In his book he retraces all the ingenious procedures he used to bring about and analyze it, insisting that these were strictly laboratory experiments.

As we are mainly concerned with colors, let us specify that according to Jules Romains, under normal lighting, "extra-retinal vision" is actually analogous to ordinary sight. Delicate shades are well perceived and identified with confidence, whatever the material of the colored object or the nature of the tinctorial substance may be.

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This color perception extends appreciably beyond the lower limits of light valid for normal visual perception. The colors enduring longest are red and yellow. It would even seem that this perception extends beyond the limits of ultraviolet, but, at the opposite end, stops at infrared.

Jules Romains observed that when his subject with closed eyelids placed himself in front of a door, he did not see what was behind the door, but when the door was opened, if his eyes were tightly blindfolded, he could "see" with the periphery of his face. Therefore, properly speaking, there does not exist a true propagation of a radiation through opaque bodies.

Experimenting on himself, Jules Romains found that he, too, was capable of recognizing colors in this manner, but less clearly than did the subjects he studied.

The colors "seen" with most certainty remained about the same in the following order:

white, red, brick, yellow-red, azure, off-white, gold, brown, and black

Although his subjects were equally successful in electric light as in daylight, the same did not hold true for him since he could manage it only in daylight.

One must also note that if the subject turns abruptly toward the source of light, he experiences what Jules Romains called a kind of "black dizziness." We were able to observe this ourselves.

Not only the sense of touch, but also taste and hearing are left out of this extra-retinal vision. As far as smell is concerned, it seems that this sense also can play a certain part in this perception of color. Nasal mucus, in particular, helped in "seeing" colors in a poorly lighted room, it being understood that precautions were of course taken to eliminate all odors characteristic of the object or related to its colored chemical nature. In this manner, a subject was able to distinguish two very close shades of a same color.

Jules Romains concluded that "the nasal mucus, too, is sensitive to light and to the different colorations of the spectrum. This function is clearly separate from smelling. It is also of an optical order," even if its optical role is not its essential function.

In brief, any area of the body can furnish this vision, and the more it is extended, the more refined it becomes.

The peripheral parts of our body most mobile (fingers, hands) seem to possess *ipso facto* a perceptive superiority, even if there is no contact with the object. Certain areas of the body are better at "seeing" *nearby objects*, and other areas do better with *distant objects.* The hands, especially the right, would belong to the first category, and the cheeks and forehead to the second.

Moreover, Jules Romains observed that a sternal vision (with the breast) on himself was also possible; it is even much clearer than the homocentric vision (the one for which we use our face) and this, no doubt, because the light perceived paroptically is much brighter. But it is very difficult to direct our attention to this part of the body, because the habit of seeing with the eyes is so deeply rooted in us.

At the same time, he studied the "apprenticeship" of this paroptic perception, the localization of objects and letters in space and the involvement of muscular reactions in focusing.

2) *Aspects of Training*

Jules Romains extended his researches to include the blind, and entrusted to René Maublanc, professor of philosophy and author of *Une éducation paroptique* (Paroptic Education), the training of Mrs. Leila Heyn, an American, born blind, and who only distinguished light from dark during the first year of her life. A detailed analysis of the stages of this training is given in the first part of *Une éducation paroptique.*

To attempt a reeducation demands a great deal of perseverance on the part of the experimenter as well as on the part of the subject. The inequality of the results is often deceiving. Moreover, training must be regularly pursued; the sessions in the case mentioned extended from February to mid-October 1925.

Conditions of health, the preoccupations or presence of other persons can influence the results, as we have seen. The first time Jules Romains was present during the tests, Mrs. Heyn made 33% errors in differentiating between red and yellow, colors which she had previously learned not to confuse.

Paroptic education of a person born blind demands from both the subject and the teacher great patience and an imperturbable optimism, because it requires nothing less than proceeding with the

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construction of a new and enriched space and universe. Here are no revelations, no enlightenments, no miracles. Obscure sensations that are first confused with familiar sensations of temperature and pressure slowly emerge from this early confusion and become more distinct, more precise; it is as necessary to learn to "see" as it is to learn to play the piano. The beginnings are unkind, without pleasure, without glamour.

This same blind woman, Mrs. Leila Heyn, was also trained to "see" with her hands. In this case, sensations associated with color seemed to be predominant.

The subject was able to analyze herself without the knowledge of the experimenter, and this analysis pointed up the importance of these sensations, whereas Maublanc's analysis was more concerned with the development of the visual "paroptic sense."

We shall discuss here only the results obtained with colors, although this subject also extended itself to the "visualization" of objects, shapes, and words.

Maublanc started with some exercises to lead the subject into the state called "delta" by Jules Romains, a state which implies a kind of detachment vis-à-vis the external world while retaining a wide-awake consciousness.

