

BREAKTHROUGH:

An Amazing Experiment in
Electronic Communication with the Dead

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direction to the whole conversation, but this does not affect the individuality of the voice-entities nor does it detract from their independent existence.

It may be true to say that this new, highly interesting form of contact is still in its infancy, but is this not true in respect of all the branches of research into supra-natural phenomena?

One thing is clear: Dr. Raudive's excellent, firmly based work is the best starting-point for further research in this field. It has a good chance (owing to the fact that it can be independently checked), of being recognised by the scientific world; it should be easily understood by our technically-minded generation, should encourage many to think more deeply on the issues involved and perhaps even influence their beliefs.

Finally, the well-known American Parapsychologist, Professor Walter H. Uphoff has contributed his own observations.

Konstantin Raudive's work with 'Voice Phenomena', using the twentieth-century technology of the tape-recorder, diode, radio, etc., raises many questions for parapsychologists that warrant further research.

I had occasion to observe Dr. Raudive at work several days during July 1969 and could find nothing whatsoever to suggest deception in the way he used instruments to pick up 'voices from beyond'. He impressed me as sincere and eager to get collaborators in his search for meaning and insight in this dimension of parapsychology.

Dr. Raudive understands seven languages. I know only two. Naturally I could not evaluate the content or significance of sounds in strange tongues but it was easy for me to recognise English and German words. One of the most intriguing and puzzling aspects about the phenomenon is the way several languages are often combined in a single phrase. At times it also seemed as though there was competition between voices seeking to be heard.

Perhaps the greatest impediment to progress in this field is the tendency for too many persons uncritically to accept or reject findings such as those reported by Raudive. What is

needed is continued research which explores all the explanations the mind can think of. I hope some persons with the means to do so will support further research in this challenging field. Boulder, Colorado, U.S.A.
19th January 1970.

3. PHYSICISTS AND ELECTRONIC ENGINEERS

The Technical and Scientific Aspects by Physikprofessor Alex Schneider, St. Gallen

Investigations

I investigated Konstantin Raudive's recording technique and the monitoring of the voices between 3rd January and 6th January 1968 at two 'play-ins' held in concert. I had earlier examined several hundred copied voices in order to accustom my ear and get a general impression of the content of the voices. I made two further visits to Raudive in February and April of the same year, when we conducted further play-ins under different electronic conditions. I was there and then convinced of the unexceptionable nature of the technique of experimentation and of the painfully meticulous registration of the voices. It is admittedly recognised that in future investigations meteorological and astronomical data, as well as all possible technical facts, should be taken into account.

I remained in close contact with Raudive. I also studied the work of other researchers (1)¹; they provided me with some measure of stimulation, but the work of none of them was as comprehensive as that of Konstantin Raudive. We may assume that further successes have been achieved since the appearance of the German edition of his book; they may well have remained unknown, either because the researcher was not in a position to justify them scientifically, or because he thought it right to keep his results on this most unusual matter to himself, publishing only oblique references, which naturally cannot be considered here.

¹ See Notes page 353.

After a few sessions, I had myself heard voices, but I did not further prosecute my enquiries for quite extraneous reasons. In the following pages I shall go into the technical side of Raudive's investigations and give a brief (but as comprehensive as possible) résumé of the present state of the technical-scientific problem, in the hope that this will serve as the spring-board for further researches.

The voices and their analysis

A Raudive magnetic tape—and it does not matter by which method the recording was made—exhibits when played back a jumble of partially unrecognisable and unclear voices which, however, are in part capable of being well differentiated one from another in both sound and content. There is a background to it all of atmospheric interference, amplifier roar and the babblings of radio transmitters, depending on the mode used for recording. One feels as though one were in the presence of a large company of speakers, disciplined to a certain extent, but all in too much of a hurry to speak; this makes it difficult to grasp longer coherent expressions of opinion, especially as the voices frequently fail to stand out adequately from the background noise.

In order to analyse what a voice says, Raudive previously copies the relevant text a number of times, putting in short pauses, on to a second tape (see test-record). Two tape-recorders are needed for this process: recorder A carries the primary tape and recorder B has the tape bearing the copied voices. They are connected by a 'diode cable' (2), as for normal programme transference.

The texts are given an auditory analysis by a number of investigators. A trained ear can make very fine distinctions, so that great reliance can be placed upon this analysis; it is better proof against self-deception than any mechanical device. It would, for example, be pointless to try to get more "objective" analyses of the spoken texts by using oscillograms (output voltage of tape-recorder as a function of time). The level indicator of the tape-recorder is sufficient to confirm that a signal is being received. (It is well known that an analysis of sound cannot easily be made from an audio-oscillogram; on the other hand; good audio-spectrum analysers have recently been

designed (3). It has been found in practice that, when voices are clear, such a high identification rate can be assured that the introduction of this method for identifying those who pay by credit card is contemplated, instead of insisting on identification by signature (4).)

