along this pathway and halting at various levels of psychosexual evolution. The chief criteria to determine the stage of this development in any individual case, are found in the unconscious. The psychoanalytic technic alone can determine this. All the previously orthodox criteria of so-called group logic are usually camouflage substitute products. In the study of unconscious processes one may be able to determine, in a manner analogous to that used by the paleontologist to determine a geological horizon, just what stage the individual has reached in his psychosexual evolution. His dynamic strivings bear a direct relationship to this grade of development, and his constitutional diseases, speaking in general, develop in definite associations with his dynamic strivings. Dr. Jelliffe said he had developed this theme before this Society frequently and it was not necessary to go over the ground, but so far as the findings in any group of organs of the body were concerned, particularly so far as the Mott gonadal changes, the faulty psychosexual evolution of the individual, so far as his wish life were concerned—these because libido was turned away from the reality functions of life, were responsible for the changes in the bodily structures. The faulty *wish* caused the disease which structurally was expressed in regressive anatomical changes, and so far as *conduct* was concerned, by a series of *potency wish substitutes*.

Dr. Jelliffe then went on and discussed the work of S. A. K. Wilson and the striatum syndromes, bringing this author's contributions in line with the work done at the Paris Neurological Conference to which Wilson himself had contributed, and to the Braunschweig meeting where the same subject was discussed.

He promised to discuss the psychoanalytic movement at a later meeting.

At the close of Dr. Jelliffe's lecture, it was moved, seconded and carried, that a vote of thanks be accorded to the speaker for his very interesting and entertaining presentation.

The Society then adjourned.

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

REGULAR MONTHLY MEETING, FEBRUARY 16, 1922. DR. F. H. PACKARD, PRESIDENT, IN THE CHAIR

AN EXPERIMENTAL STUDY OF THE MECHANISMS OF HALLUCINATIONS

Dr. Morton Prince presented this paper in which he reported upon the results of an experimental research in the mechanism of hallucinations. The traditional theories, he said, which could be classified in two groups—anatomico-physiological and the psychological—were all unsatisfactory. As the result of previous study Dr. Prince had reached the conclusion that visual hallucinations were the emergence into consciousness of normal imagery pertaining to

subconscious processes. The method of investigation previously employed by him was that of introspection in hypnosis, by which memories of subconscious processes were obtained. It remained to prove this theory by objective methods.

For the purpose of such a research there was required a subject who exhibited both visual hallucinations and synchronously occurring subconscious processes which could be "tapped" by methods permitting physical records of the same to be obtained, namely, so-called automatic, *i.e.*, subconscious, writing. Such a script, of which *the subject was not consciously aware during its production* would obviously be a physical record of ideas occurring subconsciously and if a hallucination occurred synchronously its imagery might be correlated with the ideas of the script if the theory was valid.

Such a subject, one that had previously reported the occurrence of visual hallucinations while automatic script was being unconsciously produced, was at hand. The technique of the experiments was as follows:

The head of the subject was covered with an opaque cloth to prevent her seeing the script as it was being written automatically by her hand. A pencil was then put into her hand which rested conveniently on a sheet of paper placed on a writing tablet by her side. She was then told to write automatically regarding some subject which was designated in general terms in each experiment: for instance, a memory of some remembered episode in her life; a memory of such an episode, but one forgotten by the subject; a fantasy; a fabrication requiring constructive imagination; etc. The object of diversifying the subjects was to obtain products of different kinds of subconscious work (memory, dream-like fantasy, imaginations, etc.). If, during the experiment while the hand was writing, a hallucination developed, the subject was directed to indicate the fact the moment she saw it by exclaiming, "picture". Thereupon a mark was made on the script at the point where the picture appeared. Likewise the moment the hallucination disappeared the subject exclaimed as directed, "gone", and the point was similarly marked on the script. Thus those words of the script which were written during the occurrence of any given hallucination could be identified and could be compared with the latter and any correlation of the written ideas and the hallucinatory images noted.

Under these conditions it was found that *the writing of the script by a subconscious process was accompanied by a synchronously occurring hallucination.*

After the observation was complete the script and the hallucination as recorded were compared and for this purpose arranged in parallel columns. Thus any correlations between the imagery of a hallucination and the synchronously written script could easily be noted. (The paralleled results, script and hallucination, were exhibited on the screen by lantern slides.)