Mrs. Leila Heyn, who had never before seen colors, dreaded the first tests. Maublanc began with making her "see" flowers in a vase, then made her classify colored cardboards of identical texture. Only at the eleventh session did Mrs. Heyn begin to recognize the red and the yellow cardboards, but was unable to "see" blue.

The results remained, however, rather uneven. During certain sessions, Mrs. Heyn would see the colors only poorly, as she told the experimenter right from the start: "These color sensations are never constant, and when they appear I am always surprised. Extra-retinal vision is not only new, but capricious as well. There are many days when I cannot even distinguish light from dark."

For the experiments of recognizing colors with her hands, Maublanc placed a screen between her face and the colored objects to be identified.

At the beginning, her fingers did not make her "see" colors, but simply induced impressions of heat and thickness. When she

finally was able to distinguish yellow from red, she continued making 33% errors in distinguishing yellow from blue.

At the sixteenth session, she passed her fingers over a tricolored cardboard and said: "These are not the colors as I see them at present with my face, but I feel differences, about the same as I felt the first time with my forehead."

Making only 14% errors with her face, she continued, however, in making 36% errors in detecting the colors with her hands.

One of the main difficulties of this training is achieving the necessary decentralization of attention. René Maublanc noted that Mrs. Heyn discerned colors more easily with her fingers when he tried to distract her with conversation. The reason, no doubt, is more psychological then physical. Mrs. Heyn wrote: "I was so long accustomed to receiving tactile impressions with the fingers that I cannot yet change my mental attitude and ask them for impressions of another order. There comes a time when touch and sight merge; this is exactly what I now feel."

It was very difficult for her to recognize letters, in spite of the fact that their black outlines gave her an impression of fullness and cold. After several months of exercise, it finally seemed to her that she could read a text with only her fingers.

Perception of color and perception of letters are mutually exclusive. Mrs. Heyn in any one session could only succeed with one or the other of the two types of tests, an observation which was confirmed in recent experiments conducted in the USSR.

The sessions devoted to the development of her paroptic sense continued and she began to "see" spontaneously without the aid of the experimenter. She saw the color of jonquils and even had esthetic impressions completely new to her.

One day, she was taken to one of the Paris railway stations and was able to see its lights. Then, she started to read words and to see colors in illustrated magazines.

After four-and-a-half months of exercises, her percentage of incorrect responses to colors again went up to 50%. Later, results improved, and in June her errors reached a low of 7%. In July, her color vision stabilized itself, and Mrs. Heyn was able to use it to select dresses from her closet.

In the presence of Jules Romains, she succeeded in a test of sorting red and blue colors. Then, she went on to three-color tests.

René Maublanc tried to have her locate a red cardboard placed in different parts of the room, but without much success. She did better at recognizing colors at a distance of about two meters than colors at a short distance from her face. She saw better by means of her cheekbones and the area around her eyes than with her forehead, especially when the stimulus was at the level of her ear. She also experienced paroptic sensations with the nape of the neck, which vision is called heterocentric (a vision extending to the back of the neck as opposed to homocentric vision).

However, a head cold or some other annoyance was enough to cause a change in the results; in such cases she only made mistakes with the color red.

In brief, all results showed that red and yellow are more easily recognized whereas blue and violet tend to become confused.

Blue is the least distinguishable color, and Mrs. Heyn was unable to acquire visual images permitting her to bring forth this color independently of sensations originating from another sense. She could not visualize white since for her white represented the usual state of blindness, a kind of nothingness without density. On the other hand, she could "see" black.

The stages of this training, described by Maublanc, may be compared with the introspective analyses made by Mrs. Heyn independently of the experimenter, reported in the second part of the book. She said that at first she confused the impressions she received from colors with those of cenesthesia, i.e., of depth sensitivity. "Blue," she explained, "came to represent the state of my soul when I was at sea or near the sea. Red usually signified heat; yellow was gold and orange. Yellow remained for me the color that made the least sense. Black for me was darkness."

At the beginning of her training Mrs. Heyn had no names for the colors; she only realized differences. Before being able to "see" the colors, she had to go through various states to develop this new capacity:

"I do not yet see the colors clearly enough to find them beautiful. I don't even know anymore what I should think of them. I no longer picture them as states of my soul, and the one I like best,

blue, is now a spot that I can neither describe nor remember. Yellow, of which I knew the least, has become the light. I find it less vague than the other colors, but I still cannot describe it. Red retains more of its former significance, but is still far off from it."