When the voice can be adequately picked out from the background noise, the spectrum described by the analyser can be used to show that a certain voice tallies with another one expressing a similar message or, at least, that it does not tally with various voices emanating from interfering radio stations. A further step now would be to programme by computer and thus get comparison of one phoneme with another. Both these steps, however, are expensive in time and money, and are really unnecessary for verification of the voices.

As long as the voices can be heard against a relatively strong background noise, they become more comprehensible if a bandpass filter is used to shut out all frequencies outside the 400-3000 Hz range (5). Comprehensibility is improved in every case by excluding notes beneath 350-450 Hz, especially for the untrained ear, whereas a cutting-off of the higher frequencies is only of advantage in the case of strong interference noise lying within this range. One should not place too much reliance on complicated filters, such as those which exclude, for example, certain thirds; it was found that every voice required a special setting to achieve quite a small improvement in the weak voices, when these devices were used.

As frequencies over about 5000 Hz have played only a minor part in the quality of the voices so far heard, the fact that older people experience a marked reduction in sensitivity to sounds over 10,000 Hz is no barrier to a practical analysis of the phenomenon of the voices. Where there is an *impairment* of the hearing faculty, this can be easily confirmed by the audiometric facilities of any firm manufacturing hearing aids. But it is also a fact that many people are unable to distinguish one voice from another through lack of *ear-training*, a musico-psychological phenomenon.

The technique of the Voice-recording

This technique is still in the early stages. Commercial radios and tape-recorders, helped by accessories constructed as a result

of tele-communications research (i.e. in all cases apparatus which is intended for quite different purposes), are used to make the contacts. It is, therefore, only to be expected that the signals are weak and often hard to understand. We have to recognise that the phenomenon is as yet physically uncomprehended in its essential points. The processes of recording have arisen by accident or by the demands of the voices. We have not hitherto been able to follow the usual research technique of extending the range of an appliance by linking it logically to something known.

Raudive's 'play-ins' were carried out by the following four methods. Other researchers have varied the arrangements in non-essential details without attaining any notable improvements.

The microphone method. The microphone is coupled up as for any usual recording.

The radio method. A wireless receiver is coupled to the tape recorder exactly as is done for the recording of any radio programme, preferably via the "diode cable" (2). A small piece of wire is inserted into the aerial box in order to keep out any long-distance reception. Raudive finds a spot in the medium wave band in between two stations where background noise is as blank as possible. Other investigators choose the moment when a transmitter starts to beam out the carrier wave (6) just before beginning to transmit a programme or else they select a slow-speaking lecture programme in which the pauses between groups of words are so considerable that call-signs can be interspersed. A carrier appears to be necessary, or, at any rate, desirable.

The auto-transmission method. A small transmitter (a metering transmitter) is coupled directly to the aerial box of the receiver, in order to provide the voices with a carrier wave that is free from heterodyne oscillation and interference. The voices thus recorded by Raudive are relatively soft, but they are at least against a homogeneous background noise, and this is an advantage when monitoring. As an experiment, the medium wave band carrier was modulated by a pure 1000 Hz note, but this was found to interfere, as was to be expected. It might, however, be practicable to modulate using a noise-generator, since a number of voices sound as though they were constituted from

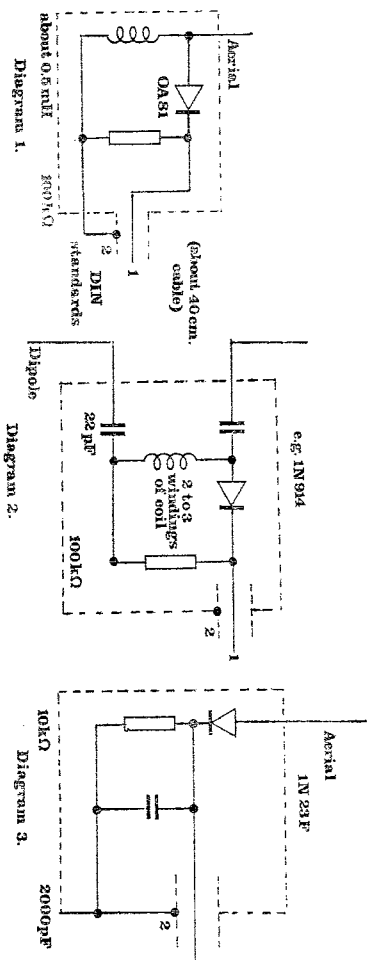
the homogeneous noise-spectrum by some physically unexplained process of selection. Perhaps a completely pre-determined series of sounds could be made to serve the same purpose, acting, at the same time, as an inductor for the contact (7).

