Hypnotic and post-hypnotic appreciation of time : secondary and muliplex personalities / by J. Milne Bramwell.

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Hypnotic and Post-Hypnotic Appreciation of Time; Secondary and Multiplex Personalities

BY

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Hypnotic and Post-Hypnotic Appreciation of Time; Secondary and Multiplex Personalities.

By J. MILNE BRAMWELL, M.B., C.M.

I commenced to employ hypnotism as a therapeutic agent in 1889, and in less than two years treated over 500 patients; of these 48 per cent. became somnambules, *i.e.*, were unable when hypnosis terminated to recall the events of hypnotic life. Having observed that the curative effect of suggestion was increased by prolonged hypnosis, I frequently suggested to my patients that they were to remain in that state until a given hour—usually that of their next meal—and then left them. Although rarely present at the conclusion of the experiment, I obtained ample and trustworthy evidence that hypnosis invariably terminated at, or within a few minutes of, the hour indicated, and thus accidentally discovered that deep hypnosis was associated with an increased appreciation of time. These observations—the by-product of therapeutic work—led to more careful experiment with somnambules, the majority of whom were males and all in good health. The following were the usual suggestions given: (1) A simple act was suggested during hypnosis which was to be carried out at a given time

before that state terminated. (2) The subject was told during hypnosis that this state was to terminate at a specified future hour. (3) The performance of a simple act at a given hour after the termination of hypnosis was suggested. (4) Awakening from natural sleep at a given hour was suggested during hypnosis. (5) The subject was told in the waking state that he was to pass into the hypnotic condition at a given hour, remain hypnotised for a specified length of time and perform certain simple acts at stated intervals; then pass again into the normal state and remain in it for a specified time, and again pass into the hypnotic condition. These experiments, continued from 1889 to the present date, have been frequently repeated before competent observers. The majority of the suggestions were executed at the moment indicated, while in the remainder the error in time appreciation rarely exceeded five minutes. In every instance, except those referred to in group No. 4, the subjects were carefully watched from the beginning to the end of the experiment.

Similar phenomena have been observed by nearly all who have done practical hypnotic work, and I have seen experiments resembling those just cited reproduced in various foreign cliniques. Two, formerly regarded as the most remarkable of their kind, were made by Beaunis and Liégeois. In one of these a visual hallucination appeared after a suggested interval of 172 days, and in the other after 365. The late Professor Delbœuf, however, pointed out in reference to all such experiments that even in the longest a fixed date had been impressed upon the subject's mind. Thus, Beaunis' subject was told that the 172nd day was New Year's Day, and Liégeois' was impressed by the fact that the suggestion was to be executed in a year from the time it was given. The experiments, therefore, did not involve the carrying out of a suggestion after the lapse of so many days, which the subjects were supposed to count as they passed, but simply on the arrival of a fixed and easily recognised date. This objection applies with great force to my earlier cases. In every instance a specified hour was suggested; and, in order that the subjects

might be conveniently watched, the time involved rarely exceeded a few hours. This point will be again referred to in treating of the theoretical explanation of the appreciation of time. Meanwhile, I wish to draw attention to the experiments made by Delbœuf with the object of eliminating an easily recognised fixed date from the suggestions.

Delbœuf's Experiments.

These occupied a week, from Saturday, October 2, to Saturday, October 9, 1886. His subjects were his two maid-servants, J. and M., sisters, aged respectively 20 and 23. All the experiments were of a similar character; from time to time during hypnosis the subjects were told that they were to do something at the expiration of a certain number of minutes, an interval of waking life always intervening between the suggestion and its fulfilment:—

*Exp.** 1.—Sat., Oct. 2, 1886; subject J.; time 6 a.m. *Sug.:* At the expiration of 350 m. J. was to ask Delbœuf if she should harness the donkey. Delbœuf's wife was ill and went out in an invalid carriage drawn by a donkey, but J. had nothing to do with it; thus her question would be unusual. *Res.:* The impulse to ask the question came into J.'s mind at the time it was due, but she successfully resisted it.

Exp. 2.—Subject M.; time 8 a.m. *Sug.:* At the expiration of 350 m. M. was to ask Madame Delbœuf if she would like to go out. Under the circumstances the question would be an unusual one. *Res.:* At 1.50, the hour indicated, M. was impelled to ask the question, but as she happened to be in the village on an errand, was unable to do so. She returned at 2.30 and carried out the suggestion.

Exp. 3.—Mon.; subject J.; time 9.15 a.m. *Sug.:* In 900 m., *i.e.*, at 12.15 a.m., J. was to go into the bedroom of one of Delbœuf's children and pull his ear. *Res.:* Suggestion carried out 95 m. too soon.

Exp. 4.—Subject M.; time 9.25 a.m. *Sug.:* M. was to embrace Mlle. H. Delbœuf at the expiration of 700 m. *Res.:* Twenty-five m. before the suggestion fell due M. looked for Mlle. H. Delbœuf in order to embrace her, but could not find her.

* Exp. = Experiment. Sug. = Suggestion. Res. = Result. d. = days. h. = hours. m. = minutes.

Exp. 5.—Subject M.; time 10.4 p.m. *Sug.:* In 900 m. M. was to embrace Mlle. C. Delbœuf. *Res.:* At the time indicated, *i.e.*, 1.4 on Tuesday afternoon, M. was having her lunch with the other servants when she suddenly got up from the table, sought and found Mlle. C. Delbœuf and carried out the suggestion.

Exp. 6.—Tues.; subject J.; time 6.30 a.m. *Sug.:* At the expiration of 1,600 m. J. was to pull the cook's nose. *Res.:* Suggestion carried out 60 m. too soon.

Exp. 7.—Subject M.; time 6.45 a.m. *Sug.:* At the expiration of 1,150 m. (Wed., 1.55 a.m.) she was to go into the cook's bedroom and pull her by the ear. (The cook was told what was likely to happen.) *Res.:* At the exact hour the subject had a strong impulse to carry out the experiment, but resisted this until 4.15 a.m., when she gave in and went to the cook's room. The cook laughed, whereupon M. said: "If you laugh I shall pull your ear."

Exp. 8.—Wed.; subject J.; time 9.55 a.m. *Sug.:* At the expiration of 1,300 m. (Th., 7.35 a.m.) J. was to ask Madame Delbœuf if she would like to have her hair dressed. *Res.:* Suggestion carried out 69 m. too soon.

Exp. 9.—Subject M.; time 6.55 a.m. *Sug.:* At the expiration of 1,500 m. (Th., 7.55 a.m.) M. was to ask Madame Delbœuf if she required anything. *Res.:* Suggestion carried out with absolute accuracy.

Exp. 10.—Friday; subject M.; time 6.30 a.m. *Sug.:* M. was to feel sleepy at 10 p.m.; go to bed and sleep profoundly. *Res.:* Correct.

Exp. 11.—Subject J.; time 9.15 a.m. *Sug.:* At 11 p.m. J. was to go into M.'s room and give her a complicated suggestion to be carried out at 5.30 next morning. *Res.:* J. went to bed at 10 p.m. in her own room and quickly fell asleep. At 10.50 p.m. (10 minutes too early) she went to her sister as suggested, but could not afterwards recall what she had said or done.

Exp. 12.—Subject M. *Sug.:* M. was to execute the orders just referred to at 5.30 a.m. She did nothing, however, beyond carrying out the first part of the suggestion, *i.e.*, that she should go to bed and sleep profoundly, and was unable to remember whether her sister had said anything to her or not.

Exp. 13.—Sat.; subject J.; time 9.30 a.m. *Sug.:* At the expiration of 3,300 m. J. was to ask Delbœuf if she should carry a small ladder to the pear tree. *Res.:* The impulse to ask the question arose 90 m. too late, but J. did not give way to it.

Exp. 14.—Subject M.; time 10 a.m. *Sug.:* Similar to the last to be executed after a like interval. *Res.:* Identical with the above, but 90 minutes too soon.

Summary.

There were in all fourteen experiments. The suggestions, to be carried out after the lapse of 350, 900, 1,600, 1,150, 1,300 and 3,300 minutes respectively, were made at varying hours of the day and night, while some fell due at night after the lapse of several days.

Results.

Three of the suggestions were fulfilled at the moment they fell due; four were carried out, but not at the exact time. In three an impulse to carry out the suggestion arose at the right moment. In one of these, the subject successfully resisted the suggestion, in another, she was accidentally prevented from executing it, while in the third, she struggled against it for two hours and twenty minutes and then carried it out. In three, the impulse to carry out the suggestion arose, but not at the correct time. In one of these cases accidental circumstances alone prevented the suggestion from being carried out, but in the two others, the subject successfully resisted it. One alone, No. 12, failed completely, but this may have been due to the fact that No. 11 was not fulfilled in its entirety, *i.e.*, it is doubtful whether J. gave the requisite orders to M. As, however, the essential fact in the experiments was not the actual carrying out of trivial and sometimes absurd suggestions, but the patient's recognition of the terminal time, the cases in which an impulse arose at the correct moment must be classed amongst the successes. The number of these is thus raised to six, while of the eight remaining experiments seven were partially successful. Of the latter four were carried out and an impulse to execute the suggestion arose in the other three, but in none was the time accurate; the error varied from a tenth to a thirty-seventh of the interval.

Remarks.

J. and M. were strong healthy peasant girls, who had frequently been hypnotised and were both good somnambules. At an earlier date, Delbœuf had made the following experiment with J. After explaining what he proposed to do, and obtaining

her consent in the waking state, he hypnotised her, extended her arms on a table, and suggested that the right should be insensible to pain. Each arm was then burnt with a red-hot bar of iron, 8 millimetres in diameter, the extent and duration of its application being identical in both, but there was pain in the left arm alone. The burns were bandaged and J. sent to bed. During the night the pain in the left arm continued, and next morning there was a wound on it, 3 centimetres in diameter, with an outer circle of inflamed blisters. On the right there was only a defined eschar, the exact size of the iron and without inflammation or redness. The day following the left arm was still more painful and inflamed; analgesia was then successfully suggested, when the wound soon dried and the inflammation disappeared.

Later J. married and was 29 years of age when her first child was born. She was attended by Dr. Fraipont, Lecturer of Gynæcology at the University of Liège, while Delbœuf induced hypnosis and made suggestions of analgesia. When J. was aroused from the hypnotic state, after the birth of the child, she was unable to recall anything that had occurred.

J. and M. were very imperfectly educated and could with difficulty tell the time by the clock. It was impossible for them to at once reduce such a large number of minutes as 400 into hours and they were obliged to proceed by successive additions, thus:—1 hour = 60 minutes; 1 hour and 1 hour makes 60 + 60 = 120; 120 + another hour makes 180, and so on. Before reaching 360 they had often made mistakes, and, no matter what method they adopted, were absolutely incapable of reducing such numbers as 1,600 and 1,150 minutes into hours. Further, supposing they recalled the suggestion on the termination of hypnosis and noted what o'clock it was—which they neither did nor could do—they would still, for example, have to determine by mental calculation the hour which corresponded to 6.45 p.m., increased by 1,150 minutes, a feat entirely beyond their powers.

Later, in order to discover whether J.'s hypnotic arithmetical powers exceeded her normal ones, Delbœuf put the following problems to her during hypnosis:—(1) "Turn 350 minutes into hours." Answer: "Six hours. No, five and a half hours." (2) "Turn 1,200 minutes into hours." A. "Fifteen hours. No, twelve and a half hours." (3) "Turn 150 minutes into hours." A. "Two and a half hours." (4) "Turn 240 minutes into hours." A. "Two hours." "Think!" Answer, after two minutes, "Four hours." (5) "Turn 300 minutes into hours." Answer, after five seconds' calculation, "Four and a half hours." Then,

after a further calculation, "Five and a half hours." Finally, "Five and three quarter hours." Delbœuf asked J. to explain the last calculation to him. She replied: "This makes five and a half hours plus 3 times 10, which makes five and a half hours exactly." Delbœuf tried to help J. as follows:—"How much is 60 + 60?" Answer, "120 minutes." "120 + 60?" A. "180 minutes." "180 + 60?" Answer, after a long hesitation, "240 minutes." "240 + 60?" A. "290 minutes." J. had spent ten minutes over attempting to solve the last problem and showed great signs of fatigue. Delbœuf did not consider it necessary to push the questions further. It is to be noted that M. was a somewhat better arithmetician than J., and that, in the experiments referred to, her results were more accurate than J.'s.

Further Time Experiments.

The following were inspired by Delbœuf's, and the results were so remarkable that I feel justified in giving as many details as possible, in order to present a fairly complete picture of the subject of the experiments, and of the circumstances under which they were carried out:—

Miss A., aged 19, was sent to me by Dr. de Watteville for hypnotic treatment, on Sept. 2, 1895. Her health had been good up to twelve months previously, when violent muscular tremor of the right arm and hand commenced. After a few weeks this spread to the right leg, and then to the left arm and leg; the tremor ceased during sleep, but only then, while walking was always difficult and painful. There was almost constant diffused headache. During the last four months, there had been frequent attacks of pain in the region of the heart. After the patient had looked at a bright object—especially anything blue—everything else appeared of that colour; this impression persisted for about an hour, while its disappearance was always sudden and accompanied by a feeling of faintness. Menstruation began at 11, and was always painful, and there had been obstinate constipation from infancy. Her illness began after over-exertion and mental strain, the result of nursing a relative who died. There had been no previous hysterical symptoms and the family history was good.