Just as Mrs. Heyn differentiated perfectly between "vision through the face and impressions received through the hands, she differentiated perfectly between perceptions of shape and perceptions of color. These are "two entirely different operations which do not originate from the same sensation, and which leave absolutely distinct memories. When the objects are taken away, I do not think of a blue square or a red circle, but of blue and of a square, and red and a circle."

Form perception remains, by the way, analytic in a blind person recovering his sight. To identify objects, he must start by running over them with his fingers, trying to synthetize his new visual space with his kinesthetic and tactile space. It is, therefore, understandable that it is difficult for him to add yet another "dimension," that of color.

The very methodical analysis of this case points up clearly the difficulties of the training and the fact that there exist two modes of perception:

—the perception of graphic symbols of black and white and of geometric forms;

—the perception of colors

These two modes of perception correspond to two different types of training according to the aptitudes of the subjects.

III. *Our Personal Researches*

Following these numerous investigations, the author personally undertook additional research work on paroptic perception. She places herself at the crossroads of extra-retinal vision and dermo-optic sensitivity, which we shall discuss later.

1) *Enviromental Effects*

The work was started in 1969 with tests of light and color variations in the environment. Mr. Maurice Déribéré, the president of the Centre d'Information de la Couleur, himself engaged in important statistical work on synesthesia, gave us permission to use the

visual testing laboratory of the Centre d'Eclairagisme et d'Information for these rather unusual tests. This laboratory is well equipped for the study of the influence of color and light intensity on various materials.

In this 21 square-meter room, 3 m. 20 high, light intensity may vary from darkness to 5,000 luces.[13] The light, emitted by tubes, can be of the fluorescent type or analogous to that produced by incandescent bulbs.

The light can come from the center of the room as well as from any of the four corners of the grilled ceiling, behind which is the source of light.

By pivoting the walls, various light effects can be produced: gray-white, dark blue-green or salmon-red.

These "decorative" colors, in the midst of which our first tests took place, have the same optic density for the same type of illumination. Of course, the subjects must ignore the number and different color shades of these walls.

A program of the changes in light intensity or in the color of the walls, as well as of other tests, is handed over, prior to the session, to the operator who controls, by means of a keyboard, the transformations of all the conditions of the room.

Seventeen subjects were tested until 1972. Eleven of them had been totally blind for a number of years. Ten had characteristic impressions and only one had no feeling at all; the six others comprised two who were only color-blind, two practically blind and two with normal vision blindfolded during the experiment but who did not succeed with the color tests very well.

The light intensity which could vary—to repeat—between darkness and 5,000 luces, as well as the differences between fluorescent and incandescent light, were better "felt" than the colors; however, 3,000 luces were mingled with darkness. Incandescent light seemed to be darker and hotter than fluorescent light.

Twelve subjects identified the colors, expressing the same impressions for white-gray in 70% of the cases, for blue in 60% and for red in 50% of the cases.

13. The lux is a unit of illumination. For instance, a 12 square-meter room, 2 m. 60 high, lighted by a 100 watt bulb, receives from 100 to 200 luces. The lighting of a room in which very exact work of designing or embroidery, or the reading of small-printed texts, must be done, will require 300 to 400 luces.

These colors were described by the following impressions:

White-Gray:	clarity, impression that the room was growing larger
Dark Blue-Green:	cold, impression of space
Salmon-Red:	hot, reduced space

A congenitally blind subject experienced acoustic impression: dispersed resonance for blue and a soft sound for red.

In darkness, colors generally induced no impression at all. It seemed that 1,000 luces and fluorescent light were the best adjuvants so that the colors of the room in the center of which the subject was seated could be "felt."

On April 23, 1971, Jules Romains and his wife gave us the honor of assisting at one of our test sessions at the Centre d'Eclairagisme et d'Information.

He told us how great his disappointment had been when, in 1920, the research he had pursued so methodically was so heavily criticized that he had finally given it up.

He encouraged us to engage in the study of extra-retinal vision and advised us to carry out this research not only with blind persons but also with subjects whose eyes were bandaged.

2) *Perception Through the Face*

These investigations are difficult to carry on because they require a great alertness and a proper frame of mind on the part of the subjects. Nevertheless, with the help of the Parapsychology Foundation, this research was initiated.

The first observations seemed to show that there is a "visual" perception in the mental field and confirm that there can also be sensations induced by the hands.

The exercises were divided into two parts, each preceded by a period of relaxation.

The first part included tests of *paroptic vision* by means of the face, but we have to confess that they seldom gave stable results. We were, however, able to experiment with some subjects by means of objects, black and white cards, geometric designs, vowels and using colors as well, during half an hour at each session.

The second part included dermo-optic sensitivity tests, especially color tests, using the hands with or without contact. At first, eight subjects were tested; five had been blind for a number of years, one was almost blind, but was blindfolded like the remaining two others. One of the last two subjects had very bad eyesight, but the other had normal sight and, of course, they were also blindfolded.