The diode method. A short (6-10 cm long) aerial is used to give a more or less broad-banded signal, which is rectified by a diode and fed directly by cable to the radio or microphone input of the tape-recorder.

This provides the clearest voices, but the interference caused by near-by strong wireless transmitters must be reckoned with. However, one can listen to their programme during the recording or reproduce them separately on other tape-recorders. Variation of the aerial length or the use of filters for particular strong transmitters can provide a better electronic performance. Weak and distant (especially foreign-language) transmitters cannot be received, particularly in the daytime.

The screen can be easily manufactured by the investigator himself, and Diagram 1 shows the circuit used in the earliest experiments. Experience with varied circuits has shown that the elements are not critical, though the rather old type of diode OA 81 could well be replaced by a more modern one. Diagrams 2 and 3 relate to the reception of higher frequencies (8).

The screens must be effectively covered, and may be carried independently. T and X (1) had great success with a broad-banded pre-amplifier in front of the diode (9).



The tape-recorder is used by all the methods for the registration of the voices, but the latter can also, under special conditions, be heard directly. Registration on tape is, however, necessary for precise analysis and study. The beginner misses most of the voices when the tape is played back, and this is why not every radio listener and recording tape enthusiast discovers paranormal voices. There are, however, grounds for thinking that voices on tape are not noticed or falsely interpreted by the casual listener, more often than is generally suspected.

The need to secure a stable mechanical performance is the primary requisite when choosing the tape-recorder, for it has to be subject to frequent switching on and off. The relatively expensive three-motor machines, which have no interference-producing couplings, are probably the best. Recorders meant for use in language laboratories might be suitable, for the mechanical demands are similar in each case. A tape recorder should in all cases have at least two speeds, and preferably should be a twin-track model. If using a 4-track model, there is a danger of simultaneous magnetisation of a second track, and only two tracks should be used.

The sceptic might object that undesired signals could be propagated through the mains, and the experimenter, straining to hear at top receptivity, must admit this. This type of interference can be negatived by the use of mains filters or by using battery sets, and the latter are more convenient for working in Faraday cages (19).

Nearly all of Raudive's recordings were made on "Telefunken" apparatus M 85 (10). Transistorised (solid state) sets have other properties than sets containing valves (see below).

Critical judgement of the procedure

The possibility of a direct paranormal magnetisation of the tape does not have to be considered, because only tapes which have been used on a recorder present voices; moreover it is also possible to hear voices directly that have not previously been recorded on tape.

It is necessary to lay down a few basic concepts of sound and electromagnetic radiation before continuing to discuss possibilities of reception.

Sound is oscillation in matter, transferred to larger areas, principally through the atmosphere. The sound-producing oscillatory components must have a frequency of 16-20,000 Hz if they are to be received by the ear—Low Frequency, L.F.*

Electromagnetic radiation (radio, heat, light, X-ray, etc.) needs no material carrier in the accepted sense. Electromagnetic radiation is often confused with oscillations, such as sound, because the rays used to carry the radio broadcast are produced by electrical oscillations, are changed back to electrical oscillations in the radio appliance and obey similar laws to sound waves as they extend in matter-free space. The frequencies of the relevant oscillations are, however, of the order of millions per second and the velocity of radiation is about a million times greater than that of sound propagation (High Frequency—H.F.).†

In radio transmission this strange radiation serves as a carrier of energy. The message, e.g. a sound, must be "modulated" on to it. In long, medium and short wave bands this is accomplished by a change in intensity of the radiation corresponding to the sound oscillation (A.M.). In the antenna of the radio receiver, the radiation stimulates a high-frequency electric potential, and on this the relatively slow oscillation of the message is superimposed via the modulation. After amplification, demodulation takes place via a non-linear element, e.g. a diode, that is, the extraction of the low-frequency audible oscillation.

At first it seemed reasonable, in the case of microphone voices, to suppose direct action on the membrane of the microphone, either as the result of paranormal excitation of the air in the proximity of the membrane or of excitation of the membrane itself, so that experimenters who were some distance off could not hear the slight excitation.

It became necessary in the meantime to take account of the fact experienced that a number of tape recorders could receive normal radio programmes, at times at great volume, especially if they had minor defects, such as non-linearity or bad contacts. Only the microphone was coupled to the recorder. In particular, transistorised tape-recorders can often receive radio programmes

* I believe audio frequency, A.F.

† Probably radio frequency, R.F.

without the microphone being connected, by virtue of their peculiarity to contain non-linearity.