Treatment.—Electricity, massage, careful drugging and change of air.

Result.—No improvement.

I succeeded in inducing fairly deep hypnosis at the first attempt; and this was repeated on September 4, 5, and 6, when the tremor almost entirely disappeared. From then to October 30 she was hypnotised on seven occasions. *Res.:* No tremor or other morbid symptoms. Bowels regular. Last period free from pain. Fourteen pounds gained in weight since beginning of treatment. No abnormal colour perceptions. Returned to work.

Remarks.—Hypnosis became more profound each time it was induced, and at the seventh séance Miss A. reached the stage of somnambulism, *i.e.*, she was unable in the normal state to recall the events of hypnotic life. From this date she could at once be made analgesic or anæsthetic by suggestion; touching the cornea or tickling the back of the throat with a feather produced no reflex, and the passing of a needle deeply into the flesh was unattended by pain.

During treatment suggestions had been made fixing the hour at which Miss A. was to fall asleep at night and the moment at which she was to wake in the morning. As these were remarkably successful, it occurred to me that she might prove a good subject for experiments similar to those of Delbœuf. Miss A. was an intelligent girl who had received an ordinary School-board education, and her arithmetical powers were in keeping with this; she could do ordinary sums in multiplication and subtraction with the aid of a pencil and paper, but failed, unless they were extremely simple, to solve them mentally. Notwithstanding this, she asserted that she had been the best in her class at mental arithmetic. She possessed no particular aptitude for appreciating the passage of time.

Exp. 1.—Nov. 5, 1895; time 4 p.m. Suggestion given during hypnosis: At the expiration of 5 h. and 20 m. Miss A. was to make a cross on a piece of paper, and write down the time she believed it to be without looking at clock or watch.—*Res.:* The suggestion was carried out the minute it fell due. *Remarks:* On this occasion I did not say anything to Miss A. about the experiment, either before or after hypnosis, and, being a somnambule, she retained in her waking consciousness no recollection of the suggestion. I told her mother its nature, but not the time at which it should be fulfilled. At 9.15 the same evening her mother noticed that Miss A. was restless, and asked her what was the matter. She replied, "I feel I must do something, but cannot tell what." At 9.20 p.m. she rapidly made a cross with a pencil and wrote "20 minutes past 9" on a piece of paper, at the same time saying, "It's all silliness." There was no clock in the

room, but her mother went into the next room where there was one, and found that the time was 9.20. When I again saw Miss A., I explained the nature of the experiments I proposed making, and instructed her to carry a pencil and paper during the day and to put them by her bedside at night. I did not describe the experiments as anything extraordinary, but simply told her that hypnotised subjects were often able to appreciate time, and that I wished to see whether she could do so. No pecuniary or other reward was promised or given. I told her I should make these suggestions from time to time, but not on each occasion she visited me. I neither told her in the waking condition that suggestions had been made, nor informed her relatives when I made them, nor what they were. They knew that suggestions of this nature were given frequently, but only became acquainted with them by seeing Miss A. carry them out, or by hearing from her that she had done so. Before making the suggestions, I wrote them down in my case book, and, when Miss A. again visited me, I copied into it what she had written on the different pieces of paper. In many instances I did not calculate when the suggestions fell due, and in others the calculations I made at the time were proved to be erroneous, the results of the experiments in these cases being only determined when the series was completed.

The experiments which followed were all of the same character, *i.e.*, during hypnosis Miss A. was told that, at the expiration of a certain number of minutes, she was to make a cross and write down the hour she believed it to be without consulting the clock, an interval of waking life always intervening between the suggestion and its fulfilment. The simple and uniform character of my experiments is due to the fact that Delbœuf's subjects resisted suggestions that were distasteful to them. The idea of making a cross on a piece of paper excited no opposition in Miss A.'s mind, while the fact that she recorded in writing the time at which the suggestion was fulfilled, especially when this was witnessed by others, put me in possession of evidence of a certain value. The arithmetical problems involved in the first one or two of the following experiments were comparatively simple. In No. 3, for example, as Miss A. could easily tell when 24 hours fell due, the suggestion practically resolved itself into one to be fulfilled in 100 minutes. Soon, however, the experiments became complicated and involved much more difficult problems in arithmetic.

Exp. 2.—Nov. 28, 1895; 2 p.m. *Sug.:* to be fulfilled in 320 m. *Res.:* Correct. *Remarks:* The suggestion was carried out

at 7.20 p.m. when the patient was in a friend's house. She had no watch with her and the clock in the room was wrong.

Exp. 3.—Dec.4 ; 3.15 p.m. *Sug.:* in 24 h. and 100 m. *Res.:* Correct. *Remarks:* When in a friend's house the following afternoon she carried out the suggestion at 4.55. She then asked the time. Her friend looked at her watch and told her, whereupon she remarked, "Your watch is 3 minutes fast." This was the case.

Exp. 4.—Dec. 12 ; 3.20 p.m. *Sug.:* in 24 h. 1,440 m. *Res.:* 3.20 p.m. Sat., Dec. 14 : Correct.

Exp. 5.—Wed., Dec. 18 ; 3.45 p.m. *Sug.:* in 24 h. 2,880 m. *Res.:* 3.45 p.m., Sat., Dec. 21 : Correct.

Exp. 6.—Tues., Dec. 24 ; 2.55 p.m. *Sug.:* in 30 h. 50 m. *Res.:* 9.45 p.m., Wed., Dec. 25 : Correct.

Exp. 7.—Tues., Dec. 24 ; 3.10 p.m. *Sug.:* in 7,200 m. *Res.:* 3.10 p.m. Sun., Dec. 29 ; Correct. *Remarks:* When No. 7 was fulfilled the patient was teaching a Sunday school class, when she suddenly felt an impulse to make a cross and mark the time. It was only after doing so that she looked at the clock, which was behind her.

Exp. 8.—Tues., Dec. 31 ; 3.45 p.m. *Sug.:* in 4,335 m. *Res.:* 4 p.m. Fri., Jan. 3, 1896 : Correct.

Exp. 9.—Dec, 31, 1895 ; 4 p.m. *Sug.:* in 11,525 m. *Res.:* 11.5 a.m., Wed., Jan. 8 : Wrong. *Remarks:* The result ought to have been 4.5 p.m., Jan. 8. I re-hypnotised Miss A. on that day and asked her to recall the suggestion I had made on Dec. 31. She said it was to be executed in 11,225 m. ; it is possible that I had made a mistake, but not at all likely, as I read the suggestion to her with the figures before my eyes. The supposed suggestion of 11,225 m. had been carried out correctly.

I now attempted to find out during hypnosis the patient's mental condition in reference to these suggestions. In reply to my questions she informed me :—(1) That when the suggestions were made in hypnosis she did not calculate when they fell due ; (2) That she did not calculate them at any time afterwards during hypnosis. (3) That she had no recollection of them when hypnosis terminated. (4) That no memory of them ever afterwards arose in the waking state. (5) That shortly before their fulfilment she always experienced a motor impulse, *i.e.*, her fingers moved as if to grasp a pencil and to perform the act of writing. (6) That this impulse was immediately followed by the idea of making a cross and writing certain figures. (7) That she never looked at clock or watch until after she had made her record.

Experiments, Wed., Jan. 8, 1896.—No. 10: 4.5 p.m. *Sug.:* in 4,417 m.—No. 11: 4.5 p.m. *Sug.:* in 11,470 m.—No. 12: 4.30 p.m. *Sug.:* in 10,070 m.

As Miss A. stated in hypnosis that she made no calculations, in order to vary the experiments I asked her, as soon as I made the suggestions and before terminating the hypnosis, to calculate when they would fall due and tell me the result. She replied as follows: No. 10, in 3 d. 37 m., or 23 m. to 5 next Saturday afternoon.—No. 11, in 187 h. 50 m., or 7 d. 9 h. 50 m. Next Wednesday morning at 5 m. to 12.—No. 12, in 1,067 h. 40 m., or 6 d. 23 h. and 40 m. 4.20 p.m. next Wednesday.

Miss A.'s calculation in No. 10 was 1 h. 5 m. too early. The interval (which was 1 h. too short) having apparently been calculated from 4 o'clock, instead of 4.5 p.m. In No. 11 her calculation was 1 d. 3 h. 20 m. too early. Here (1) 11,270 was taken instead of 11,470, and hence the interval was calculated to be 187 h. 50 m., equalling 7 d. 19 h. 50 m. (2) 7 d. 9 h. 50 m. was given instead of 7 d. 19 h. 50 m. The time falling due was then calculated with this interval (7.19.50), but (3) a mistake of 1 d. was made.

In No. 12 her result was correct, but did not correspond with her calculation. 10,070 m. equals 167 h. 50 m., not 1,067 h. 40 m. Here (1) a cypher was wrongly inserted and (2) 40 m. miscalculated for 50. The latter error was repeated when 6 d. 23 h. 40 m. was given instead of 6 d. 23 h. 50 m.—*Res.:* No. 10, Sat., Jan. 11, 5.42 p.m.: Correct.—No. 11, Thur., Jan. 16, 3.15 p.m.: Correct.—No. 12, Wed., Jan. 15, 4.20 p.m.: Correct.

Remarks.

As the subject had wrongly calculated during hypnosis the time the suggestions fell due, I concluded that she had thus fixed these dates in her own mind and would carry out the experiments in accordance with them. My astonishment was great when they were executed correctly. I re-hypnotised Miss A. and said to her, "You did not carry out these suggestions at the hours you told me they would fall due. Why was this?" She replied, "What I told you was all wrong." "How do you know the other results are right?" "I can't tell you, I only feel that they are." Further questioning elicited no memory of the processes by which the

original mistakes had been corrected. Miss A. assured me that she had never thought of the suggestions from the time they were made; she simply fulfilled them in response to an impulse to write down the figures, and while doing so, neither recalled her calculations nor even the suggestions themselves.

When No. 12 was fulfilled, Miss A. had been hypnotised in my room for an hour and had had no opportunity of consulting the clock. Exactly at 4.20, without waking or opening her eyes, she said she had to make a cross and put down the time—this was preceded by the movement of the fingers already described. From this date I arranged that some of the experiments should fall due when Miss A. visited me, but not, it is important to note, every time she came. They were fulfilled either in the normal waking state or in hypnosis, and Miss A. recorded them herself in my case book. I then at once compared her figures with the actual time and entered the result, this being nearly always witnessed and signed by others. From this date several suggestions were made at each séance. In some cases, the same hour was given as the starting point of all the experiments; in others, varying and even imaginary ones were chosen. In the latter case, the subject was told the actual time, but ordered to carry out the experiment from, say, 2.15 p.m. of the previous day.

Experiments, Wed., Jan. 15, 4.45 p.m.—No. 13, from 4.45 p.m. *Sug.:* in 4,453 m.—No. 14, from 2 p.m. *Sug.:* in 10,470 m.—No. 15, from 2 p.m. *Sug.:* in 10,060 m.

At the time the suggestions were made the patient was again asked in hypnosis to calculate when they would fall due and replied rapidly:—"No. 13, in 722 h. and 33 m., or 11.15 p.m. next Wednesday." "No. 14, in 197 h. and 30 m., or 4.5 p.m. next Wednesday." "No. 15, in 8 d., 5 h. and 30 m., or 4.25 p.m. next Wednesday."

In No. 13, Miss A.'s calculation was 4 d. 4 h. 17 m. too late. 4,453 m. equals 74 h. 13 m., not 722 h. 33 m. Perhaps 4,453 was mistaken for 43,353 equalling 722 h., 33 m. The time of falling due had been calculated from the interval of No. 14.

In No. 14, her calculation was 4 h. 25 m. too early. 10,470 m. equals 174 h. 30 m., not 197 h. 30 m. The time of falling due

was also wrong. There is no explanation for either of these independent errors.

In No. 15, her calculation was 1 h. 45 m. too late. The wrongly calculated interval, 8 d. 5 h. 30 m., corresponded to the wrongly calculated 197 h. 30 m. of No. 14; this interval had apparently remained in the mind. The time of falling due had been calculated with 4.45 as initial time, as in No. 13, instead of 3.0.

Results.—No. 13, Sat., Jan. 18, 6.58 p.m. Correct.—No. 14, Wed., Jan. 22, 8.30 p.m. Correct.—No. 15, Wed., Jan. 22, 2.40 p.m. Correct.

Remarks.—Again the subject's miscalculation did not affect the accuracy of her results, and questioning in hypnosis again failed to revive any memory of the processes by which these had been reached.

Experiments, Wed., Jan. 22, 4.5 p.m.—No. 16. *Sug.:* in 20,180 m.—No. 17. *Sug.:* in 20,160 m.—No. 18. *Sug.:* in 20,140 m. Miss A.'s calculations in hypnosis. "No. 16, in 336 h. 20 m., or 13 d. 20 m. Tues., Feb. 4, at 4.25 p.m." "No. 17, Tues., Feb. 4, at 4.5 p.m." "No. 18, Tues., Feb. 4, at 3.45 p.m." In each instance these calculations were 1 d. too early, but in No. 16, 20, 180 m. was correctly given as 336 h. 20 m.

Results.—No. 16, Feb. 5, 4.25 p.m. Correct.—No. 17, Feb. 5, 4.5 p.m. Correct.—No. 18, Feb. 5, 3.45 p.m. Correct.