The first part of the paroptic "vision" exercises took place in daylight; the subject was sitting with his back toward the window, or was lighted sideways. The objects to be detected were placed in plastic boxes, and the other stimuli, black and white cards or cards printed with geometric forms or letters, were in plastic containers held by the experimenter at a distance of 5 to 30 cm. from the face of the subject.

Paroptic "vision" begins to be produced in a haze from which formless lines emerge which the subject may try to define. If the subject turns the *palms of his hands* toward the stimulus, the paroptic "vision" emerges stronger.

These tests are very fatiguing and require great power of attention, a great mental alertness and excellent health. Any worries or illnesses make this perception disappear.

The paroptic "vision" of colors by means of the face was studied during daylight as well as under electric lights.

With natural lighting, differences between contrasting colors were first perceived, such as red and white, yellow and green, without the subject trying to name the color. The left temple proved to be the most sensitive. Before being visualized, the colors evoked the following impressions: white—not rough, fatiguing; blue—fatiguing, weak visualization; green—cold; yellow—visual vibration; red—warm, visualization.

The *electric-light tests* were carried out sometimes with vertical rows of colored bulbs, sometimes with colored plates lighted from below.[14]

In the first test, a single row of lamps of the same color was lighted and the subject, seated at 1.60 m. from the board on which

14. The tests that we made in 1975 with a laser, show that coherent light causes blind subjects to experience different sensations than those created under ordinary electric light. The cluster of the laser is felt to be thin and constricted, and the sensations are more easily detected with the nape of the neck than with the palm of the hand.

they were fixed, indicated the impressions received, especially by his left temple, the center of his forehead being insensitive. The cold colors were indifferently perceived.

In the second test, the subject is seated before a table on which a box is placed, the cover of which consists usually of various colored plates.

A white plate induced an impression of continuity, but with a feeling of unevenness. A yellow plate evoked an impression of heat, differing from the one evoked by red. An orange plate was hotter and thicker than the yellow one, but blended with red. The red one was easily recognized as it induced pulsations. Green and black induced no impression and soon blended. With training, the subject learned to distinguish green from black, when placing his hands 20 cm. above the plate, green induced a kind of motor sensation on the level of his hands.

3) *Perception Through the Hands*

After a pause, less fatiguing exercises of *color detection by hands* were taken up again. With some subjects, only these exercises gave results.

Let us repeat that persons able to experience impressions through their faces are found very infrequently. Most of the subjects we recently observed (since December, 1971) obtain differentiated impressions through their hands. Thus we are in the process of studying what Professor A. C. Novomeysky calls "dermo-optic sensitivity."

We found that graphic symbols in black and white evoke but slight reactions for their detection. Nevertheless, one of our blind subjects learned to recognize vowels represented by small black disks pasted on white cardboard, forming symbols similar to printed vowels. The palm of her hand, placed on a glass plate covering a vowel, gave her successive thermal impressions of its contours permitting her to name it. (Let us specify that she had a very weak tactile sensitivity.) This observation will be more fully discussed later.

For the detection of colors by hand two types of training are possible: by contact or at a distance.

In the first case, the subject examines by touch various surfaces of paper, of wood, or other materials, or colored books. Colored cards can be put under plastic or under glass after the first tests.

Certain subjects start by taking the colored materials fully in hand, recognizing them by impressions of weight, bulk or size of diameter, even if the stimuli are identical. In this case it's green that seems to be either the "heaviest" or the bulkiest, or the lightest for most of the subjects. One of them learned to recognize red each time he had the impression of putting his hand on something thick like the edge of a book.

In the second stage, the subjects learned to distinguish between colors by running their hands over colored surfaces. Some subjects' tactile and thermal impressions of some of these colors ranging from smooth and cold to rough and hot are:

—Blue: cool
—White: fatiguing, rough, mixed with yellow and black
—Green: cold, very smooth
—Yellow: less smooth, but smoother and colder than black, with vibrations of light
—Red: more rugged, as if the hand stroked an animal against the fur, giving an impression of heat

(Two years after recording this very special observation, we were surprised to read an identical note in a work published by the Pedagogical Institute of Sverdlovsk.)

This is followed by exercises of sorting out two colors distributed unevenly: yellow and black, red and white, etc. It appears that yellow is easier to identify than black, and that the contrast between green and white, or red and white, is easier to perceive than between red and green, while the blue color is "felt" in contrast with the red color.

All these impressions of which some are of an affective order result in a classification of colors in which blue or green is found at one end of the extreme and yellow or red at the other end, with orange most often in between.