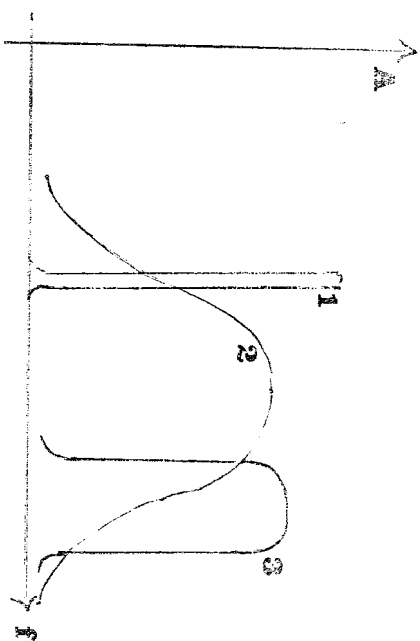
It would require compelling reasons for us to seek to explain this occurrence by some additional hypothesis—here, for example, a paranormal action on the membrane of the microphone; we should rather seek a unitary hypothesis for all the methods of playing-in.

The same observation would apply to a theory that low-frequency electromagnetic fields were being directly beamed on to sensitive parts of the tape-recorder; it is not easy to see what part is being played by the microphone connection, necessary in the case of most tape-recorders with valves. Furthermore, the fields would have to be very strong ones, since the recorders have to be well screened against scattered fields, especially those of the mains network. No results were achieved by putting short pieces of aerial wire into the microphone input of Raudive's valve set.

We are entitled to assume that in all the recording methods a similar beamed input is involved. It must be a form of radiation, either entering already in the form of electromagnetic radiation or a form of radiation unknown to us which induces in our receiving apparatus a secondary electromagnetic effect or one which has similar effects to electromagnetic radiation. As the sets in the radio, auto-transmitter and diode methods are designed for reception of electromagnetic radiation, it would only remain to prove that the microphone voices really arose from this radiation. As, however, we regard this method anyway as unproductive, we conducted no further systematic experiments in this direction. The voices themselves often demand an actual radio screen (pages 171 ff.). The following investigations might be carried out however: one could replace the dynamic microphone with a coil of equal value or by fixing the microphone coil (oscillatory circuit effect); T conducted experiments with his transistorised tape-recorder, localising certain places in the circuit where he obtained reception of voices without the connection with any other appliance. There was a suggestion, and some investigations supported this, that the reception arrived via that part of the circuit which serves the premagnetisation of the tape (X), but T could not confirm this.

Optimum extension of the input circuits with respect to a hypothetical electromagnetic radiation. In the radio and auto-transmission methods, a definite type of beam (Graph 1) is picked out of the whole spectrum of rays; this, however, unnecessarily restricts the phenomenon, since the experimenter compels the voice to use the chosen type of beam and this could involve a limitation in the possibilities of making contact. A broad-banded reception is attained with simple apparatus using the diode screen. The voices can now utilise any given ray out of a broad gamut of radiation (Graph 2), and the middle frequency is obtained by the choice of inductivity and the scatter capacities present. Thus the whole jumble of rays which falls within this band is demodulated, including, as mentioned above, the (strong) radio stations which are also comprised within it.

Sensitivity as depicted in Graph 3 is to be preferred to that obtained with the diode screen; it could be so shifted within the frequency range that no strong interfering transmitter falls within its band. However, it must not be forgotten that a carrier is probably necessary for the voice-phenomenon; it might be possible, as it was in the auto-transmission method, to produce it by an auxiliary transmitter. One would have to find out whether this carrier would have to have a certain defined



A Amplitude, f Frequency of radio bearing.
The curves give a only stylised illustration.

frequency or whether it could be selected from anywhere within the band of reception.

We have some grounds for thinking that the use of high frequency radiation gives better reception than the medium wave band; tests have been made up to 10^{12} Hz. In the top ranges, moreover, interference from wireless stations practically disappears. Auxiliary transmitters could be very useful here.

Pre-amplification, possibly with special low-noise amplifiers, gives in all cases a better signal-to-noise ratio and also a hitherto unexplained selective differentiation from interfering radio programmes.

Voices have been received to date from all ranges of the radio spectrum, and experiments may be extended in the direction of infra-red. The full analysis of the content of the messages should clear up the question of whether the voices, as is supposed by researchers, differ primarily one from another as a function of the frequency of their carriers (12).

On the other hand, another supposition that needs testing is that we are, perhaps, receiving sub-harmonics from a relatively high frequency beam; the same voices occurred in intervals of the sub-harmonics, which suggests reception might be better at a higher frequency. Apart from an effect such as this, it still seems that we are receiving a normal, amplitude-modulated signal, consisting of a spectrum whose frequency band-width corresponds to twice the highest audio-frequency being broadcast. It is not as though the voices were being received "all over" a broad band, between the radio transmitters. It is obviously feasible to assume the existence of modulations in which a number of spectra are produced over a certain frequency range (deep sub-harmonics!). If the investigations confirmed multiple reception, we could test a receiving circuit—it would be rather an expensive one—in which the only amplification would be what is being received simultaneously on two separated channels.