Remarks.—On Wed., Feb. 5, I hypnotised Miss A. at 3 p.m. At 3.45, without passing from the hypnotic state, she made a cross and wrote down the correct time. I aroused her at 4 o'clock and she carried out the remaining experiments correctly at 4.5 and at 4.25.

Experiments, Wed., Feb. 5, 4 p.m.—No. 19. *Sug.:* in 10,050 m.—No. 20. *Sug.:* in 10,080 m.—No. 21. *Sug.:* in 10,090 m.—No. 22. *Sug.:* in 840 m.—No. 23. *Sug.:* in 900 m.

Miss A.'s calculations in hypnosis: "No. 19, Wed., Feb. 12, 3.30 p.m." "No. 20, Wed., Feb. 12, 4 p.m." "No. 21, Wed., Feb. 12, 4.10 p.m." "No. 22, Thur., Feb. 6, 6 a.m." "No. 23, Thur., Feb. 6, 7 a.m."

The above, made almost immediately, were correct in every instance.

Results.—No. 19, Wed., Feb. 12, 3.30 p.m. Correct.—No. 20, Wed., Feb. 12, 4 p.m. Correct.—No. 21, Wed., Feb. 12, 4.10 p.m. Correct.—No. 22, Thur., Feb. 6, 6 a.m. Correct.—No. 23 Thur., Feb. 6, 7 a.m. Correct.

Remarks.—When Miss A.'s mother went to her bedroom on

the morning of the 6th, she found her asleep and two pieces of paper on a table by the bedside. On each was a rough cross; on one the figure 6, on the other 7, both very badly written. Miss A. said she had not awakened during the night.

The other suggestions were carried out during hypnosis in my room, the time being marked by Miss A. in my note book and witnessed by others.

The five suggestions were given rapidly one after the other. These, and similar complicated ones, were never read to the subject more than twice, and sometimes only once.

I re-hypnotised Miss A. and questioned her about the suggestions which had been carried out during the night, presumably in natural sleep. She told me she remembered nothing about them, and afterwards, when suggestions were again carried out in natural sleep, her memory was equally at fault.

Experiments, Wed., Feb. 12.—No. 24, 3.30 p.m. *Sug.:* in 2,220 m.—No. 25, 3.30 p.m. *Sug.:* in 2,285 m.—No. 26, 3 p.m. *Sug.:* in 10,115 m.—No. 27, 3 p.m. *Sug.:* in 10,150 m.—No. 28, 4 p.m. *Sug.:* in 20,190 m.

Miss A.'s calculations in hypnosis: "No. 24, in 18 h. and 40 m., or 10.10 to-morrow morning.—No. 25, to-morrow morning at 11.15.—No. 26, next Wednesday at 25 m. to 4 p.m.—No. 27, next Wednesday at 5.30 p.m.—No. 28, a fortnight and half an hour."

The answers to Nos. 26, 27, 28, were given immediately. In No. 24, Miss A.'s calculation was 18 h. and 20 m. too early, but would have been correct if the interval suggested had been 1,120, instead of 2,220 m. In No. 25, her calculation was 18 h. 20 m. too early, but would have been correct had the suggested interval been 1,185, instead of 2,285 m. In No. 26, her calculation was correct. In No. 27, her calculation was 1 h. 20 m. too late. Here the interval seems to have been taken as 7 d. 150 m., instead of 10,150 m. In No. 28, her calculation was correct as far as it went, but the exact time of fulfilment was not given.

At the time I made the suggestions I also calculated when they would fall due, thus: No. 24, Feb. 14, 5 a.m. Wrong; half an hour too late.—No. 25, Feb. 14, 6.5 a.m. Wrong; half an hour too late.—No. 26, Feb. 19, 3.35 p.m. Right.—No. 27, Feb. 19, 4.10 p.m.: Right.—No. 28, Feb. 26, 4.25 p.m. Wrong; 5 m. too soon.

Res.: No. 24, Fri., Feb. 14, 4.30 a.m. Correct.—No. 25, Fri., Feb. 14, 5.35 a.m. Correct.—No. 26, Wed., Feb. 19, 3.35 p.m. Correct.—No. 27, Wed., Feb. 19, 4.10 p.m. Correct. No. 28, Wed., Feb. 26, 4.30 p.m. Correct.

Nos. 24 and 25 were fulfilled during sleep. On the 14th Miss A., on awaking, found papers by her bedside with 4.30 and 5.35 written on them. On the 19th she was hypnotised in my room at 3 p.m., and carried out Nos. 26 and 27 while in hypnosis. On both occasions she wrote the time in my note book, and this was witnessed. I asked her during hypnosis if she remembered my last suggestion (No. 28), made the previous week. She said she did and repeated it correctly, but stated she had never thought of it since, and did not know when it would fall due, or the number of minutes that had elapsed since it was given. She had apparently forgotten that, when the suggestion was given, she had calculated when it would fall due. No. 28 was executed correctly during hypnosis on February 26.

Experiments, Wed., Feb. 19.—No. 29, 3.30 p.m. *Sug.:* in 720 m.—No. 30, 3.30 p.m. *Sug.:* in 780 m.—No. 31, 3.30 p.m. *Sug.:* in 2,160 m.—No. 32, 3 p.m. *Sug.:* in 10,135 m.—No. 33, 3 p.m. *Sug.:* in 20,210 m.

Miss A.'s calculations in hypnosis: These, with the exception of No. 32, were all correct, and her replies were almost instantaneous. No. 32 was said to be due at 2.5 p.m. on Wed., Feb. 26. This was 1 h. 50 m. too early, and represented an interval of 7 d. less 55 m., instead of 7 d. plus 55 m.

Res.—No. 29, Thur., Feb. 20, 3.30 a.m. Correct.—No. 30, Thur., Feb. 20, 4.30 a.m. Correct.—No. 31, Fri., Feb. 21, 3.30 a.m. Correct.—No. 32, Wed., Feb. 26, 3.55 p.m. Correct.—No. 33, Wed., Mar. 4, 3.50 p.m., was written down at 3.48. The calculation, therefore, was correct, but the time appreciation 2 m. too early.

Remarks.—On awaking at 7 o'clock on the morning of the 20th, Miss A. found a piece of paper with 3.30 marked on it, and another with 4.30. On the morning of the 21st she found a piece of paper with 3.30 marked on it. She had no recollection of waking during the night, and, as usual, questioning in hypnosis failed to revive any memory of what she had done. The other suggestions were fulfilled in my room and witnessed by others.

Experiments, Wed., Feb. 26, 3.30 p.m.—No. 34. *Sug.:* in 2,140 m.—No. 35. *Sug.:* in 3,590 m.—No. 36. *Sug.:* in 5,030 m.—No. 37. *Sug.:* in 10,125 m.—No. 38. *Sug.:* in 10,100 m.—No. 39. *Sug.:* in 20,180 m.

Res.: No. 34, Fri., Feb. 28, 3.10 a.m. Correct.—No. 35, Sat., Feb. 29, 3.20 a.m. Correct.—No. 36, Sun., Mar. 1, 3.20 a.m. Correct.—No. 27, due Wed., Mar. 4, at 4.15 p.m., was not

recorded.—No. 38, Wed., Mar. 4, 3.50 p.m., was written down at 3.48. Calculation therefore correct, but time appreciation 2 m. too early.—No. 39, Wed., Mar. 11, 3.50 p.m., was written down at 3.51½. Calculation therefore correct, but time appreciation 1½ m. too late.

Remarks.—These suggestions were only read to Miss A. once; she was then asked to repeat them, and did so correctly, with the exception of No. 37. She was told not to make any calculations. Nos. 34, 35 and 36 were executed during sleep, and the papers, as usual, were found at Miss A.'s bedside in the morning. It is to be noted that 3.50, March 4, the terminal time of No. 38, was also the time at which another suggestion, made a fortnight before, fell due, and which has already been recorded in its proper place. Miss A. stated at 3.48 that she had to make two crosses and to put down 3.50 twice. No. 37, due at 4.15 p.m., Wednesday, March 4, I have no record of. I am not certain whether this was my fault or Miss A.'s; I was hypnotising another patient when the suggestions were fulfilled, and I might well have omitted to enter that one; on the other hand, Miss A. might have failed to carry it out. Three suggestions fell due very quickly, and one of them, as we have seen, belonged to another series. When suggestions were made to fall due in a fortnight and I saw the patient in the week between, I sometimes questioned her in hypnosis as to the unfulfilled ones; she always assured me that she had never thought of them, did not know how much of the time had elapsed, nor when they fell due.

Experiments, Wed.. Mar. 4, 3.45 p.m.—No. 40. *Sug.:* in 10,080 m.—No. 41. *Sug.:* in 10,055 m.—No. 42. *Sug.:* in 10,040 m.—No. 43. *Sug.:* in 750 m.—No. 44. *Sug.:* in 2,160 m.—No. 45. *Sug.:* in 2,195 m.—*Res.:* No. 40, Wed., Mar. 11, 3.45 p.m., was written down at 3.44. Calculation correct; time appreciation 1 m. too soon.—No. 41, Wed., Mar. 11, 3.20 p.m., was written down at 3.22. Calculation correct; time appreciation 2 m. too slow.—No. 42, Wed., Mar. 11, 3.5 p.m. Correct.—No. 43, Thur., Mar. 5, 4.15 a.m., during sleep. Correct.—No. 44, Fri., Mar. 6, 3.45 a.m., during sleep. Correct.—No. 45, Fri., Mar. 6, 4.20 a.m., during sleep. Correct.

Remarks.—When these suggestions were given Miss A. was not asked to calculate when they would fall due. Mr. Barkworth and Dr. Barclay were present when Nos. 40, 41 and 42 were fulfilled.

At this séance, March 11, fresh suggestions were made under the following conditions. Mr. Barkworth and Dr. Barclay were both put *en rapport* with Miss A., and it was agreed that they should

each make two time suggestions, arranged so as to fall due at the next séance, when they promised to be present. These were given when I was out of the room, and I was not told what they were until after their fulfilment. The suggestions were as follows :—

Experiments, Wed., Mar. 11, 4 p.m.—No. 46. *Sug. :* in 21,400 m.—No. 47. *Sug. :* in 21,420 m.—No. 48. *Sug. :* in 21,428 m.—No. 29. *Sug. :* in 21,434 m.—*Res. :* No. 46, Thurs., Mar. 26, 12.40 p.m., was written down at 12.38. Calculation correct, time appreciation 2 m. too early.—No. 47, Thur., Mar. 26, 1 p.m., was written down at 12.59. Calculation correct, time appreciation 1 m. too early.—No. 48, Thur., Mar. 26, 1.8 p.m. Correct.—No. 49, Thur. Mar., 26, 1.14 p.m. Correct.

Remarks.—Miss A. was hypnotised at 12.30 p.m. on Thursday, March 26, and carried out the suggestions while in that condition. Mr. Barkworth and Dr. Barclay were both present and checked the time records. None of us, however, had any idea whether the experiments were correctly carried out or not, as Mr. Barkworth and Dr. Barclay had mislaid their notes and were unable to recall the suggestions they had given. Miss A. was roused from the hypnotic state and, as usual, remembered nothing of the suggestions. She was then re-hypnotised, asked to recall them, and replied as follows : "They were made at 4 p.m. last Wednesday week and were to be fulfilled in 21,400, 21,420, 21,428 and 21,434 minutes. Mr. Barkworth and Dr. Barclay gave two suggestions each." Miss A. stated that she had made no calculation at the time and had not thought of the suggestions afterwards. On April 22, Dr. Barclay sent me the lost memorandum of his two suggestions, viz., 21,428 and 21,434 minutes from 4 p.m. on the day already mentioned. On April 27, Mr. Barkworth wrote to tell me that he also had found his lost memorandum, and that the suggestions were 21,400, 21,420, 21,428 and 21,434 minutes, the first two having been made by himself, the two latter by Dr. Barclay. This agreed with Miss A.'s account.

A fresh series of suggestions was made on April 8, some to fall due during the night, others the following week in my presence. The patient lost her papers recording the former, and I was too busy to enter the latter. These are the only experiments in the whole series which are not recorded, and they are omitted for the above reasons. Later, Miss A. found the records of the suggestions, which had been carried out during natural sleep. They were correct.

Experiments, Thur., May 7, 3 p.m.—No. 50. *Sug.:* in 8,650 m.—No. 51. *Sug.:* in 8,680 m.—No. 52. *Sug.:* in 8,700 m.

I still further complicated these by suggesting as follows: "No. 50 is to be fulfilled in the waking state. Five minutes before No. 51 falls due you are to pass into the hypnotic condition. No. 51 is to be fulfilled during hypnosis, but five minutes afterwards you are to pass into the normal waking state and continue in that until after the execution of No. 52. Eight minutes after No. 52 is carried out hypnosis will again appear."

Results.—No. 50. (*a*) Suggestion fulfilled, Wed., May 13, 3.10 p.m. Correct. (*b*) Hypnosis appeared at 3.31 p.m. This ought to have been 3.35 p.m. and was therefore 4 minutes too early.

No. 51, Wed., May 13, 3.40 p.m. (*a*) Suggestion fulfilled during hypnosis. Correct. (*b*) Miss A. passed spontaneously into the normal state at 3.45. Correct.

No. 52, 4 p.m. (*a*) Suggestion fulfilled in the waking state. Correct. (*b*) Hypnosis appeared exactly at 4.8. Correct.