In the second case the subject operates at a distance, and he feels the same thermal and tactile impressions as if by contact. A blind student located the following impressions on his hands: blue on the left palm, green on the back of his left hand, yellow on the right palm and red on the back of his right hand.

If colors are said to be "seen," they only appear as if in a haze or in the middle of a group of contrasting spots. Plastic containers

give them a brilliant effect which can, according to the subjects, be an aid or an obstacle to their perception.

In a recent (1973) treatise, Professor Novomeysky proposed the following explanation: paroptic vision covers a nonanalyzed perception; the subject indicates only the results of the sensations felt through his hands, and one falsely concludes that "the hand sees." This method of "synthetic notation" does not permit drawing any conclusion as to whether the subject detects the color or rather guesses it.

On the other hand, the "analytic" method specifies impressions similar to those induced by thermal tactile sensitivity, and permits the subject to obtain results as constant and stable as those obtained, for instance, from learning to read. Thus the proceedings and results are quite different from the ones of G.E.S.P.

After having read the works of Professor Novomeysky, we investigated at what height the subject must hold his hands to enable him to perceive colors at a distance. It was ascertained that these levels were of a lesser elevation for the color red than for black, yellow and blue, but sometimes without delimitation of height for very light colors, such as white.

Moreover, we registered the dynamometric reactions of the two blind subjects and of the almost-blind subject. The measures of the dynamometric pressures were taken at the time of the paroptic perception and compared with the ones taken when the color was named.

The first two subjects reacted most vigorously to yellow and the almost-blind subject to red at the time of the paroptic perception. But when the color was named by the experimenter, the strongest reactions made by the three subjects were to red.

It seems from all these investigations that black or white cards, geometric forms, letters, and, above all, colors, can be used for paroptic perception. As far as the face is concerned, the left side is more sensitive. It seems that, in daylight, differences in saturation are perceived, while under electric light green and black are confused and red evokes impressions of pulsations. This faculty requires great concentration, and the subject must be of good health and free of worry.

When it concerns the development of the sensitivity of the

hands, the training is less exhausting. Colors induce impressions of heat and density, red is even apt to attract the hands of the subject, while green for some subjects induces a feeling of thickness.

This paroptic perception seems to make the subject conscious of his capacities which are blurred by normal sight.

IV. *Dermo-Optic Sensitivity*

The same phenomena of reading with the fingers have also been studied in the USSR under the name "dermo-optic sensitivity," but from quite another perspective than that of Jules Romains. For Soviet scientists, the perception of colors is not the effect of a vision but of reasoning, as we will soon see.

We present here only the actual facts which formed the object of their research. The phenomena of color detection without eyes and of reading with fingers have been studied in the USSR since 1962, when Dr. I. M. Goldberg, a neurologist, noted the capacities of Rosa Kuleshova.

She had excellent sight but, as several members of her family were stricken with blindness, she trained herself with bandaged eyes to develop the capacity for paroptic vision. Physiologists and physicists then submitted her to numerous tests in Moscow laboratories.

Kuleshova could discern the colors of luminous rays projected on a screen within the limits of the visible spectrum but could not discern infrared rays projected on her fingers. She did not detect colors by a tactile hyperesthesia of minimal textural differences due to the dyes used nor by thermal impressions, since the caloric strength of infrared is much higher than that of other color radiation of the spectrum.

Under red light and in darkness she did not differentiate between colors with her fingers, thus eliminating the hypothesis that it was thanks to telepathy or clairvoyance that she recognized the colors. The first observers were intrigued by her abilities and a number of researchers became interested in her case.

1) *Research in the USSR*

As this faculty could be developed by training, systematic investigations were started. We shall only give a glimpse of those

which have been engaged in at the Pedagogical Institute of Sverdlovsk under the direction of Professor A. C. Novomeysky.

It was Professor Novomeysky who adopted the term dermo-optic sensitivity for these phenomena, even if, according to him, they are quite distinct from those of normal sight and touch.

Nevertheless, the term dermo-optic sensitivity can be justified since, on the one hand, the phenomena of complementary colors, the laws of their mixtures, and optic illusions detected as if by normal sight and, on the other hand, the use of palms seems to imply touch, as well as the turning of the subjects to the tactile language for the expression of nonhabitual sensations.

According to Professor Novomeysky, one person out of six can develop this faculty which, far from being "foreign" to the normal domain, can be integrated (according to him) within the scope of known psychological, physiological and, mainly, physical laws.

At the Pedagogical Institute of Sverdlovsk, the students are trained systematically to identify colors with their fingers, and to eliminate any objection, such as insufficient darkening of the eyes by a bandage, the subject's head can be covered with a hood and his hands can detect the colors under an opaque screen.

a) *The Analytical Method*

The training is based on study of the association between tactile, thermal and affective impressions, with the colors evoking them, and, step by step, the subject learns to identify and to name these colors.