On comparing in this way the description of the hallucination with the script it was easy to recognize that *the images of the hallucination corresponded with the ideas recorded in the script and were*

such as normally would be the imagery contained in those ideas. For example: the script described a memory of a particular scene in a room at "Harvard University" and the imagery of the visual hallucination was an exact reproduction. The script was a verse describing in allegory a treasure chest, a fountain, golden musical instruments, etc., and the synchronously occurring hallucination was a perfect visual representation of those ideas, such as normally would be the case. The script described a fabricated romance and the personages of the romance and the local scenes were faithfully represented by the visual imagery of the hallucination; and so on.

After the observations were made the subconscious process was directed to answer in writing a questionnaire directed to ascertain what sort of process occurred subconsciously during the hallucinations and the relation of the one to the other. The script testified that during the production of the script images corresponding to the written ideas appeared first subconsciously, without the subject being consciously aware of them, and that then *those images emerged into awareness as the hallucination.*

A second series of experiments was made, the converse of the preceding. That is to say hallucinations were primarily produced by fixation of the attention and the automatic script employed to determine what sort of subconscious process, if any, and its content, occurred synchronously.

The results were the same as in the preceding series.

Auditory hallucinations were found to have the same mechanism as was also the case with the imagery of a dream.

The following conclusions were drawn: (1) There is a type of visual hallucination in which the imagery has its source in a dissociated mental process of which the subject is not consciously aware. Such a process is by definition a subconscious one; (2) The content of this subconscious process contains images identical with the normal imagery of conscious thought; (3) The hallucination is due to the emergence into consciousness of the previously subconscious images. This emergence necessarily results in a hallucination in that the imagery of the latter is not related to the content of the conscious train of thought but is foreign to the latter. This is a necessary consequence of the imagery being normal elements in a separate dissociated train (mental process); (4) The subconscious process is essentially a co-conscious one of thought; (5) There is a type of auditory hallucination which has essentially the same mechanism; (6) As there is a type of hallucination (visual and auditory) occurring in the insanities which is identical in form, structure and behavior with that produced experimentally in this study, the conclusion is justified that such hallucinations of the insane are due to the same mechanism; (7) The implication follows that when hallucinations of this type occur in the pathological psychoses, they are indications of the activity of a dissociated subconscious process as a factor in the psychosis; (8) The hallucinatory phenomenon carries the further implication that the genesis and psychopathology of the psychosis are to be found in the forces which have determined the dissociation

and motivated the subconscious process; (9) It is not to be assumed that all hallucinations have the mechanism of the type here studied. It is possible that in those occurring in the intoxication psychoses and in certain forms of organic brain disease, particularly where the hallucination is of a simple unelaborated static structure, the imagery is induced by direct irritation of the cortical or subcortical neurones. It is difficult, however, to exclude the possibility that the intoxicating agent or organic process simply removes inhibition and permits subconscious dissociated processes to function. Nor can we find any analogy with the known effect of irritation of motor and other areas of the brain. Irritation, as observed, produces simple movements and simple sensory phenomena (noises). Still, the possibility of irritating factors becoming the immediate excitants of organized complexes of neurones underlying the hallucinations, cannot be excluded. This theory, however, needs to be proved. Even the irritative theory, as opposed to the psychogenetic theory, permits of the interpretation that the irritation excites a dissociated subconscious process from which images emerge into consciousness; (10) The psychological problem of differentiating between normal imagery and hallucination disappears in that they are identical, the hallucination being only the normal imagery of a dissociated subconscious process; (11) If the evidence given by subconscious introspection be not accepted, a possible interpretation of the hallucinatory imagery is that the images do not themselves occur primarily as subconscious elements, but by the same mechanism appear in awareness as the conscious correlates of a co-active dissociated physiological process. In other words, a subconscious process is neural, not psychical. On the other hand, such an interpretation does not take into account a large mass of collateral evidence for the psychical nature of processes occurring outside the field of awareness; (12) So far from a hallucination being a regression to an infantile form of thought (Freud), it is an element in highly developed adult thought processes; (13) The mechanism of the imagery of some dreams is the same as that of the hallucinations of the type here studied.