Remarks.—On May 13, Miss A. came into my consulting room at 3.5 p.m., and almost immediately fainted. She had recently met with a severe accident and was in acute suffering. Immediately on regaining consciousness she said she had to make a cross at 3.10, and did so in my case book; others were present in the room when all the suggestions were fulfilled with the exception of the first.

Experiments, Wed., May 13, 4.30 p.m.—The suggestions were given in the following general terms: "You are to repeat all the experiments made last Thursday, but to-day you are to start from 2.55 instead of 3 p.m., and to each suggestion you are to add 1,440 minutes." The original suggestions were not cited, nor any other information given. The experiments, therefore, were as follows:—

No. 53, Wed., May 13, 4.30 p.m. *Sug.:* in 8,650 m. from 3 p.m., plus 1,440 m., minus 5 m. from starting point.—No. 54, Wed., May 13, 4.30 p.m. *Sug.:* in 8,680 m. from 3 p.m., plus 1,440 m., minus 5 m. from starting point.—No. 55, Wed., May 13, 4.30 p.m. *Sug.:* in 8,700 m. plus 1,440 m., minus 5 m. from starting point.

Results.—No. 53, Wed., May 20, 3.5 p.m. Fulfilled in the waking state. Correct. Hypnosis appeared at 3.30. Correct. No. 54, Wed., May 20, 3.35 p.m. In hypnosis. Correct.

Miss A. passed spontaneously into the normal state at 3.40. Correct.

According to the original suggestions, Miss A. was to remain in the normal state until the fulfilment of the next experiment, but, as she had a severe headache, I hypnotised her, made curative suggestions, and told her hypnosis would terminate one minute before the next experiment fell due. She passed into the normal waking state at 3.49, six minutes too soon.—No. 55, Wed., May 20, 3.55 p.m. was written down at 3.50. Calculation, therefore, correct, but time appreciation 5 minutes too early.

I re-hypnotised Miss A. immediately the above experiment was fulfilled. At 4.3 p.m., while still in the hypnotic state, she said it was 3 minutes past 4, and that I had suggested that hypnosis would appear at that hour. This was correct.

Remarks.—It is to be noted that hypnosis appeared at 3.30 p.m., the exact time suggested. This is particularly interesting as the experiment, correctly executed at 3.30 on May 20, was the erroneously carried out experiment of May 13, complicated by five minutes having been deducted from its starting point and 1,440 added to its interval.

No. 55 was the last experiment of the series. A few others, similar in character, were made in October, 1896. These were successful but presented no fresh features, and as Miss A. had to cease her visits, owing to her approaching marriage, further experiment was impossible.

Summary.—Fifty-five experiments are cited; of these one, apparently, was either not carried out by Miss A., or unrecorded by me, while in another (No. 9) she mistook the original suggestion, but fulfilled it correctly in accordance with what she thought it had been. Forty-five were completely successful, *i.e.*, not only did Miss A. write down the correct terminal time, but this was done, also, at the moment the experiment fell due. Eight (Nos. 33, 38, 39, 40, 41, 46, 47, 55) were partially successful. In these the terminal time was correctly recorded in every instance, but there were minute differences, never exceeding five minutes, between the patient's correct estimate of when the suggestion fell due and the moment at which she carried it out. The proportion which these errors bear to their respective intervals varies between 1 to 2,028 and 1 to 21,420. The following table gives an analysis of the conditions under which the experiments were carried out and their results:—

Experiments.		Witnessed by				Results.		Unrecorded	Remarks.
		Friends or relatives.	Bramwell and others.	Bramwell alone.	Unwitnessed.	Correct.	Wrong.		
Fulfilled in the waking state	26	14	11	1	0	20	6	0	1 mistaken suggestion. 1 fulfilled 2 minutes too soon. 1 fulfilled 2 minutes too soon. 1 fulfilled 1 minute too soon. 1 fulfilled 2 minutes too soon. 1 fulfilled 5 minutes too soon.
Fulfilled in hypnosis	15	0	15	0	0	12	3	0	1 fulfilled $1\frac{1}{2}$ minutes too soon. 1 fulfilled 2 minutes too soon. 1 fulfilled 1 minute too soon.
Fulfilled in natural sleep	13	0	0	0	13	13	0	0	In each instance figures which correctly represented the terminal time of the experiment were found at the subject's bedside in the morning, but there is no evidence to show whether this was done at the moment the suggestion fell due, *i.e.*, the subject's calculations were correct, but evidence as to time appreciation is wanting.
Unfulfilled ...	1	0	0	0	1	0	0	1	It is doubtful whether this experiment was carried out by the subject. It is, however, possible that I omitted to record it, as it fell due when I was engaged with another patient.
Total ..	55	14	26	1	14	45	9	1	

Similar experiments, more or less successful, were made with other somnambules, but in none were the results so striking as with Miss A. In those about to be cited the subject was Miss B., aged 20, an intelligent, well-educated girl, who had received some scientific training. Her arithmetical powers were superior to Miss A.'s, but she possessed no particular aptitude for appreciating the passage of time. She was a somnambule, could be rendered anæsthetic and analgesic by suggestion, and had been the subject of several painless minor surgical operations. Her health, from the commencement of the experiments to the present date (August, 1900) has been good.

The first experiments consisted in determining by suggestion the time of waking from normal sleep. The hours selected varied widely; but the results were almost uniformly successful and the greatest error recorded did not exceed five minutes. Others similar to Miss A.'s followed thus:—

Exp. 1, Nov. 25, 1895, 3.55 p.m. *Sug.:* in 24 h. and 50 m. *Res.:* Correct. *Remarks:* In reply to questioning in hypnosis, Miss B. stated that when the suggestion was given she calculated when it would fall due and determined to carry it out at that hour.—*Exp.* 2, Nov. 27, 1.20 p.m. *Sug.:* in 1,445 m. *Res.:* 10 m. too early.—*Exp.* 3, Dec. 6, 3 p.m. *Sug.:* in 1,440 m. *Res.:* Correct.—*Exp.* 4, Dec. 9, 3.15 p.m. *Sug.:* in 2,880 m. *Res.:* Correct.—*Exp.* 5, Dec. 12, 3.30 p.m. *Sug.:* in 1,540 m. *Res.:* 7 m. too late.—*Exp.* 6, Dec. 16, 3.30 p.m. *Sug.:* in 1,620 m. *Res.:* 13 m. too late.—*Exp.* 7, Dec. 20, 3 p.m. *Sug.:* in 1,380 m. *Res.:* Correct.—*Exp.* 8, Dec. 31, 3.15 p.m. *Sug.:* in 24 h. 1,200 m. *Res.:* Correct.—*Exp.* 9, Jan. 2, 1896; 3.10 p.m. *Sug.:* in 24 h. 1,430 m. Miss B.'s calculation, made in hypnosis, was 40 m. too early. *Res.:* 5 m. too late.—*Exp.* 10, Jan. 6, 3.15 p.m. *Sug.:* in 24 h. 100 m. Miss B.'s calculation in hypnosis was correct. *Res.:* 8 m. too late.—*Exp.* 11, Jan. 27, 3.10 p.m. *Sug.:* in 24 h. 150 m. Miss B.'s calculation in hypnosis was correct. *Res.:* 10 m. too soon.—*Exp.* 12, Mar. 27, 3.10 p.m. *Sug.:* in 24 h. 240 m. Miss B.'s calculation in hypnosis was correct. *Res.:* Correct.

Time experiments more or less closely resembling those cited have been occasionally repeated with Miss B. up to the present date (August, 1900) and with practically identical results.

Before considering theoretical explanations of hypnotic and post-hypnotic appreciation of time, I propose to discuss (*A*) the possibilities of mal-observation or deception, and (*B*) to draw attention to certain other points which appear worthy of notice.

(*A*) *The Question of Mal-observation or Deception.*

(1) The subjects of all my time experiments were either former patients or personal friends. None of them were trained hypnotic subjects, and in no single instance was a pecuniary reward promised or given. All this, however, does not in itself exclude the possibility of mal-observation or deception, and I would rather base my arguments in favour of the genuineness of the results on post-hypnotic amnesia, and the fact that the problems involved were beyond the subject's waking powers.

(2) While, however, all observers recognise post-hypnotic amnesia, it must still be admitted that loss of memory might be assumed for purposes of deception. Fortunately, there are other hypnotic phenomena impossible of imitation; amongst these may be cited: (*a*) the absence of certain organic changes following injury (Delbœuf's case of two symmetrical burns), and (*b*) the absence of physiological signs of pain during severe and prolonged operation. The latter fact was clearly demonstrated in the operations on my patients at Goole and Leeds (*Journal of Dental Science*, March 30, 1890, and *Lancet*, April 5, 1890). Several of these patients were afterwards the subjects of my time experiments, and all who were employed for this purpose, including Miss A. and Miss B., could be easily rendered anæsthetic or analgesic by suggestion.

(3) Post-hypnotic amnesia alone, even when it is undoubtedly genuine, does not exclude possible error, as the subject might receive information from the operator or spectators. It is, however, difficult to say how this could have happened in Miss A.'s case. Thus, twenty-seven experiments were fulfilled in my absence, and no information regarding these—excluding, of course, the suggestions

made to Miss A. during hypnosis—was given to anyone until some time after the whole series was completed. I did not calculate when any of these twenty-seven suggestions would fall due, and did not know, until after their fulfilment, whether they had been carried out correctly or not. Twenty-seven further experiments were fulfilled in my presence, these, with one exception, were also witnessed by others. In four of them the suggestions were made by Mr. Barkworth and Dr. Barclay, and I did not know what they were until afterwards. These two operators, however, could not assist the subject, as they had lost the memoranda of their suggestions and were unable to recall the figures. In the remaining twenty-three, none of the spectators knew what the suggestions were. Indeed, in most instances, they did not know that any experiments were being carried on, until they saw them executed and were asked to witness the figures, their ignorance being purposely arranged.

(4) In the twenty-three cases just cited, before giving the suggestions, I calculated when they would fall due. Could Miss A. have learnt anything about this through telepathy or muscle-reading? During the last ten years, I have searched for evidence of telepathy and also taken part in the experiments of other observers; the results, however, have invariably been negative; if, for argument's sake, we conceded the possibility of telepathy, recognising that somnambules possess hyperæsthesia of the special senses, it would still be difficult to see what information Miss A. could have obtained from me. In the majority of the experiments I did not work out when the suggestions would fall due, and even when I did, many of my calculations were only approximately correct, although I was not aware of this until after all the experiments were completed. Moreover, I I have an unusually bad memory for figures, and never either before or during the execution of the suggestions, recalled my calculations as to the time at which they were supposed to fall due. Further, when the experiments were carried out I was nearly always busily engaged with other patients and so placed that Miss A. could not see my face.

(5) Again, even supposing post-hypnotic amnesia had

not existed in Miss A.'s case, the retention in the waking state of the memories of hypnotic life would not in itself explain her feats in calculation and time appreciation. Miss A.'s memory, knowledge of arithmetic and power of appreciating time, in no way exceeded that of other imperfectly educated girls in her station of life. Her normal memory was incapable of retaining complicated series of figures, and she was unable to make even much simpler mental calculations than those involved. After the suggestions were made, she remained in the hypnotic state for an hour or more and could not consult the clock. During this period it was absolutely impossible for her to record the suggestion in any way other than mentally.

(B) Other Points of Interest.

(1) Five minutes before the first experiment was fulfilled, Miss A. became restless and felt she must do something. This preliminary stage of restlessness was absent in all the others. In them, when the time for carrying out the suggestions arrived, Miss A. had a sudden twitching of the fingers of her right hand, immediately followed by the idea of writing down certain figures. The abruptness of this invasion of the normal consciousness, by a message from the subliminal one, was particularly noticeable when Miss A. was actively engaged in conversation at the time.

(2) On twenty-four occasions Miss A. was asked to calculate when the suggestions fell due; she was wrong in the first nine instances, but in the remaining fifteen right in eleven and wrong in four. As the experiments advanced, not only the frequency, but also the extent of Miss A.'s errors in calculation decreased, and the answers were given much more rapidly. Sometimes the correct replies were almost instantaneous, and in these instances no conscious calculation could be traced. It is to be noted that Miss A.'s mistaken calculations had no effect on the correctness of her results.

(3) *Memory.*—Once only did Miss A. spontaneously recall in hypnosis that a time suggestion—yet unfulfilled—had

been given. This was *Experiment No.* 3, where the suggestion was an easily remembered one, viz., 24 hours and 100 minutes. On other occasions when Miss A. was questioned in hypnosis as to the unfulfilled suggestions, she invariably recalled the fact that these had been made, but rarely remembered their exact terms. She always asserted that she had never thought of them, did not know how much time had elapsed since they had been given, nor when they were due. This was so even in cases where she had calculated the terminal time. At first Miss A. forgot all about the suggestions immediately after they were fulfilled; she did not know she had made a cross or written down the figures, and could not recall what they meant. This condition of memory was identical with what is almost universally associated with post-hypnotic acts. Later, for convenience' sake, it was suggested to Miss A. during hypnosis that she should remember having executed the experiments. She then knew in the waking state that she had made a cross and written down certain figures, but recalled nothing of the original suggestion, of which these acts were the fulfilment. When Miss A. was questioned in hypnosis, after the execution of the suggestions, her memory, on certain points, was very clear. She could recall in every detail the terms of all experiments that had recently been carried out, *i.e.*, she remembered the hours at which they had been made, the number of minutes suggested, her own calculations, if any, and the moment and circumstances under which the suggestions had been fulfilled. Putting aside the calculations she made at the time, in response to suggestion, she was unable to recall having made any others, or to give any information as to the methods by means of which she had correctly fulfilled the experiments. When a second series of suggestions was given, before the first had been fulfilled, after all had been carried out, she could recall both series and place each member of them in its proper order. This memory, however, was not persistent. A fortnight after the experiments had been executed, although Miss A. still remembered in hypnosis that they had taken place, she was unable to recall the details. When experi-

ments were fulfilled in normal sleep she remembered their terms in hypnosis and when they had been given, but not when they had been executed.