According to advocates of an analogy between dermo-optic sensitivity and normal vision, a physical agent must have light for the detection of colors. (Professor D. K. Guylev and associates.) Their first investigations are mainly concerned with an analysis of the impressions felt due to the diverse stimulations found in a lighted room.

According to Professor Novomeysky's theory (which we shall consider in more detail later) dermo-optic sensitivity, in spite of being analogous to normal sight, differs greatly from it, as evidenced by the results obtained with certain subjects capable of detecting colors in complete darkness and other still more unusual results.

The booths in which the subjects are isolated, the screens

separating their blindfolded eyes from stimuli and the multitude of precautions taken to avoid all interference with the experimenter are described in detail in the publications of the Pedagogical Institute of Sverdlovsk, comprising the work of various researchers.

Professor Guylev requires his students, who are blindfolded, to analyze the tactile impressions induced by sheets of colored paper and then to compare them. In this way they learn to differentiate the color red from blue, then yellow from orange and the other colors of the spectrum, and finally the color black from white and gray. The greatest differences felt were those between red and green, and white and black. The tactile impressions induced by the colors can be classified in the order of the prism.

Warm colors: red—clinging, rough, gluey; orange—rough; yellow—smooth, slightly rough, not gluey.

Cold colors: violet—very rough; dark blue—gluey, slippery; light blue—smooth, not too rough, not gluey.

The thermal impressions are about the same for blue and yellow as for violet and orange. Green is neuter. Black is rough, very definitely rough and warm; white is much less rough and less warm; gray is cold, hard and very smooth.

Among a great number of other tests, those of Professor Dobronavrov show that the subjects most sensitive to pain are the ones most able to detect colors.

Other tests indicate that dermo-optic sensitivity diminishes with low temperature in a dimly lit room. The diminution of this faculty corresponds also to a general weakening of the entire organism.

Only one quarter of the students obtained results with daily training.

b) *The Barriers of Color*

The research work of Professor Novomeysky is more strongly based on the physical rather than the psychological conditions of dermo-optic sensitivity.

The experiments without any hand contacts with the colored surfaces show that the students can push themselves up to certain thresholds called "color barriers." Their heights are measured with a calibrated instrument.

These indices of recognition without contact, i.e., evaluated

according to the different levels to which the hand must be lifted "to feel" the color, permit a very interesting research on the relationship of these barriers to the colors of the prism.

Having thus learned to apply different recognition indices to colors, the students trained themselves to differentiate between them and to name them according to the levels of these barriers. This test permits all kinds of analyses, for instance, that of their relationship to the acuity of the dermo-optic sensitivity.

The highest barriers are those of the dark colors which are situated at the extremities of the spectrum: red and violet.

At the center of this incurvated curve we find the neuter barrier of green; the curves of yellow, orange and red arise on the one side of it and the curves of light blue, dark blue and violet on the other side. The levels are higher for red than for violet, and for light blue than for yellow.

Here too—and this is just our personal observation—the curve is inverted in comparison with the curve of retinal sensitivity (Purkinje curve) which, let us remember, rises from red to yellow and green, to descend to dark blue and violet.

Classified by height, in daylight, the decreasing order is the following: red: 115 cm.; violet: 109 cm.; dark blue: 107 cm.; light red: 99 cm.; light blue: 96 cm.; orange: 89 cm.; yellow: 87 cm.; light yellow: 82 cm.; green: 77 cm.

The intensity of the detected symbols increases in proportion to the height of the barriers, i.e., they are more intense for red and violet.

Furthermore, the higher they are, the more stable they are. Professor Novomeysky observed that if the art students who were experimenting were good athletes, the barriers were high and stable. Aren't the athletes trained to coordinate their movements? Thus, they stop their hands at the exact position at which the threshold related to specific color is felt.

c) *Variations in Physical Conditions*

The relationships of these barriers are the same in daylight and under electric light, but at twilight, strangely enough, the dark blue barrier is higher than the red one.

Very thorough investigations have been made on the relationships of the barriers to various other environments.

The color intensity of the stimuli, their fixed or mobile presentation and the time required for detecting the color are also characteristic elements of this sensitivity.