Discussion: Dr. Donald Gregg asked how can one determine that what is being written is unknown to the individual?

Dr. Prince said that in one sense one cannot, any more than one can tell when a person comes into the office and says that he has a pain in his back, that he is telling the truth and is not a malingerer. It must be borne in mind that automatic writing, like lumbago, is a very common phenomenon and has been observed and recorded by a large number of experimenters in all countries. It is, therefore, a well established phenomenon. It is always possible that any given person may be a malingerer and the question, if raised, must be determined as in the malingering of other conditions. Let no one imagine, however, that medical men and scientists generally have a monopoly of integrity. The particular subject who was used in these experiments had written a very large amount of material long before she came under my observation. She wrote automatically for her own pleasure. A number of investigators have trained them-

selves to write subconsciously and their testimony is unimpeachable. It is not a difficult thing for some people to acquire. In an audience like this, no doubt two or three automatic writers given proper conditions could be found; then after say a month's practice and training a fair percentage of those present probably could produce automatic script.

Dr. Donald Gregg asked if this particular individual knew what she was writing?

Dr. Prince said no. Automatic writers differ very much in this respect. Some have no awareness at all of what the hand is writing and indeed may not know that the hand is moving at all for in some cases the hand becomes temporarily anesthetic during the production of the script, as was first shown by William James. In other cases the written ideas of the script emerge into consciousness during the writing and yet it is automatically or subconsciously produced, as is shown by the fact, in such cases, that if the writing is stopped at any given moment the writer is found to be ignorant of what is going to be written and cannot consciously finish the sentence and the theme.

Whether or not the subject is aware at the moment of what the hand is writing is not in principle of importance for the script is still produced automatically. It may be of importance only for the particular experiment that is being made. Then again, writing may be obtained from a person who had previously had complete anesthesia of the hand. The subject therefore cannot tell through the muscular action, what the hand has written or know that the hand has moved at all.

An important phenomenon, frequently observed during subconscious writing where the subject is unaware of the written ideas, is the emergence, not of the ideas, but of the *affect* pertaining to the subconscious process. The affect of exaltation or joy, or depression or fear, may thus emerge into consciousness when such an affect does not belong to the conscious thoughts of the writer but can be traced to the subconscious process. This phenomenon I have observed hundreds of times under experimental and other conditions. I believe this to be the mechanism of the emotional state in many of the psychoses such as manic-depressive states, some phobias, and even in many normal conditions. The affective condition is due, as I have said, to emergence into consciousness of the affect belonging to a dissociated subconscious process.

In answer to the question whether a subject can perform another action at the same time that he is writing, Dr. Prince said, in general, yes. But the performance of the action differs somewhat with its nature. He can perform all ordinary movements, subject of course to the necessity of writing at the same time. He can observe accurately everything going on about him, such as watch and recognize accurately and without confusion what is passing in the streets, comment upon and enjoy the situation, read aloud from a book, and so on. In the last instance, however, he is liable to go into a dreamy state, in which he keeps on reading. The trouble here is, I think, that it is difficult, even if possible, for two different processes to make

use of the language function at one and the same time. There is apt to be blocking of one by the other. On the other hand, according to my experience, an automatic writer can passively observe, think freely and reflect upon what he observes while the automatic writing is being produced. During the writing by such subjects, as I have observed, it was difficult for the subject to find the precise language in which to express his conscious thoughts. In other words he seemed to be largely robbed of the language function by the writing subconscious process.

Dr. D. A. Thom asked if the emotion of the subject were appropriate to the hallucination she was going through?

Dr. Prince said: Yes; in this connection, as an example of the emergence of the mood belonging to the subconscious processes, I may cite one observation in this study which is of interest. When the subconscious system wrote as a joke a pretended spirit message and while this system, under interrogation in regard to it, manifested through the script, a humorous, almost hilarious mood, the subject herself without obvious reason was consciously in high spirits, joyful and felt the spirit of fun. Later, during the latter part of the examination, when the subconscious system wrote bitterly and remorsefully of the past, confessing subconscious sins, the subject remarked during the production of this script, without knowing what the hand had written, "I feel serious now. All my high spirits and feeling of fun have left me. I have a sad, remorseful feeling".