(4) The experiments had no prejudicial effect on Miss A.'s health. On the contrary, this steadily improved. She is now a strong, healthy, well-developed woman, the mother of two children, and has had no return of her nervous symptoms.

In no single instance did any bad effect, even of the most trivial description, follow hypnotic experiment.

(5) The results of the experiments were only estimated after the series was completed, when a friend, Mr. Bartrum, B.Sc., kindly checked them for me. He discovered that some of my calculations made at the time had been erroneous. I am also indebted to him for a critical examination of the calculations the patient was asked to make when the suggestions were given.

(6) With the following exception, the phenomena observed in the cases of Miss A. and Miss B. differed little. When a simple suggestion was given, Miss B. sometimes spontaneously calculated when it would fall due. Miss A., on the other hand, never made any spontaneous calculations at all. Apparently Miss B. did not spontaneously calculate the more complicated arithmetical problems. When she did so, in response to suggestion, her results were invariably correct, but, despite this, the experiments were not always fulfilled at their appropriate time. Miss A., on the contrary, was often wrong in her calculations, while the suggestions themselves were carried out with phenomenal accuracy.

(7) In some recent instances Miss B. apparently made no spontaneous calculations, despite the fact that the arithmetical problems involved were extremely simple. For example, I suggested that she should shake hands with me forty minutes after I aroused her from hypnosis. At the moment indicated, in the midst of an animated conversation, she suddenly asked me to shake hands with her. In reply to my questions, she said she had felt impelled to do this, but could not tell why. A few minutes later she had entirely forgotten the incident. I re-hypnotised her; she then re-

called the suggestion and the impulse she had experienced, but could not remember having made any calculation or having in any way marked the passage of time.

Theoretical Explanations.

Delbœuf, as we have seen, pointed out that the terminal day in Beaunis and Liégeois' experiments fell on an easily recognised date with which the subjects were acquainted. These experiments, he said, did not show, as they were supposed to do, that somnambules possessed the power of counting days, but only that they were able to retain a given date. To remove this objection his suggestions were made in minutes, while the majority of mine were given in a similar but even more complicated form. In explaining the phenomena, therefore, we must take into account, not only the appreciation of the passage of time, but also the feats of memory and arithmetical calculation which sometimes exceeded the subject's normal powers.

Bernheim's Theory.

This is mainly based on the supposed occurrence of self-hypnosis in somnambules and the existence during that condition of a peculiar mental concentration, with consequent revival of hypnotic memories. According to Bernheim, conscious mental activity exists both in sleep and in hypnosis. During sleep we are conscious that our mind thinks and works, just as the somnambulist knows what he is doing, but the form of consciousness differs from that of waking life. In both, concentration of the nervous force upon the suggested image or idea is the characteristic phenomenon. This continues to exist, although dream succeeds dream in sleep and varying suggestions are instantly executed in hypnosis; the nervous concentration has only changed its object, the focus shifted its place.

According to Bernheim, if an individual goes to sleep determined to wake at a given hour, his attention is fixed

upon this idea, and he thinks about it voluntarily and consciously all night. When he awakes, he believes he has done so spontaneously, as the conscious thoughts of sleep are forgotten. Finally, he says, the lost memories of hypnosis may be revived by chance association of ideas, like forgotten impressions of the waking state, and also in other ways, and thus, the memory of the suggestion has not been latent all the time. In support of this he cites :—

First—*Experiments.*—Two subjects, who had received deferred suggestions, when hypnotised and questioned in the interval, stated that during natural sleep they had once dreamt of what had been suggested during hypnosis.

Secondly—*Certain general observations as to the mental condition in somnambules.*—The memory, he says, of what has taken place during hypnosis depends upon the psychical concentration already referred to; every time this is reproduced, the lost memory is revived. Somnambules pass easily and spontaneously from the normal to the hypnotic state; they then become self-absorbed and concentrated, and recall the operator's suggestions. They know when these should be executed and take their measures accordingly; they reinforce the idea of not forgetting them, just as a person in natural sleep determines not to miss the hour set for waking. Although the suggestion may have been present in their minds the greater part of the day, they forget this if we divert their attention from themselves by speaking to them. By doing this, we have disturbed their psychical concentration, drawn their cerebral activity from the inside to the outside, and produced another state of consciousness in which the memory of the suggestion is lost; the memories of the second, or hypnotic state, being effaced in the first, or normal, one.

In consequence of this, when the somnambule carries out a suggestion, he believes that the idea has newly and spontaneously dawned in his mind—"*He no longer remembers that it is a memory.*" Thus, in Bernheim's opinion, a deferred suggestion is no more difficult to explain than one executed immediately on waking.

Three points are involved in Bernheim's theory.

(1) *Nervous concentration and its relationship to hypnotic memory.*—According to Bernheim, everyone possesses a certain definite amount of nervous force or cerebral activity. In the waking state this is concentrated in the higher nervous centres—the reasoning part of the brain; in hypnosis in the lower ones—the imaginative or automatic part. All the phenomena induced during hypnosis—conceptions, movements, sensations, images—owe their origin to this concentrated and accumulated nervous force. When the subject passes into the normal state this nervous concentration ceases, and the impressions received during hypnosis fade. When hypnosis is again induced, the former state of concentration reappears and, at the same time, the lost memories are revived.

This explanation is ingenious, but not in keeping with observed facts. If I suggest to a subject that he will still remember the events of hypnosis, after that state has terminated, he invariably does so. Yet, according to Bernheim's theory, the redistribution of nervous force to the higher centres should inevitably have prevented this. Again, suggestion may rob the hypnotised subject of the power of recalling the events of previous hypnoses. If, however, Bernheim's explanation be correct, the lost memories could not escape revival, seeing that they must have reappeared when the nervous force was again concentrated in the lower centres.

Further, as numerous and varied hypnotic phenomena can be simultaneously evoked in the same subject, this clearly shows that the phenomena of hypnosis cannot be explained by the concentration of attention on any one given point. Again, the fact that the multiple phenomena are sometimes similar in character to the isolated ones, indicates that the explanation of hypnotic phenomena by means of the amount of attention concentrated is also fallacious. If all the attention is requisite for the production of one hypnotic phenomenon and yet, while it still lasts, many others are simultaneously induced, whence do these derive that excessive amount of attention which is said to be necessary for the induction of the primary phenomenon?

(2) Admitting that hypnotic memory is associated with this psychical concentration, the evidence in favour of the frequent and spontaneous occurrence of the latter is far from convincing. Granting that two subjects had each *once* dreamt of a suggestion during natural sleep, this does not justify the conclusion that somnambules pass easily and spontaneously from the normal to the hypnotic state. Further, although the memories of hypnosis, whether self-induced or not, are lost on waking, these can be easily evoked by questioning in subsequent hypnoses. If, therefore, subjects passed spontaneously into the hypnotic state, and thought about the suggestions, they could be made to recall the fact that they had done so. Despite this, Bernheim's generalisations are founded on the two dreams just cited; and he has apparently made no attempt to discover the actual mental conditions involved, although he might easily have done this by means of the simple method of interrogation in subsequent hypnoses.

(3) Granting both the points in dispute, *i.e.*, the psychical concentration and its spontaneous occurrence, the difficulty is still unsolved. If no trace of the hypnotic memory remains in the normal state, what advantage does the normal consciousness obtain from the unknown or forgotten fact that the hypnotic consciousness recalled the suggestion at some time before the date fixed for its fulfilment?

Beaunis' Objections.

Beaunis also raises many objections to Bernheim's views. Thus, while admitting the influence of attention and concentration upon the production of certain hypnotic phenomena, he holds that these are insufficient to explain deferred suggestions. They may account for a hallucination realised immediately on waking, but not for one that has been retarded for several days. Here, the subject was unconscious of the suggestion until the hallucination appeared at the hour fixed, and it is absurd to suppose that all this time he was under the influence of a dominant idea. Bernheim's experiments, therefore, do not settle the question.

Granting that the subject dreamt of the suggestion in normal sleep two days before it fell due, it is still necessary to explain how it was carried out at the time fixed. The suggestion, it is true, now involves a shorter period of time, *i.e.*, two days instead of the original number, but this, while reducing the extent of the problem, still leaves it unsolved.

Beaunis disputes Bernheim's assertion that those who wish to wake at a given hour think of this all night, for, he says, if this were true, they would afterwards remember having done so. Dreams which have passed rapidly through the brain can often be recalled in every detail; we should, therefore, be able to remember still more vividly the ideas upon which our attention has been continuously fixed. Further, some people always know what o'clock it is, and, if suddenly asked, are able to give an exact reply, no matter how much their attention may have been concentrated on other things. Had they consciously noted the passage of time, they would afterwards be able to recall having done so. This, however, is not the case, and they are unable to explain how the feat was performed.

Finally, in contradistinction to Bernheim, Beaunis justly points out that important differences exist between the way in which the lost memories of the waking state and those of hypnosis are revived. The former may be recalled at any time by a chance association of ideas. For example, things long forgotten may be remembered on hearing the name of someone we knew in childhood. The lost memories of hypnosis, however, possess the distinctive and essential characteristic that they cannot be revived by a chance association of ideas, and are, therefore, fundamentally different from those of the waking state. The hypnotic suggestion is only realised at the hour fixed and cannot take place before, even when associations occur which would have restored lost normal memory. Thus, if it is suggested to A. that he is to do something at the expiration of ten days, when he hears B. cough three times, B.'s signals, if given at any time before the day fixed, produce no response, although they inevitably do so when the appropriate time arrives.

Beaunis' Theory.

Beaunis attempts to explain the phenomena of time appreciation by the existence in the human organism of an unconscious physiological power of time measurement. The phenomena of deferred suggestion, he says, is analogous to that of awaking at a fixed hour from normal sleep, and both may be explained by the existence of a sort of mental mechanism, arranged, like an alarm clock, to produce a movement at a fixed hour. The brain is a machine which acts without our knowledge, with an activity we are unable to estimate, and the things of which we are conscious only feebly represent this mysterious work. The power of appreciating time, rudimentary or rather atrophied in civilised man, is well developed in the savage and lower animals. Thus a dog, accustomed to go out with his master at a certain hour, will show that the time has arrived by expressive pantomime, should his master delay a little in getting ready for his walk. In Beaunis' opinion, the measurement of time by somnambules is an act of unconscious cerebration.

Paul Janet's Objections.

Janet grants that an image of which one is unconscious may exist in the memory, and, further, that it can be revived, even at a fixed date, if the operator associates the suggestion with some definite sensation, as, for example, the sight of a particular person. He cannot, however, understand the return of the lost memory at a fixed day, without other association than the numeration of time. Thirteen days, for example, do not represent a sensation, but form an abstraction. The carrying out of a suggestion, therefore, at the expiration of such a period, presupposes the existence of an unconscious power of measuring time—an entirely unknown faculty. Up to this everything could be explained by the law of association of ideas, but here we make a sudden jump, and the thread of analogy is completely broken. No association can explain the unconscious counting of thirteen days, and the "suggestion theory" is in default.

Beaunis' Reply.

A day is not an abstraction. The idea of a day represents a series of definite impressions, the result of external agencies, such as light, temperature, &c., which produce in our organism different kinds of reactions. A day is, then in reality, not a sensation, but a succession of sensations and unconscious reactions. Animals know exactly the hour at which they are habitually fed, and an attack of fever returns at the same hour each day, or every other day, for weeks; this indicates that the measurement of time is not an abstraction, but has its roots in the very life of the organism. The periodicity of days, weeks, months and seasons corresponds to periodic organic variations, which under certain circumstances might acquire sufficient intensity to constitute a sort of "unconscious faculty for measuring time," although the word "faculty" is a little too philosophic a term for an organic aptitude of this kind.

Remarks.

Beaunis' explanation assumes (1) the existence of an unconscious faculty for measuring time, and (2) its applicability to the cases in question.

(1) *The unconscious measurement of time.*—According to Beaunis, time appreciation is highly developed in savages, while certain civilised persons can awake at a given hour, and others always know what o'clock it is. In support of this, however, he does not cite a single example or experiment. Let us take the simplest case, *i.e.*, waking at a given hour. Many persons, it is true, believe they can do this; usually, however, the self-waker only shows the power of giving himself a lighter sleep than usual; he wakes several times during the night, and, in the end, does not always hit the exact hour. On behalf of the Society for Psychical Research, several persons, who believed they possessed this power of self-waking, tested it in a rigorously scientific manner. The results were disappointing. One experimenter only succeeded on two occasions out of seventeen, and one of these was his usual hour of waking; another was successful on five times out of twenty-nine, but on three of these he

awoke at other hours as well, while the third was right two out of thirteen times, and the fourth succeeded in four instances out of forty-six.