The influence of the color of the lighting—white, blue or red—was studied. The reactions of the dermo-optic sensitivity to ultra-

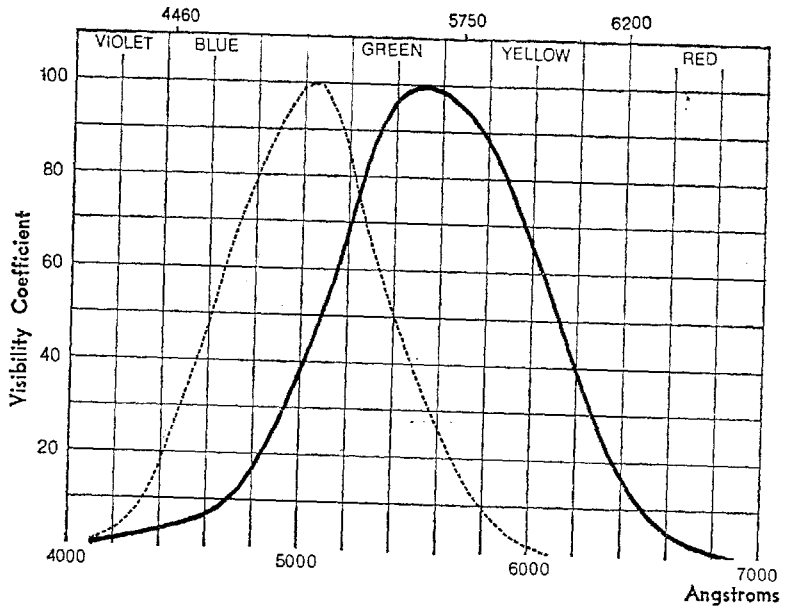

Fig. 4

Visibility curves as a function of the wavelength of the visible radiations.
The unbroken line indicates the photopic vision; the eye is adapted to light; sensitivity of the cones.
The broken line indicates the curve of scotopic vision; the eye is adapted to darkness; sensitivity of the rods. In daylight, the maximum sensitivity is equal to 100 and situated in the yellow-green; in twilight, it is situated in the blue-green. (Purkinje phenomenon.)

—*Précis de Physiologie* (Physiological Abstracts) Hermann and J. Cies, Professors of Physiology at the Faculté de Médecine (Masson & Co., Paris, 1970).

violet or infrared rays, to which the hands were exposed for a few moments before the experiments, were also analyzed.

All the variations of the surrounding physical conditions were expressed by comparisons between the heights of these barriers.

Experiments were carried out with standard electric light, with varied intensities, and, proving Professor Novomeysky's theories, certain subjects were able to detect colors in darkness. The light colors were then found to be more predominant than those at the extremities of the spectrum.

This is when we see the difference between the possibilities in dermo-optic sensitivity and those of normal sight. But some more disconcerting effects seem to manifest themselves when opaque plates were placed over the colors.

Preceding tests were made with transparent media such as benzine, water, and glass, placed on top of the colored plates for the purpose of studying the influence of their thickness or structure on the dermo-optic sense. For example: the thicker the glass pane, the more difficult is the perception; or if an ordinary glass plate has the same thickness as an organic glass plate, the perception is better with the latter.

The opaque screens can also consist of snow, wood, various metals, lead. According to Professor Novomeysky's theory, dermo-optic sensitivity is strengthened when the colors are under an aluminum plate; sensitivity is further improved when the subject as well as the stimulus are insulated from the ground. This sensitivity is modified by the degree of conductivity of the metals used—whether they are good or bad conductors of electricity—and, based on recent research, by the degree of their permeability to infrared rays of the colored surfaces they cover.

Some more surprising results, bordering on the fantastic, were produced when some subjects were asked to name the colors—always in search of the barriers of sensitivity—when, unknown to them, the colored plate had just been removed from under the lead plate where it was a few moments before the test. The colors were recognized with accuracy, according to scales of heights comparable to those used in other tests.

d) *Experiments with the Blind*

All these investigations conducted with not especially gifted subjects were later extended to blind persons whom Professor Novomeysky submitted to the same tests.

These subjects were not born blind. They proved themselves

more apt than the others for this dermo-optic detection, although it was necessary to place the stimuli on a glass pane resting on porcelain insulators. Their perception depended more on the intensity of the lighting and the extent of the colored surface than did the perception of seeing people. Their training, however, was identical. They, too, learned to associate the different colors with the impression felt in their palms. They evaluated the different heights of thresholds of perception of the colored surfaces, whatever the materials used or the nature of the color—aniline, gouache, etc.

After two months of training, they were able to distinguish the so-called achromatic colors: white, black, gray.

Moreover, they were able to detect the colors of different crayons (whereas the non-blind subjects never got that far) as well as various colored surfaces independently of the background colors from which they stood out.

When the stimuli were placed on metal plates, the dermo-optic sensitivity became stronger, so that red produced a feeling of near burning on the hand; but when the metal plate covered the color, the perception weakened, especially for mixed-color tones.