I am astonished that psychiatrists have not made use of induced hallucinations in order to study the mechanism of hallucinations in the insane. Here is material and the method right at hand for experimental studies. The observations can be controlled, the hallucinations traced to their origin, etc., and we have at least an approach for attack of this and many other psychiatric problems. Likewise automatic writing is a most valuable means of research. [Has been done for many years by other instigators. See Literature by Silberer.—Ed.]

In reply to the question if it were as easy to get automatic writing from the insane as from normal people, Dr. Prince said: Unquestionably, no. It is necessary to have complete coöperation between the subject and the experimenter and in most insane people that is impossible. Then, too, the dominating mental processes of the insane block the impulses of any subconscious processes that might be stimulated to write automatically. On the other hand there are many borderline cases, like those of the early stages of dementia praecox, in which automatic writing might be easily obtained and the experiments of the kind I have mentioned carried out.

Dr. E. W. Taylor asked: How about febrile delirium? He recalled a study made some years ago by Dr. Prince of a postpneumonic delirium in which you were able to explain the character of the hallucinatory phenomena that resulted.

Dr. Prince said it was a case in which during the delirium there were in activity normal co-conscious processes which perfectly oriented the situation, recognized clearly the delirious character of

the conscious process and fully explained the delirium, and hallucination. He had observed this phenomenon several times. In this connection he mentioned an experiment which he made comparatively recently in the case of delirium during typhoid fever and continuing during convalescence. He was asked to relieve the insomnia present by hypnotic suggestion. As he had a suspicion as to what might be the psychogenic cause of the delirium he took the occasion to make the experiment, although he had little expectation at the time of success. While the patient was in hypnosis he made various explanations and suggestions along the line of the hypothesis which he had formed as to the real cause of the delirium. The patient was living at that time in the country. He left him fast asleep and returned to Boston. He had hardly reached his house before the telephone rang and to his surprise the patient was at the other end and reported, to his great delight, that he had entirely recovered; that he recognized the delirious character of his ideas and that he was all right again. His delirium disappeared for good and to his surprise his experiment was a success. His explanation was that the delirium at the time of the experiment was entirely functional. Whether this was its nature during the fever it is, of course, impossible to say, but if not it must have become transformed into a functional delirium. In the case of pneumonia, to which Dr. Taylor referred, he thought it must have been a functional delirium from the beginning.

Dr. E. W. Taylor asked if he thought such a method could be used generally?

Dr. Prince said he thought not and practically for the same reason that the method is not practical in most cases of insanity. Perhaps, however, it might be used more than one thinks.

Dr. F. H. Packard said he understood Dr. Prince to mean that the toxic condition had disappeared, when the experiment was made, that there would be more chance of success under those circumstances than during the toxic period.

Dr. Prince said: Precisely, if the primary delirium is really due to the effect of the toxemia. But I think that this pathology may be fairly questioned. To my way of thinking it is more probable that such delirium is due to the loss of suppressions. The toxemia paralyzes the normal inhibitions thus permitting the abnormal processes constituting the delirium to take place, somewhat after the fashion of dreams.

Dr. E. W. Taylor said that in the hallucinations of smell which we occasionally see in tumor of the temporo-sphenoidal lobe, there certainly appears to be a structural origin.

Dr. Prince said he thought one might get a simple sensory phenomenon from a structural origin, such as a smell, a flash of light, or a noise like buzzing or whizzing, but not a complicated process—like a visual picture or the musical strains of grand opera; that is to say, elaborate ideas with meaning.

Dr. E. W. Taylor said the original stimulus is certainly organic, whatever the elaboration of it may be.

Dr. Prince said simple sensory and motor phenomena may result from the pure stimulation of an organic process, but elaborate hallucinations are not built up. He said he had not found any accounts of such cases in the literature. Organic irritation of a motor center will produce simple movements like the flexion or extension of a limb; but did you ever hear of an organic irritation or a motor area exciting the complicated movements of a baseball pitcher—spitting on the ball, rubbing his hands in the mud, winding himself up and then delivering a curved ball to a “Babe Ruth”? That is practically what one is asking an organic process to do in producing analogous sensory and ideational phenomena by this theory.