Raudive has primarily concerned himself in his work with the facticity of the phenomenon; he has not hitherto allowed himself to be distracted by the variations and investigations of other such parameters, but has wisely carried out his experiments in the medium wave band with a minimum of changes of apparatus.

The origin of the radiated waves

We remain completely in the field of known technical processes so long as we do not enquire into the source of the rays. The casual critic is understandably prone to characterise our radiation transmitters as simply sources of radiation modulated with speech. To postulate the existence of other sources requires such an extension of present-day experience that the latent idleness within us prompts us to disown the new; as Helmholtz said, in a similar case: "As things stand, it's just impossible." But the scientist today is rather more cautious in rejecting the unusual than was his famous predecessor, Helmholtz.

The history of technical-scientific progress has often demonstrated the pattern that Science first cast cold water on a simple technical process, empirically founded, until such time as it became compelled, by reason of the cogency of the facts, to acknowledge and incorporate the new process (examples: the gramophone, the aeroplane, etc.).

Physics is now faced with the task of sorting out a mass of empirical and carefully gathered material in the phenomenon of the voices that is most unusual for paranormal phenomena in its fullness and cogency, and physics above all other sciences has, in recent centuries, grown chary of condemning unexpected results. In the narrow field of physical experiment, we have run up against many laws which have perhaps not been generally apprehended in all their unintelligibility, either because they are too little known or because only the technical application of the investigations was advanced (14).

Physics is a descriptive science, whose duty it is to order happenings in an incontestable system of laws; it would be unscientific, to reject the phenomenal as not lying within the competence of this science, because it may have no explanation for its content.

The first step is to demonstrate that the contacts can be harmonised with the laws of being and the second, coming much later, is the extension of the scientific philosophy of the universe, made necessary by the realisation of so far unattained and, hence, unexplored worlds.

It is wrong to believe ourselves forced by the energy theory to reject the phenomenon as being contrary to all other basic

experience. The energy which is here being demonstrated, although admittedly small in quantity, must come from "somewhere" (15). It is, however, easy to persuade oneself by calculation that when measuring, say the cooling of the environment or the decay of matter to redress the balance of expenditure of energy, the claim to exactitude is by far inadequate to prove that such a happening never took place. Moreover, it is a fact that the space in which the phenomenon is manifested is so far unrestricted.

The energy could emanate from other sources, as yet closed to human experience. Just as energy evaporates when neutrinos are created (16), so energy could in some similar, as yet unknown, reciprocal effect be transferred into "our" system. Man has certainly not yet discovered all forms of energy, and there is certainly so far no principle that forbids other forms. Moreover, we are not sure nowadays that the principle of energy actually applies to all reciprocal actions.

Although a rejection of the phenomenon of the voices on the basis of the law of energy is on principle unthinkable, yet the origin of the energy is peculiar. Even if we accept that the intelligence which is speaking to us is not itself delivering the energy, but is only directing it, transforming it or, at least, modulating it, yet a certain, albeit still smaller, amount of energy must still be getting added to it. Now, however, we have transferred the problem into that still greater and uncomprehended complex of questions which arise from the psychological or parapsychical direction given to physical occurrences.

There is certainly also a reciprocal action with the experimenter, as has been several times confirmed with the voices. There is complete experience available to show that people can give off electromagnetic radiation (17), and cases have been known where electrical apparatus has been activated by the presence of human beings (18). It may well be that the changes of energy with the experimenter have involved smaller quantities in the case of the voices than in other phenomena. It is scarcely to be expected that the experimenter, who is acting as a relay station for the transformation of electromagnetic radiation, should at the same time function as an amplifier. We covered the antenna of a diode screen completely except for a small opening in a metal housing. As

different parts of the experimenter's body were brought near to it, we might have expected that the voices would become louder, but it was not clear that this was the case. This experiment will also serve to oppose a one-sided animistic interpretation of the phenomenon.

Proceeding from the proof of the facticity of the phenomenon, which the examination of the contents of the messages has abundantly furnished, if we want to know more of the origin of the voices we must certainly continue the as yet ambiguous experiments with Faraday cages (19).

The framework of Physics

There is a daring hypothesis, made more probable through other results which cannot yet be discussed here, that electromagnetic radiation is only a part of a hitherto unknown and much larger complex (20). When making such an assumption as this, it is as well to remember that we do not yet know very much about electromagnetic radiation. Even though we may very well know its effects on matter and be able to exploit radiation in the technical field, every fundamental investigation has made it seem more enigmatic. For example: when a ray of light comes towards us, for the light itself our space and our time are not present; emission and absorption for electromagnetic radiation are in the same place and at the same time, even though in our sight long distances have to be traversed in long periods of time. Conversely, the inner dimensions and properties of radiation coming in our direction cannot be recognised by us; they constitute a transcendental world (Einstein's Theory of Relativity).