Since I became interested in time appreciation, many people have assured me that they could awake at any given hour. None of them, however, were able to experimentally reproduce the alleged phenomenon, while the two following are the only genuine cases I know of :—

Dr. George Savage possesses the power of waking at a given hour and has tested it on many occasions. The following is an example :—One day, having to catch an early train, he determined to wake at 6 a.m., and slept soundly without waking until the exact time. The seven following mornings he woke exactly at six, notwithstanding that he went to bed at different hours, and there was no necessity for early rising. This involuntary repetition of self-waking at unusual times also occurred when he was roused by others at abnormally early hours. Thus, when in the Alps, if he were called at 2 or 3 a.m., he would certainly wake spontaneously at the same hour next morning, even if he had been much fatigued with climbing. Dr. Savage states that the accuracy of the time of waking in these instances has puzzled him greatly.

The following is Professor Marcus Hartog's own account of his case :—

"When I was a student, under 17, I found I could, sleeping soundly, awake at any given time I had set myself overnight. The peculiarity of such waking was that it was always sudden and complete, not preceded by a period of light broken sleep, nor accompanied by the drowsiness of an ordinary unprepared waking. If I found that it was needless to get up I soon fell asleep again, and then had the ordinary drowsy waking, often oversleeping myself. This faculty has persisted with me. Between the ages of 20 and 25, on three distinct occasions I had to nurse friends, when I had to administer food and medicines at regular intervals, as well as to attend to every call or unrest on the part of the patient. The last occasion extended over, I think, three weeks. On each occasion the facility and manner of waking completely and suddenly was exactly the same as for early rising, whether at the stated call, or at the least stir of the patient. On lying down to rest again I seemed to see a gradually widening vista, and as my eyes diverged I fell asleep; the time

occupied could not have been a quarter of a minute, though I felt wide awake at the moment of closing my eyes. My sleep on these occasions was singularly if not absolutely dreamless, though I was under the greatest mental anxiety while waking."

In Professor Hartog's case the waking at fixed hours was never involuntarily repeated, *i.e.*, as regards the waking at repeated intervals. Sometimes, however, when he set himself to wake at a fixed time in the morning this was repeated for several days, as in Dr. Savage's case.

(2) *The applicability of Beaunis' theory to the particular cases in question.*—The experiences of Savage and Hartog undoubtedly show that certain persons can wake at a given hour. This does not, however, explain why this power is almost universal amongst somnambules; it is an attempt to explain the little known in terms of the less known, and the analogy, even if successfully established, does not solve the problem but adds another to it. Granting that the uncivilised man possesses some natural power of marking the passage of time, it would be of little use to him in cases such as those cited by Delbœuf and myself. If he cannot count above five how is he to bring his powers to bear on a suggestion which starts from, say, 3.15 p.m. yesterday and is to terminate in 20,840 minutes?

Delbœuf's Theory.

Delbœuf first pointed out that his subjects in the normal state were unable to make the necessary calculations involved in his time experiments. As the latter were successful this showed, he said, that the subjects, when hypnotised, had an idea of the passage of time and unconsciously calculated when the suggestions fell due. Apparently they possessed a sort of mechanism like an alarm which they set to go off at a fixed time.

Edmund Gurney's Objections to the Theories of Delbœuf and Beaunis.

According to Gurney, commands to be fulfilled at a particular date involved the reckoning of time. This was

usually assumed to be physiological. Thus, Delbœuf believed that the subject calculated when the order fell due, and said to himself: "I shall fall into a trance at such and such a moment and then perform the act." The subject set his organism like an alarm for a given time ahead; his mind, relieved of responsibility, then went off duty till the suggestion fell due, when it was aroused by its own automatic machinery, the action resembling the running down of an alarm. Gurney asserted that hypnotic subjects never formulated their orders in this way, and that Delbœuf's explanation was pure guess work, unsupported by fact.

Further, he said, even if we granted the purely physiological hypothesis for cases of short duration, where the idea of the time fixed could be easily grasped, and thus the setter of the alarm knew exactly what he was about—it would be a very different thing to extend it to others where the command had been executed after the lapse of months.

Gurney, like Delbœuf, drew a distinction between commands to be carried out at a specific date, such as New Year's Day, and those where the length of time alone was named, as in the direction to do something "on the 69th day from this." In the former instance the brain might at once register the date along with the order, and the arrival of the former would thus suffice to arouse the latter. A length of time could not be registered in this way. Its termination, till reckoned by the calendar, was quite indefinite, and when the particular day arrived it conveyed nothing likely to revive the suggestion—it carried no more *sixty-ninthness* about it than any other day.

Gurney considered that Beaunis' explanation did not fully meet Janet's objection that such a length of time—*i.e.*, 69 days—was simply an abstraction. Admitting that "a day" was a sufficiently familiar and definite unit to present a concrete character, that it represented a series of conscious reactions, and, further, that there were periodic organic changes which extended over weeks and months, this did not prove that "the measurement of time was not an abstraction, but had its roots and conditions in the very

life of the organism." It did not follow that "sixty-nine days" were concrete in character because this was the case with "one day," and, further, the organic conditions associated with established physiological periods were absent from those suddenly and arbitrarily fixed by human volition. The vital processes were as unable to make a time calculation of this kind as a school boy's digestion to work out a proposition of Euclid. Such time measurement was not a function of animal life; its result was not an inevitable bodily state, but a needless act. It depended—not on progressive changes in the stomach or blood—but on an original course of cerebration taking place in the higher tracts of the brain, initiated by an impression—that of the command—which had a distinct psychical side.

According to Gurney, the passage of time must be registered, looking at it from the brain side alone, not by general gradual change, but by a series of specific changes corresponding to the days and units of measurement, and this was the only kind of cerebral process capable of clearly differentiating the case from that of ordinary physiological time reckoning. Further, unless cerebral events such as were normally correlated with the ideas "sixty," "sixty-one," "sixty-two," &c., really took place, how could the gulf be spanned with precision? Any other kind of change would not know when to stop, or how to associate a point it had reached with the order given long before. Granting that these specific brain-changes took place, was it not reasonable to suppose that their mental correlate existed; and that, hidden from our view, there was an actual watching of the course of time? This hypothesis went a long way towards removing Paul Janet's difficulty. From this point of view his "unknown faculty" resolved itself into a known one, working in the normal way, but below the surface of ordinary consciousness.

Gurney's Theory.

As we have seen, the carrying out of a post-hypnotic command several thousand minutes after waking can neither be explained by any ordinary physiological power of appre-

ciating time, nor by a supposed spontaneous re-hypnosis with temporary revival of memory. The feat, according to Gurney, can only be performed as the result of the intelligent action of a secondary consciousness, which watches the time as it passes just as the ordinary one would do, and, when the correct hour arrives, pushes the ordinary consciousness on one side, takes its place and carries out the command. In Gurney's opinion, the mental conditions involved in the execution of post-hynotic commands varied widely in different cases. Of these the following are examples :—

(1) A subject was told to do something ten minutes after she awoke. On waking she looked at the clock until the expiration of the time, then executed the order. In this case, the subject was conscious of having consulted the clock, and afterwards—apart from any question of the revival of hypnotic memory in post-hypnotic states—remembered having done so.

(2) A subject was told to do something five minutes after he awoke. Immediately on waking he looked at the clock and continued to do so at intervals, talking naturally meanwhile to those present. At the end of five minutes he executed the order. Afterwards, he neither recollected looking at the clock, nor carrying out the command.

This case appears to occupy an intermediate position between No. 1 and the others about to be cited.

(3) A subject was told that on the 39th day from then he was to execute a post-hypnotic suggestion. He had no memory of the command when awake, and no reference was made to it until March 19, when he was suddenly asked, during hypnosis, how many days had elapsed since it was given. He instantly replied, "Sixteen," and added that there were twenty-three more to run. Both statements were correct.

(4) Another subject was told on March 26, that he was to do something on the 123rd day from then. On April 18, he was hypnotised and asked if he remembered the order. He at once replied : "Yes, this is the twenty-third day ; a hundred more." Further questioning made it clear that every few days the command occurred to his mind and that

he calculated how many days had passed and how many more had to elapse. His waking memory retained no recollection of the original suggestion, nor was it aware of the memories and calculations which he described when hypnotised.

In the two last cases, the watching was undoubtedly wholly of an internal kind, and, although obviously accompanied by consciousness, was afterwards entirely forgotten.

The two points in Gurney's theory which specially demand consideration are: (I.) What evidence have we of the existence of a secondary consciousness? (II.) Granting its existence, how far does it explain all the phenomena we have been considering?

(I.) *The secondary or subliminal consciousness.*

The facts in favour of the existence of a secondary consciousness may be divided into three groups: (*a*) Those arising from, or more or less closely associated with, morbid states; (*b*) Those occurring in normal waking or sleeping life; (*c*) Those arising spontaneously, or as the result of suggestion, in the hypnotic condition.

(*a*) To those who have not studied hypnotic and cognate phenomena, this group is practically the only one that exists. Its most familiar examples are to be found in post-epileptic and other more or less clearly defined morbid conditions. Here the personality of the secondary consciousness is generally a reduced one; volition is frequently suspended or weakened, and consciousness dimmed. The individual does not recognise himself, his surroundings and mental state, in as clear a fashion as he would do were he in his normal condition.

The case of Louis V. is one of the most interesting of this kind. This young man presented two distinct mental, moral, and physical states. In the primary, he was docile and intelligent, while sensibility and movement were normal. In the secondary, he was violent, vicious, less intelligent, and presented hysterical contractures. Each state was completely independent of the other and possessed absolutely distinct memories.—"The Life History of a Case of Double or Multiple Personality," by A. T. Myers, M.D. (*Journal of Medical Science*, January, 1896); "Les Variations de la personnalité," par MM. Bourru et Burot (*Revue de l'Hypnotisme*, 1887, p. 193).

Dr. Rieger (*Der Hypnotismus*, 1884, pp. 109-115) cites a case of frequently recurring attacks of secondary consciousness in an epileptic. In the normal condition his character was orderly, but this state alternated with others during which he would leave his home for weeks at a time and lead the life of a thief and vagabond, sometimes being sent to prison, sometimes to asylums. In his primary condition, he had no memory of the acts for which he had been punished.

Dr. Lewis C. Bruce (Brain) gives an account of an asylum patient who not only showed two separate and distinct states of consciousness, but in whom the right and left brain alternately exerted a preponderating influence over the motor functions. At one time he was ambidextrous and only understood English, at another he was left-handed and spoke Welsh.

Spontaneous somnambulism affords another example of the action of a secondary consciousness. In volition and consciousness are to be found the main differences between it and induced somnambulism. The hypnotic subject knows what he is doing and why he does it, and can reject disagreeable suggestions. Unless specially trained, he usually only acts in response to influence from without—influence more or less directly transmitted to him by the suggestions of others. The spontaneous somnambule, on the contrary, acts his own dreams. His hallucinations sometimes excite criminal acts, and authentic cases are reported in which spontaneous somnambules have committed murder, under the delusion that the person they attacked was a wild beast or a burglar. Spontaneous somnambulism, properly speaking, is a neurosis, and, as Hack Tuke pointed out, in its severest forms approaches perilously near epilepsy, while the condition of mental automatism which sometimes succeeds epileptic fits closely resembles that of the sleep-walker. Yellowlees looks upon spontaneous somnambulism as a form of insanity, and calls it *somnomania*. He holds that the sole difference between it and insanity or epileptic violence is that it occurs during sleep, and involves only a temporary arrest of volition, instead of the more prolonged loss of control which results from organic mischief.

In another group of cases the secondary state, while markedly inferior to that particular individual's primary one,

finds its counterpart in degenerate states which are not necessarily insane.

Of this the following case, recorded by "Dagonet" (G. R. Sims) in the *Referee*, January 31, 1897, is an example:—One night Mr. Sims received a message from the master of a workhouse, to the effect that the police had brought a man to the infirmary whom they had found insensible in the street, apparently suffering from drink; a letter, signed by Mr. Sims, was in his pocket. Mr. Sims knew him as a professional man in a good position. Next day he was conscious, but absolutely denied his identity. He said he was a street musician, and that his cornet had been stolen during a row in a public house where he was playing. He returned to his lodgings as soon as he was discharged from the infirmary, and told his landlady he thought he must have had a fit and fallen down in the street, for he was bruised and ached all over, but did not remember anything about it. Exclusive of the time passed in the infirmary, he had been absent from his lodgings a week, but maintained that he had only left the house that morning. A few days later he fulfilled an important professional engagement. All went well for some time, then he again suddenly disappeared. Search was made for him, and he was eventually found playing a cornet outside a public house in Camden Town. Addressed by his proper name he made no sign, and when questioned asserted that he had been an itinerant musician for the last fifteen years. To-day Mr. —— is again living an ordinary respectable professional life, and has not the slightest knowledge of his periodical lapses into another individuality—that of a street musician. His name is well known to all who are familiar with music and the drama.

In another group, the secondary state, instead of being one of obvious mental disorder, differs little in intelligence and volition from the primary one. The following are examples:—

Ansel Bourne, an itinerant preacher, aged 61, residing at Greene, Rhode Island, suddenly disappeared. In spite of the publicity which the newspapers gave to the fact, and the efforts of the police to find him, he remained undiscovered for two months. He then found himself at Norristown, Pennsylvania, where for the previous six weeks he had been keeping a small variety store under the name of A. J. Brown, appearing to his neighbours and customers as a normal person. When his normal

consciousness returned, he was extremely alarmed to find himself in an unknown situation, with absolutely no memory of his surroundings, or of the incidents which had taken place from the date of his disappearance.—*Proceedings of the Society for Psychical Research*, 1891, p. 221.