Dr. Hugo Mella asked: What is the theory of the mechanism of suppression in the nontoxic cases?

Dr. Prince said in such cases there is conflict, repression and consequent dissociation followed by the motivation of the dissociated system as a subconscious process by some strong anxiety, wish, aspiration or other impulse. The original break up in this patient, for example, was due to a conflict between two sides of her nature, one longing for another, an intellectual life, believing that she had musical and other talents and hating the banal life she was obliged to follow; the other side motivated by the ordinary sense of duty and obligation and certain urges. It would take us too far away to go into these.

In reply to the question by a member whether he “asked the subject a question which was really directed to the subconscious and answered by the hand”; he said that this inquiry raises a very complicated problem. As ordinarily expressed, “I asked the hand, or the subconscious, a question”. This, of course, while the subject was not hypnotized. That seems a paradox. It is, of course, a figure of speech. And, after all, it is a figure of speech to speak of the subconscious as a separate mind. We are really dealing with different mental systems or complexes of which the mind is constructed and which are more or less closely integrated into one mind. They are all one mind and there is only one mind, however much the different systems of which it is composed may be temporarily disintegrated. In the latter condition the systems are out of gear, out of harmonious integration and coöperation. And yet by simply talking to a person you can reach the dissociated systems. It is not necessary to hypnotize the subject and bring these systems into the content of conscious awareness. Let us speak in terms of stimulus and reaction. A given stimulus strikes and awakens a reaction from a system which is so organized and attuned to it that it will react. Otherwise no reaction will follow. Thus, for example, if the composite content of conscious interest is solely occupied with thoughts and affects of a baseball game, a stimulus suggestion related to religion and going to church will awaken no reaction from the baseball content of conscious awareness, but it will, or may, strike and awaken a reaction from a subconscious system of religious memories, ideas and emotions, even though it be dissociated and though the memories be consciously forgotten. In practical therapeutics this

principle is of the greatest value. However the fact be explained, the fact remains that questions and suggestions can stimulate and awaken a reaction from a dissociated system even though they have no meaning for the content of conscious awareness of the moment. The personality can be compared, in a way, to a complex manufacturing establishment, like the Ford plant. There is the casting department, the department where cylinders, gearing, bolts, nuts, wheels, bodies, etc., are made, and the assembling department. All are under a central executive control. Accordingly they all work harmoniously. But sometimes a strike occurs in one of the departments; the cylinder department refuses to cooperate and make cylinders. Not only efficiency is impaired, but economic adjustment of production of the integral parts to the total output is disarranged. The executive must get in touch with the group of strikers. He can do so without disturbing the other departments. Any questions, directions, or appeals to the strikers will not awaken a response from the other departments that are at work. In the same way we can have a strike in any of the different systems of the mind and it can be settled in the same way—by arbitration, conciliation, persuasion, or suggestion.

Of course our knowledge of the integration of the systems of the mind is very superficial and any explanation is incomplete. We can hold, however, to the empirical facts of experience.

As to psychotherapeutics: it is an art, not a science, though it makes use of scientific principles. This is one of the difficulties in teaching it. You can teach principles but their application is an art that comes from experience, like painting a picture.

As to the principles, what I am now going to say may sound very arrogant but I am going to say it: To investigators who have had a long training in psychological phenomena and particularly subconscious phenomena, and are familiar with them from personal observation and experimentation, as a bacteriologist is trained in bacteriology and a physicist in physics, the Freudians for the most part seem like amateurs, because very few, if any, show by their writings that they are familiar by personal training and experience with all the phenomena of the subconscious. What would you think of a person who undertook to formulate laws regarding the electrons, atoms, electricity and determine the ultimate nature of matter who had only read the writings of physicists and whose own experiences were limited to the phenomena obtained from an amateur's wireless outfit, or to studying the discharge from a particle of radium or an X-ray machine? Even Freud, himself, has never shown by his writings that he possessed the requisite training and experience, though he may not have disclosed it. Indeed he has repudiated the use of methods of research which others have found to be essential. One must know all the phenomena of the mind and not only those obtained by a single method of research like that of "free association" if one is to reach sound conclusions regarding the laws of the mind.