If we may make this reasoning a little clearer, insofar as this is possible in such a short survey, we may say that the present-day fundamental laws of Physics leave a lot of leeway even for phenomena such as are found in parapsychology. Previously the fundamental laws described definite courses taken by processes; an example of this was the laws with which the paths of the heavenly bodies were calculated. Observations which lay outside the scope of such laws were usually rejected out of hand, because they struck the investigators as impossible in the accustomed framework within which they worked; they were *mandatory* laws. Our fundamental laws today are

prohibitory laws; they tell us what is impossible. The principle of energy may serve as an example. These laws have proved themselves exceptionally useful in modern microphysics, inasmuch as all processes which are not by them forbidden could really be confirmed. It would be quite absurd to try to use these fundamental laws to reject the possibility of the phenomenon of the voices or an extension of the theory of electromagnetic radiation.

Though Physics may well be unable to dismiss in principle the phenomenon of the voices, yet it also finds it difficult to range it among known phenomena in the framework of a converging theory. There are, however, other phenomena too in the narrow field of Physics which are scarcely more susceptible of a satisfactory interpretation; we thus conclude that the answer to the problem must lie elsewhere. The material so far gathered together is so massive that a new scientific philosophy of the universe is needed to meet the facts. Such adaptations to the basic conception have often taken place in the past; thus, it was not false to regard the Earth as the centre of planetary motion, until such time as the need to construct a universal philosophy which would *meet the facts* dictated that the Sun should be recognised as centre (21). If we merely take as our base what we know already about electromagnetic radiation, it is almost impossible properly to comprehend the phenomenon of the voices. The above-mentioned psychical or parapsychical process of directional transmission presupposes some sort of transmitting apparatus which quickly become fantastic projections of the technical appliances, with which we are acquainted, in matter-free space. We come, then, to the belief that we must search for a formula to embrace both this phenomenon and electromagnetic radiation, such that what we have hitherto known about radiation will appear as a partial aspect, like a straight section cut through a body. The different contradictory aspects will then, like incongruent sections, all converge within the higher unity. Physics has often been in this situation before, and not least in the attempt to describe the riddle of light, or electromagnetic radiation; the conflicting representations of light in terms of waves and corpuscles are of the nature of these contradictory part-aspects so long as we persist in describing radiation by mechanical analogies, refusing to consider it as a unified phenomenon which lies beyond mechanics. We did at

first try to complete or replace the wave analogy, which was unable to describe all the phenomena, by the corpuscular theory, which belongs to the same category of being. The contradictions which confront us can only be resolved when we recognise that this radiation cannot be described in mechanical terms, but only by the laws that are inherent in it, and circumstances will probably dictate that this must be done if further experiences are to be co-ordinated. We shall continue the better to understand this phenomenon as we continually develop newer and superior modes of description.

Nor would the scientist be surprised; rather would he have recourse to a representation which meets the facts of the phenomenon, a representation in which space and time would have to be made starkly relative *vis-à-vis* our usual concepts, the opposition of animism and spiritism. In the phenomenon of the voices, modulation and transmission are no longer the same ideas, from the point of view of our space-time relationship.

It makes it more difficult to accept the necessity of extending the theory of electromagnetic radiation in the interests of the phenomenon of the voices that there is in practice absolutely no material available to support an exact theory; in addition, a whole series of suppositions is, scientifically speaking, irrelevant. The physicists would welcome the opportunity—and would thereby assist the cause of the phenomenon of the voices—to extend the knowledge of electromagnetic radiation. However much parapsychology today is thrown back upon the collaboration of physics, the paraphenomena must yet contribute in their turn to the creation of a new Physics.

But anyone who has had anything to do with the Theory of Relativity knows how hard it is to extrapolate into extended conceptual systems which strain the imagination; so easy is it to commit the error of once more reverting to the old accustomed manner of considering the facts. Our situation here makes one particularly prone to fall into the trap of adopting anthropomorphic conceptions when considering space and time.

Cogency of experiments

The scientist is ever more reduced to rely on the deposition of a few witnesses, or even of one only, though they should be

recognised as qualified. It is also sometimes found that the deposition relates to a single observation. The theories that are enunciated on the basis of such evidence are, as has been said above, often more unusual than Raudive's conclusions, for he, after all, is only confirming what generations of men before him, drawing on different sources, have witnessed. Paranormal phenomena have often been characterised, however, by the credulous being victimised by the incorrect depositions of unqualified witnesses, and this has created a climate of scepticism towards the unusual in parapsychology. However, the physicist would be very surprised if we did not here invoke the same criteria as apply to the exact sciences, namely, that a *single* true voice is necessary to prove the facticity of the phenomenon and a single true voice for each play-in is necessary to demonstrate the possibility of reproduction. It is, admittedly more difficult to draw conclusions as to the structure of the spheres that are communicating with us from what is said by the voices.