It was observed that moving the colored stimuli intensified sensitivity in detecting colors resulting from a mixture. After having learned previously to name a color resulting from a mixture of two or three others through impressions received from the contact of colored papers, the blind subjects were able to detect on a rotating disk: orange resulting from red and yellow; gray resulting from dark blue and yellow, etc. Thus for so-called accidentally blind persons, the laws of color mixtures were analogous to those with ocular vision. Professor Novomeysky stresses, however, the importance of optic experience the accidentally blind has had before becoming blind.

Identical experiments were carried out with persons born blind, but they were only able to discern red from blue.

The blind were also trained to recognize graphic signs, geometric figures, numerals and letters, without any direct contact. The height of the signs was 6½ cm. For this detection, the kinesthetic sensations of the fingers and hands are indispensable. Thereby the subject outlines with one hand the contours of the shape to be detected, placed 2 to 3 cm. below.

If the sheet to be "deciphered" has been placed on a metal

frame, the reading process is faster and the hand can be held higher with weaker lighting.

Even if the subject is able to detect numerals under an aluminum plate, it is very difficult for him to detect these numerals when they are under a glass plate 4 mm. thick.

As René Maublanc and we ourselves have observed, the training for the detection of graphic shapes lowers the results obtained for colors.

At the same time, during two weeks of numeral reading exercises, Professor Novomeysky found out rather quickly that troubles were arising in connecting impressions and colors which hindered the subject in naming them. Also, any interruption of the exercises also resulted in a decline and disappearance of the faculty.

2) *Research in the United States*

The work done in the USSR quite naturally attracted the attention of other researchers. In the United States, Professor Richard P. Youtz, who teaches psychology at Barnard College in New York, had tested, as early as 1963, a woman student, who had acquired spontaneously, this capacity of detecting colors with her fingers. He put stimuli into a box, lit from the inside, and took all kinds of experimental precautions. He used various colored materials. She was able to detect quite well the colors of sheets of paper or plastics, but she could not discern the colors of stimuli made of wood or soft rubber.

Professor Youtz had her do statistical experiments with combinations of colored cards, for instance red and blue, placed under various filters. He ascertained that, when the filter intercepted only 13% of the wavelengths, his subject succeeded in the proportion of 85 to 95%; but with filters intercepting more than 87% of the visible wavelengths, results were those of simple probability. He also noted the importance of the effect of the thickness of the pane covering the stimuli, as well as that of the room temperature and the temperature of the hands of the subject.

But when he tested the same subject the following year, he found that she had lost these faculties; she probably was too absorbed in her family life.

He made other experiments with his college students, and, as

one of the women students distinguished blue from white much better than from red, he assumed that the heat from the subject's hand reflected differently depending on the color of the stimuli, and that it was these differences in reflection that were perceived.

To verify this hypothesis, which states that the skin could be sensitive to reflected heat, Dr. Youtz made experiments with blind subjects which showed that they detected lighted color cards with greater success if lit at a short distance by a fluorescent light.

Here again, the observation points to a detection made in objective conditions. The emergence of impressions, the existence of which has been generally denied up to date, opens the door to possibilities which no longer seem to be attributed to a few rare subjects.

Starting from phenomena considered to be fantastic and most often fruits of our own imagination, we have been guided toward invisible aspects of energy which only laboratory apparatus can detect, arriving at phenomena that were strongly contested and could be, perhaps, expressions of the dynamism of life.

In short, we arrive at this double finding:

—Parapsychology implies a wide range of multidisciplinary knowledge and much delving into the sciences (be they social or natural).

—Parapsychology, far from easily integrating with them, raises again the question of their pivotal point center of gravity.

CONCLUSIONS

We believe we have sufficiently established the existence of most of the phenomena, with one and only problem: the appearance of color (or colors) when the specific sense, that of sight, has not been touched directly. Two questions come readily to mind and will lead to our conclusions:

Going over, a final time, the three levels considered: what plausible explanation—as scientific as possible—shall we give for these phenomena?

Can we—could we—hope to derive from them data that can usefully be applied to our daily life, if it be true that all scientific knowledge must always be followed by a technique?

I. *The Theories*

Concerning an explanation of these phenomena, many of them have been mentioned in passing, but we shall consider here, for simplification, only those which, in our opinion, represent the greatest interest as well as substantiality. We shall exclude those referring to simple "beliefs" in the sense of comprehensive postulates as, for example, belief in a world beyond, in life after death or in a possible reincarnation.

In doing so, we should bear in mind that these phenomena formerly considered as within the realm of the sacred, continue to give rise to increasingly rational explanations, in spite of the irreversible separation made in our time—since Kant—between that of science and religion, science eliminating superstition from religion and purifying the realm of faith.

1) *At the Psychological Level*

The phenomena of synesthesia, especially that of color hearing,