Emile X., barrister, sometimes passed, without loss of consciousness, into a secondary condition, which lasted from a few minutes to several days. During it he led an active life, which apparently did not differ from his normal one. The state always terminated suddenly, and the ordinary consciousness retained no recollection of what had just passed. After one attack, which lasted three weeks, he came to himself a hundred miles from home.—Dr. Proust, Professor of Hygiene at the Hôtel Dieu, Paris. *Revue de l'Hypnotisme*, March, 1890.

Mr. N., aged 32, educated, consulted Forel and told him the following story. He stated that he had been living for some weeks in Zürich, and had vague recollections of arriving there after a long voyage. Recently he had read two newspaper notices describing the sudden disappearance from Australia of a Mr. N., and he felt that he was the person referred to, although at the same time it seemed impossible that this could be true. N. entered the Burghölzli Asylum for treatment and was hypnotised by Forel, who succeeded in restoring his lost memory by suggestion, and thus obtained an account of his doings from the time he had left Australia. There was no reason, pecuniary or moral, for N.'s disappearance. He recovered under Forel's treatment.—*Ein Fall von temporäner, totaler, theilweise retrograder Amnesie (durch Suggestion geheilt)*, von M. Naef, Voluntärarzt an der Heilanstalt Burghölzli. *Zeitschrift für Hypnotismus*, 1897, p. 321.

The following is the most recent example I have been able to trace of the group we are considering:—On April 16, 1900, George Ridderband, aged 19, a law student and the son of a well-known lawyer, suddenly disappeared from his home in New York. No reason, except that he had been studying hard for an examination, was discovered for this, either at the time or afterwards. His parents put the matter in the hands of the police. On April 21 the lad walked into a police station and told the following story:—Five days previously, he suddenly found himself walking in the street, but neither knew who, nor where he was, nor could he recall anything as to his past life. Since then he had been wandering about, struggling in vain to revive his lost memories, keeping meanwhile a diary of his proceedings. He asked if any-

one corresponding to him had been advertised as missing, and the sergeant recognised him as the lost George Ridderband. He was taken home and placed under medical care. At first he did not recognise any of his relatives, but a week later his memory commenced to return; he was still, however, unable to account in any way for his disappearance.

In another group the secondary state, from a physical, moral and intellectual point of view, is superior to that of the primary one. The following are examples :—

A girl, aged 18, healthy, but quiet and somewhat stupid in character, swallowed some unguentum lyttæ. After the acute symptoms of poisoning passed off, a cutaneous hyperæsthesia of the head and morbid sensitiveness to sound remained. She had frequent attacks of temporary insensibility and passed alternately from her ordinary mental condition to a secondary one, and from this in its turn back again to the normal one. In the secondary state she was excitable; her conversation was lively and spirited, and she was intellectually superior to what she was in the primary condition. The memories of the two states were absolutely distinct; the primary self knew nothing of the secondary one, the secondary self nothing of the primary one.—"Case of Double Consciousness," by Thomas Mayo, M.D., F.R.C.S., *London Medical Gazette*, New Series, Vol. I., 1845, p. 1202.

Mary Reynolds, a dull and melancholy young woman, was found one morning in a profound sleep, from which it was impossible to arouse her. After twenty hours she awoke, but her disposition was absolutely changed and she had no memory of her past. She was now cheerful, buoyant, sociable and merry, but did not recognise her relatives or friends, and had lost the power of reading and writing. Five weeks later, she passed into the primary state; again became dull and melancholy, and remembered nothing of her secondary condition. After the lapse of a few more weeks she again passed into the secondary stage after a profound sleep, and took up her new life precisely where she had left it. The memories of the two states were absolutely distinct; in the first she remembered former primary states, but these alone, in the second, she only remembered former secondary states. These alternations of consciousness continued for fifteen years, then finally ceased, leaving her permanently in the second state. In this she remained without change for the last twenty-five years of her life.—"Case of Mary Reynolds," by Dr. Weir Mitchell. *Trans. of the College of Physicians of Philadelphia*, April 4, 1888.

Félida X., aged 14½, without known cause, though sometimes under the influence of emotion, had attacks of sharp pain in both temples, followed by a state of profound stupor, which lasted ten minutes. She then spontaneously opened her eyes and appeared to wake, but in reality passed into a condition of secondary consciousness. This lasted for an hour or two, then the stupor and sleep re-appeared and she passed into her ordinary state. The secondary state differed markedly from the primary one. In the latter she was a miserable, querulous, hysterical invalid, and remembered nothing of her secondary life, which was superior, both intellectually and physically, to her primary one. In it she was gay, active and intelligent, and remembered not only all the events which had taken place in former attacks of secondary consciousness, but also those of normal life. As time went on the frequency of the secondary attacks became greater and their duration longer, till at the age of 24 they commenced to exceed the periods of normal life. From 24 to 27 she remained in the normal state. After this the secondary attacks became more and more frequent, and finally almost completely occupied her entire existence. In 1875 Félida, who was then 32 years of age, told Azam that she still suffered from attacks associated with loss of memory. These so-called "attacks," however, were simply lapses from her secondary consciousness into her original primary one. Thus, once when returning from a funeral she felt her attack, *i.e.*, her normal state, come on. She became unconscious for a few seconds, without her companions noticing it, then woke in the primary state, absolutely ignorant of the reason for which she was in a mourning carriage. Accustomed to these accidents she waited till, by skilful questions, she was able to grasp the situation, and thus none of those present knew what had happened. Later, she lost her sister-in-law after a long illness, and, during a relapse into the normal state, knew nothing about her death, and only guessed at it from the fact that she was in mourning. In the earlier periods the transition from one state to another was marked by a period of more or less prolonged unconsciousness. As time went on, this diminished and, finally, the loss of consciousness became so brief that Félida was able to disguise it. In 1887, when Azam published the account of the case, Félida was 44 years of age and her lapses into normal life had become more and more rare.—*Hypnotisme double Conscience et Altérations de la Personnalité*, par le Dr. Azam. Paris, 1887, J. B. Ballière et Fils.

In 1888 Dr. Ladame, of Geneva, communicated a somewhat

analogous case to the Société Médico-Psychologique, which had been cured by suggestion.

In the cases just cited, the first attack of secondary consciousness was frequently preceded by shock, although sometimes it arose without apparent exciting cause. In subsequent ones it was usually more difficult to trace the exciting cause; generally the attacks were independent of the patient's volition, although cases are recorded by McNish and others where the state could be induced at will.

The attacks of secondary consciousness usually terminated spontaneously, and without discoverable cause. In some instances, however, the accidental reading of an account of their lost selves seems to have evoked some of the memories of the primary state and contributed to the disappearance of the secondary one.

(*b*) *Facts in support of a secondary consciousness drawn from normal waking or sleeping life.*—Here the evidence is not so clear as in the preceding section, but without the hypothesis of a secondary consciousness, it is difficult to explain phenomena such as the following:—

(1) Time appreciation in cases such as those of Savage and Hartog. Here, no ordinary physiological explanation is possible, and, while the ordinary consciousness was asleep, an intelligence of some kind must have watched the passage of time.

(2) The recollection of forgotten facts without the association of ideas connected with normal memory. Everyone, I think, must recall instances in which he has tried to remember a forgotten name, and, after having failed to recall it by every device imaginable, at last put the problem on one side in disgust and turned his attention to other things. Later, the forgotten name rises into consciousness, with a suddenness which is startling, and no association of ideas can be discovered to account for its appearance.

(3) Literary problems, which are vainly struggled with when awake, are sometimes apparently solved in sleep. Thus, on awaking, page after page is easily and satisfactorily

written, while the day before the author had been unable to find expression for his thoughts.

(4) According to Myers, works of genius, instead of being the result of an infinite capacity for taking trouble, are due to the intelligent action of a secondary consciousness. The labour is performed in a subterranean workshop, as it were, and then presented in completed form to the normal consciousness. The latter not only believes that it has done the work itself, but thinks that this has been performed instantaneously.

(*c*) *Hypnotic phenomena which apparently support the theory of a secondary consciousness.*—These are too numerous to be referred to in detail, and it might even be claimed that every deeply hypnotised subject shows evidence—in memory changes alone—of the existence of a secondary consciousness. In the waking state, he can recall nothing of what has passed in profound hypnosis, but when hypnotised, not only remembers the events of previous hypnoses, but also all that his ordinary memory can recall of waking life and even, in addition, much that it had forgotten. Further, he has acquired a control over his own mind and body without parallel in waking life. He can alter the rhythm of his pulse, control his secretions and excretions, and increase or arrest the activity of his special senses. He can induce anæsthesia and analgesia, and, even when all the phenomena are elicited by the suggestion of the operator who has hypnotised him, maintain consciousness and volition unimpaired. From the therapeutic side he can obtain relief from the pain of disease or injury, procure sleep at will and for as long or as short a time as he wishes. He can escape from obsessions, conquer the diseased craving for alcohol and narcotics, and get rid of numerous functional nervous disturbances. Finally, he can be taught to hypnotise himself, and from henceforth—free from all external interference—can by self-suggestion produce phenomena identical with those just described. All these phenomena cannot be evoked in every case, but something can always be effected beyond the power of the waking will.

The following is an interesting example of the spontaneous

and intelligent action of the secondary consciousness in an untrained hypnotic subject. I questioned Miss A. (the subject of the time experiments above referred to) during hypnosis, as to her mental life in previous hypnoses. She replied as follows:—"When you do not speak to me and nothing occurs that interests me directly, I generally think of nothing and pass into a condition of profound restfulness. Once, however, I had an important dress to make and was puzzled how to do it. After you had hypnotised me and left me resting quietly, I planned the dress. When I awoke, I did not know I had done so and was still troubled about it. On my way home, I suddenly thought how the dress ought to be made and afterwards successfully carried out my ideas. I believed I had found the way out of the difficulty there and then in the waking state, I now know I did so some hours previously when hypnotised." When the subject was aroused, she had no recollection of what she had said and still believed she had planned the dress when awake. The origin of this feat in dressmaking—one apparently beyond the subject's normal powers—may be taken as illustrating the possible source of the higher intellectual achievements of genius.

Finally, there is evidence which shows, not only that there is a secondary consciousness which alternates with the primary one, but also that the two may act simultaneously and independently of each other. This is clearly demonstrated by the phenomenon of automatic writing.

Automatic Writing.

In choosing a subject for automatic writing two things are essential, viz.: (1) he must be a somnambule, *i.e.*, retain no memory on waking of what has passed in the hypnotic state, and (2) hypnosis must be capable of being induced and terminated instantaneously. Thus, when the subject is aroused immediately after the suggestion has been given, the problem must be solved in the waking state, although, as we shall see, not by the waking consciousness.

I have often made the following and similar experiments.

I ask a subject while awake to write down a few verses; these I take charge of and do not show him again. I then make him read aloud from some book previously unknown to him, this being chosen in order to engage his entire attention. While reading I hypnotise him suddenly, place pencil and paper near his right hand, and suggest: "On waking you will go on reading where you left off, and at the same time write down how often *b* (or any other letter selected) occurs in the verses you gave me. Wake up." He wakes, resumes reading, and at the same time writes down the answer to the problem suggested. This, almost invariably correct, is often done so rapidly that I have not had time to count the letters, even with the verses before me. I now tell the subject to stop reading, and ask him what he has written. He replies, "Nothing," and when I show him the paper, is astonished and declares he does not know what it means. I then re-hypnotise him, whereupon the lost memory returns, and he not only recalls the suggestion, but also the fact that he has carried it out.

Thus, the primary waking consciousness retains no recollection of the hypnotic suggestions. It does not know that the secondary consciousness, after the hypnotic state has been terminated, first solves the problems, and then directs the motor acts which record them. It is also unconscious of the motor acts themselves.

Gurney made many interesting experiments with healthy non-hysterical men, which illustrate the severance of the normal, or primary, from the latent, or secondary, consciousness. Of these the following are examples:—(1) The first were simple cases which involved memory, but not independent thought. Thus, Gurney showed P., one of his subjects, a planchette and made him write his name with it. P. was then hypnotised; told that it had been as dark as night in London on the previous day, and that he would record this fact in writing. On awaking he remembered nothing. His hand was then placed on the planchette—a large screen being held in front of his face, so that it was impossible for him to see the paper or the instrument—and in less than a minute he wrote, "It was a dark day in

London yesterday." (2) In the next experiments statements were impressed on the subjects, but nothing was said as to subsequently recording them. After waking, however, the writing was executed as before. (3) Gurney made more complicated experiments with another subject. During hypnosis questions were asked about his past life, or arithmetical problems suggested. He was then awakened immediately, before he had time to think of a reply, and, to engross his attention, told to count backwards from a hundred; meanwhile the planchette wrote the correct solutions of the problems. (4) Further experiments involved the reckoning of time. These, however, were not confined to the execution of an order at a given moment, but involved, in addition, other calculations made in the waking state *at a suddenly selected moment*, regarding which nothing had been previously said to the subject. For instance, during hypnosis, he was told to do something at a given date, and also that, before this time arrived, he would be required to write down the number of minutes that had passed since the suggestion was given, as well as the number that had to elapse before its fulfilment. In the interval, when his hand was placed upon the planchette, he generally wrote the answers to the problems. The results, allowing for the time occupied in writing, were remarkably accurate.