Further problems cropping up in the experiments

The following hints, though not unexceptionable, are given as stimuli and working hypotheses for other researchers:

(i) Effect of the moon. Is the full moon particularly favourable? It is here interesting to note that, in the early days of radio technique, the position and phase of the moon were confirmed as affecting the quality of reception (92).

(ii) The influence of geopathic zones over which experiments are taking place? Is the receptivity of the voices in general dependent on the place? Do static and dynamic electric fields play a part?

(iii) Since the phenomenon of the voices indicates a connection with the experimenter or any other persons present, it is obvious that the vitality of the participants plays a part and that the voices themselves demand a measure of concentration and seriousness. Raudive does *not* listen in to the play-ins (via headset or loudspeaker), whereas others consider this as without any influence on the incoming voices.

(iv) Even though we may not exactly know what is talking to us and how the process is being accomplished, yet we must surely take the possibility into account that our *vis-à-vis* is

also having his "technical" problems in establishing contact with us. (See certain voices on this point.) We must also allow the voices time to adjust and not expect an immediate reaction when a different set is being used. Some of the voices express themselves forthrightly on changes of apparatus, while other novelties are welcomed.

(v) If those worlds which the mystics describe are really talking to us, then the rules of conduct on which they insist could, to a certain degree, play a rôle (S has, for example, one voice that recommends him to stop smoking).

(vi) Another of S's voices demands adjustment of his consciousness, in the highest sense. When S doubts the origin of his voices, he gets practically no results.

These considerations are meant to indicate that our research object is not static; we are dealing with an active collaboration that is leading us to undiscovered laws that involve the experimenter. The experimentation requires much patience and a conscientious application to the problem of the technical positions that have to be made. This explains why Raudive's first work has not been followed up by series of technological experiments.

Notes

- (1) Three other researchers are named as T, S and X.
- (2) The circuits are described at length in the working instructions of the apparatus involved. In nearly every case, two different machines can have the playback transferred from one to the other.
- (3) The sound is here, in essence, reduced to its signal components, whose amplitudes are then represented graphically as a function of the frequency. Manufacturers of spectroscopic apparatus are, e.g. Muirhead, Kay Electric Company, MB Electronics, General Radio.
- (4) We understand that the Stanford Research Institute is studying this matter and has found that the human voice provides extraordinarily reliable identification, preferable, for checking purposes, to signatures and finger-prints.
- (5) Unit measurement of frequency: 1 Hz (Hertz) = 1 s⁻¹ (1 oscillation per second). It may be helpful to know that

- middle A in music is 440 Hz; doubling the frequency means, in musical terms, raising the note by one octave.
- (6) For an explanation of the term: high frequency carrier, see under "Critical judgement of the procedure".
- (7) Ideas for this parapsychical component may be found in the abundant literature on the magic of sound. One could, of course, also try to do the same thing with the other play-in methods.
- (8) T had success with Circuit 3, but Circuit 2 is only a blueprint.
- (9) T uses a commercial two-stage valve amplifier for shared aerials, to which the diode screen is coupled.
- (10) Valve set M 85 (is no longer manufactured). Two speeds—
9.5 cm/sec ($3\frac{3}{4}$ in/sec) (most used),
19 cm/sec ($7\frac{1}{2}$ in/sec).
Two tracks. Frequency range: 30–20,000 Hz at $7\frac{1}{2}$ in/
sec;
30–15,000 Hz at $3\frac{3}{4}$ in/
sec.
- Input voltage for complete volume control: microphone input 2.5 mV at 2 megohms; radio input 2.5 mV at 100 kilohms.
- (11) The voltages before and after this element stand in a non-linear relationship. It is not absolutely necessary to have a so-called rectifier characteristic in order to get demodulation.
- (12) An investigator in this field will not be afraid to combine the two following esoteric statements into a working hypothesis, namely, that the phenomena correspond to each other on different levels of voice-reception and that higher frequency stands for a higher standard of consciousness. Higher frequency radiation produces contact with higher spheres. On the other hand, the investigator who rejects a spiritistic attitude could interpret this observation also on a purely animistic level. When voices mention "radar", should we understand that we are in the presence of a directional beam, or that the investigator is being tried out, or that we should select the radiation band of military radar?

- (13) Oscillations whose frequencies stand in the relationship: $1 : \frac{1}{2} : 1/3$.
- (14) Examples: the quantum field theory is working on anti-particles which run *backwards* in time.
Matter has been reduced by the work of Rutherford and Bohr to the tiny atomic nucleus; it thus takes up only the hundred millionth part of the material phenomenon, and the remaining space is empty. However, modern theories, e.g. on the electron, see in its "neighbourhood", so much photo-energy that, not only is there finally nothing left for the actual material nucleus, but it would have to be made up of negative matter.
The tachyon theory requires particles with (mathematically) imaginary mass, etc.
- (15) In classical physics it stated, not that energy comes from nothing, but that it can only be transformed. Since the theory of relativity, it can admittedly also concern a transformation into or from matter.
- (16) Neutrinos produced by certain processes involving elementary particles can only with an unimaginably small amount of probability restore to "our" world the energy they have removed. They pass through the heavenly bodies practically without resistance.
- (17) e.g. the case of Ida Ronconi, in which Prof. Istomin, of Rome, found the emission of electromagnetic radiation to be of "considerable strength".
- (18) One may recall the incidents connected with Rechtsanwalt Adam in Rosenheim, Germany, investigated by Bender, of the University of Freiburg.
The number of investigations into the effects on geopathic zones and certain climatic influences of electromagnetic radiation (at least partially) is mounting up. A mutual effect between the radiation and the human body also appears to be proven.
- (19) By Faraday cage, we understand a chamber made radiation-free by being isolated by conducting material (a narrow mesh grid, steel plate). The mains feed must be very carefully filtered, or it would be better to work with battery sets. The screening effect should, in any case, be

tested with recording apparatus which has been sensitively adjusted.

(20) Unless it should turn out that we are dealing with a bearer of information who has no connection with electromagnetic radiation.

(21) The general theory of gravitation was only possible in a heliocentric system. Faraday, Planck, Einstein, etc., gave us a new outlook.

(22) e.g. *Handbuch der drahtlosen Telegraphie und Telephonie* (Handbook of Wireless Telegraphy and Telephony), Vol. 1, by Dr. Eugen Nesper, 1921, Springer-Verlag, page 454; *Funkbaster (Do-it-yourself Radio)*, Issue no. 14, 1933, page 220, Dr. K. Stoye, *Einfluß des Mondes auf elektrische Wellen (Influence of the Moon on electric waves)*.

St. Gallen

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Scientific Experiments and Evaluation.

by

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1. Introduction

I first heard about the phenomenon of the voices when I read an article in a magazine. As I was interested in the problem, both as a scientist and as a technician, I wrote to Dr. Raudive on 18 January 1970 asking him to meet me, and he agreed to do this at 4 p.m. on 13 February 1970. In the meantime I studied Konstantin Raudive's book: *Unhörbares wird hörbar (The inaudible made audible)*. The work is based on a sound scientific discipline and the author is revealed to possess a scientific sense, an impression which has since been strengthened. I myself have been concerned for some thirty years with the study of the fringe areas of scientific investigation and am, therefore, no newcomer to this sort of experience.

Dr. Raudive and I, therefore, duly met on 13 February 1970. I had just bought a sealed tape-recorder which we proceeded to use for the play-in.

I asked Raudive to demonstrate to me all the play-in possi-

bilities. We began with Professor Schneider's diode method, following this with playing in by the microphone, the radio and, finally, the auxiliary transmitter. All these methods have been exhaustively dealt with by Professor Schneider, and I do not need to say any more about them.

2. The play-in

A type M 85 Telefunken tape-recorder was used, and the play-ins proceeded as described above. As I had had no experience in listening, I was at first well aware that there was something on the tape, but I could not make much out of it. By copying Raudive I did, however, learn, step by step, to listen in.

I called on my deceased wife, my parents and my brother. My wife could be heard particularly loudly, at times with first-class reproduction. My mother and my brother, and a number of deceased members of Dr. Raudive's family, were also heard. It is quite impossible that this could have been produced by any sort of manipulation, because I had myself carefully checked the perfect state of the apparatus being used. I have concerned myself for some forty years with high frequency techniques; I have been in research, design and testing, and I have learnt to think and act scientifically. I may, thus, be permitted to pass some judgement on this phenomenon. The possibility of some trick of radio transmitters is completely ruled out, because we put questions that were answered. It would be impossible for a radio speaker to be saying Konstantin Raudive's name and surname, and even his pet name. I was also addressed by name. Most of the sentences were in Raudive's mother tongue or were in several languages; they were, in some way, compressed and fitted into a rhythm reminiscent of the Greek hexameter. I was personally able to make out the German words.

After a detailed examination, I retained a strong impression of Raudive's integrity and scientific standing; I was completely convinced by the truth of what I had experienced.

3. My own experiments

When I got home, I started experimenting myself. I made it my aim to investigate all the methods in turn and, where the need was so indicated, to improve on them.