Remarks.

The experiments in groups Nos. 3 and 4 showed, according to Gurney, that the hypnotic substrata included higher physical functions than mere random spurts of memory, viz., processes of deliberate reckoning and reflection, which it would be almost impossible to conceive as having only a physiological existence. In group 4, the order itself was remembered and realised by the secondary consciousness, while the primary consciousness was wholly without knowledge of it. In Gurney's opinion, these so-called automatic writings were, in most cases at all events, intelligent and involved mentation. When a statement was made which the subject was told he was afterwards to record in writing, the performance might possibly be regarded as an exclusively

automatic one, due to a "setting of the organism." Sometimes, however, the impression was made without a hint as to the future—without the faintest suggestion that it would produce any result whatever; yet, in the midst of quite irrelevant surroundings and experiences, the phenomenon appeared as soon as the opportunity of "automatic" representation arose. Here the organism could not have been specially set for the effect. Further, if we regarded the action as purely automatic, we should be compelled to concede a singular power to hypnotic impressions, viz., that of storing up energy in the brain which would work mechanically outwards along the motor nerves, as soon as the act of writing was sufficiently easy for the muscles. Moreover, memory on re-hypnotisation afforded strong evidence of mentation. Not only did the subject remember the original idea conveyed to him, and the fact that he had written something, but also the exact words he had used to convey his conception of the impression. Surely this indicated an intelligent apprehension of the words. We have seen that the memory of these so-called automatic acts could be recalled in hypnosis, but some of them, in addition, indicated the existence of a hypnotic memory superior to the normal one, as the facts recorded had occurred at an early period of the subject's life and had long been forgotten.

(II.) *Granting the existence of a secondary consciousness, how far does this explain all the phenomena we have been considering?*

The facts just cited—and these might be supplemented by many more — apparently indicate not only that a secondary consciousness exists, but also that it can act simultaneously with, and independently of, the primary one. Even, however, if we grant the existence of a secondary consciousness, this does not explain all the phenomena of time appreciation and arithmetical calculation that we have been considering.

Obviously if the intelligence of the secondary consciousness were at all comparable to that of the primary one, it would not be difficult for it to calculate the arrival of the

39th or the 123rd day from any given date. In Gurney's cases, it apparently performed this feat with ease, and the subject, when hypnotised, could recall the manner in which it had been accomplished.

Here the secondary consciousness apparently acted in just the same way as the primary one might have done under similar circumstances; having to execute an order on the 39th day from a given date, it recalled the fact from time to time and noted how many days had passed and how many had to come. Many of the experiments I have cited, notably the more complicated ones executed by Miss A., present more difficult problems, and by none of the theories already considered can these be properly solved. Bernheim's explanation, as we have seen, is in opposition to observed facts, while Gurney's objections to that of Beaunis apply with even greater force to my cases. Thus, if there is little analogy between ordinary physiological periods of time, and, for example, 39 days chosen suddenly and arbitrarily by human volition, the analogy is still less between the former and, say, 20,845 minutes.

Further, the secondary consciousness theory, while it affords a reasonable explanation of the way in which Gurney's subjects carried out their suggestions, fails to account for much that is important in the cases I have cited. The following are the principal points which demand explanation:—(1) The want of hypnotic memory as to the manner in which the suggestions were carried out. (2) The fact that the suggestions not only involved feats of arithmetical calculation and memory far beyond the subject's normal powers, but also in some cases beyond their hypnotic ones. (3) The difference in the nature of the time appreciation required in Gurney's cases and in those cited by me.

(1) *The want of hypnotic memory as to the manner in which the suggestions were carried out.*

According to Bernheim, the hypnotic subject is conscious in all stages, and all the memories of hypnotic life, which are lost on waking, can be restored by suggestion or other means. This statement is not absolutely correct. Hypnotic life, it is true, is more conscious than the normal one,

and lacks the prolonged and regularly recurring periods of unconsciousness, represented in the latter by sleep. Sometimes, however, deeply hypnotised subjects receive impressions, and even perform acts, of which they are unconscious.

Thus, (*a*) where anæsthesia has been induced for surgical purposes, the subjects can recall nothing of the operations, either when awake or in subsequent hypnoses. Generally speaking, present forgetfulness does not prove past unconsciousness. When we find, however—in the instances where analgesia and hyperæsthesia have been simultaneously excited—amnesia as to certain sensations, associated with hyperæsthesia as to others, we have reasonable grounds for inferring that the sensations, which cannot be recalled, never reached consciousness. This view is further strengthened by the fact that the operations were characterised by absence of shock, persistence of analgesia after waking and unusual rapidity in the healing process.

(*b*) If a subject is told to be unconscious of everything until aroused by the operator, he will, if neither questioned nor touched, take no notice of what is said or done around him, while suggestion, in subsequent hypnoses, often fails to revive any memory of what has taken place.

(*c*) If a simple movement is suggested, of which volition does not disapprove, it may after a time become automatic, *i.e.*, after having been frequently consciously and voluntarily performed, it may be executed unconsciously, as a genuine automatic act, in response to the habitual stimulus which has excited it. Here, again, the lost memory cannot be recalled by suggestion in subsequent hypnoses.

With the exception of examples of the three classes just cited, the acts of hypnotic life are performed consciously and can be recalled by suggestion in subsequent hypnoses. Further, as the hypnotic memory is more exact and far-reaching than the normal one, the absence of memory as to some given circumstances of hypnotic life, other than those just cited, is markedly suspicious. These suspicions are deepened when the forgotten act is analogous to those invariably remembered by the hypnotised subject. Gurney's subjects easily remembered their calculations as to the days

that had passed, those that had to come and the terminal time of the experiment. In some instances, when the arithmetical problems involved were simple, Miss B., in subsequent hypnosis, recalled the fact that she had calculated out the terminal time of the suggestions and set herself to carry it out at the appointed hour. This, by the way, Gurney asserted hypnotised subjects never did. When the experiments became more complicated, Miss B. ceased to do this, and then, like Miss A., was unable to revive in hypnosis the slightest trace of memory, as to the manner in which the suggestions had been carried out—they could then recall no calculations and no time watching, no foretelling of the terminal time and no recognition of it when it arrived. Yet, from what we know of hypnotic memory, it is impossible to doubt that if calculations and observations of this kind had been made by the subject, they would have been able to have remembered them when again hypnotised.

(2) *The fact that the suggestions not only involved feats of arithmetical calculation and memory beyond the subject's normal powers, but also in some cases beyond their hypnotic ones.*

Delbœuf pointed out that his subjects, in the normal state, were unable to make the necessary calculations involved in his time experiments; therefore the success of these experiments, he said, demonstrated that the subjects when hypnotised had an idea of the passage of time, and unconsciously calculated when the suggestions fell due. Experiments made in hypnosis, however, showed that the subject was quite incapable of calculating even much simpler problems than those involved, and, although this fact was recorded by Delbœuf himself, he apparently missed its significance. When Miss A. was asked to calculate in hypnosis when the suggestions fell due, she was wrong in the first nine instances, her errors frequently being extremely gross ones. Again, unless specially asked to do so, the secondary consciousness apparently made no calculations at all. The time appreciation, however, could not be carried out independently of *such* calculations, obviously the subject could not perform an act at the expiration of 40,845 minutes

unless she—or some self, or consciousness, within her—knew the terminal time this represented.

Further, in Miss A.'s case the hypnotic memory was apparently incapable of retaining the complicated series of figures which were read to her. When she was questioned about them in subsequent hypnosis, but before the fulfilment of the suggestions, she always recalled that the latter had been made, but rarely correctly remembered their details—her recollection being less and less distinct in proportion to the time which had elapsed since they had been received.

(3) *The difference in the nature of the time appreciation required in Gurney's case and in those cited by me.*

There is a marked difference between the recognition of a particular day on its arrival and the last minute in such a series as 20,845. A secondary self or intelligence, which can count the days that have passed and those that have to come and refreshes its memory by doing this every night, could have no difficulty in recognising the terminal day. The varying impressions from the external world, which tell us that a new day has dawned, would be received as freely by the secondary as by the primary consciousness, and all that the former would have to do would be to associate them with the calculation it had made the night before, that the next day would be the suggested one. In my cases the problem is a widely different one. Granting that some intelligence worked out the arithmetical portion, and determined that the suggestion fell due, for example, at 3.25 p.m. a fortnight later, the determination of the arrival of 3.25 differs widely from the recognition of the dawning of a particular day. Admitting that some intelligence, equal to the primary one, tried to determine when this moment arrived, circumstances, often specially arranged, added to the difficulties of the task. In some instances, for example, Miss A. was in a darkened room for several hours before the suggestion was executed, and absolutely without any of the ordinary methods of determining the time. Even if she knew what o'clock it was when she entered the room at noon, how could she determine when it was 3.25?

The general conditions of memory, then, in reference to the experiments I have cited, apparently show that the secondary consciousness—or at all events such manifestations of it as Gurney describes—did not participate in them at all. Further, the feats in calculation and memory were beyond the power of that consciousness, while we have no evidence of the secondary consciousness carrying out time appreciations comparable to the particular cases involved. Some intelligence, however, must have made the arithmetical calculations, and, further, corrected them when they were erroneously worked out by the secondary consciousness. Something also must have remembered the complicated series of figures and the varying results of the calculations, and also, in some fashion, noticed the time as it passed and connected this with the date given as the result of the calculations involved in the suggestions. Could the problems have been worked out by a third consciousness acting independently of the primary one? The theory that a multiple, as well as a secondary, consciousness exists is not a new one, although, as far as I know, it has not yet done duty in explaining the phenomena of time appreciation. I propose now to examine some of the alleged cases of multiple consciousness, and later to see what light, if any, they throw upon the problems we have been considering.

Cases of So-called Multiple Consciousness.

Sarah L. was the first person in whom I found any evidence of so-called multiple personalities, and when she came under my notice about ten years ago I knew nothing of the literature on the subject. In the normal state she was quiet, respectful and somewhat shy, and retained this character when I hypnotised her. She was a profound somnambule; in the waking life she knew nothing of the events of hypnosis, but in hypnosis could recall all the memories of the normal state as well as the incidents of hypnotic life. In 1889, the late Mr. Bendelack Hewetson, of Leeds, operated on her for double strabismus, the only anæsthetic employed being hypnotic suggestion. Later, she sustained a

severe fracture of the nose; there was a good deal of displacement and the parts were swollen and extremely painful. Profound anæsthesia was again induced by suggestion and the bones moulded into position; in each instance the occurrence of subsequent pain was entirely prevented by suggestion. Further, the patient was also cured of attacks of migraine, from which she had suffered since the age of 7, while, after fifteen months' amenorrhœa, menstruation appeared at a suggested date. The above details are cited in order to show the genuine and profound character of the hypnosis.

Before coming under my care Sarah L. had been hypnotised and exhibited by a stage performer, and, some time after the events just recorded, her mother told me that Sarah occasionally hypnotised herself, and that the condition then differed markedly from the one I induced. After some coaxing the girl consented to hypnotise herself, and went through the following performance:—First, she closed her eyes and appeared to pass into a lethargic state, then, a few minutes later, awoke with a changed expression; instead of having a shy and modest air, her eyes sparkled and she looked full of mischief. In place of addressing me as "Sir" —she had formerly been a servant of mine, and an extremely respectful one—she put her hand on my arm and said in a familiar way, "I say?" She then began to ask me impertinent questions about the persons she had seen at my house, and to criticise them in a particularly free and sarcastic fashion. The performance was so interesting and amusing that I got the patient to hypnotise herself on a good many occasions. The same phenomena always appeared; she invariably became familiar, inquisitive and sarcastic, while her highest praise for anyone she approved of was conveyed in the words, "She'll do." Other facts were noticed and reported to me by her mother. Thus, sometimes when Sarah hypnotised herself, she would remember that her mother owed her a few coppers and insist upon having them at once. If they were refused, she would take them by force; to this, however, her mother lent herself. The girl would then generally go out and buy oranges, and,

on her return, eat them all herself; this selfishness was quite out of keeping with her normal character. Sometimes, when her mother asked her to do work that was distasteful to her, such as blacking the grate, she would induce self-hypnosis with profound lethargy and remain apparently deeply asleep for hours. I never taught her to hypnotise herself, nor, as far as I could learn, had this been done by anyone else. During this third stage she remembered everything that had happened in previous conditions of this kind, and also the events of the normal state and those of ordinary hypnosis, but the waking consciousness and the ordinary hypnotic one knew nothing of the events of this third state. After I had observed the condition for some time, I concluded that it was not likely to be beneficial to the patient, and suggested, during ordinary hypnosis, that she should lose the power of creating it. The suggestion was successful and the condition never reappeared.

Pierre Janet has been fortunate in finding several patients who apparently possess multiplex personalities, and has published full and interesting accounts of their cases. Amongst these that of Léonie —— is, I think, one of the most striking. This patient, aged 45, apparently possessed three distinct and well-marked personalities, viz., Léonie I.; the Léonie of normal life, a serious and sad peasant woman, calm, slow, gentle and timid. Léonie II.; Léonie in the ordinary hypnotic state, a gay, noisy, restless being, given to irony and bitter jesting, who describes her visitors in an impertinent fashion and apes their airs and graces. Léonie II. refuses to identify herself with Léonie I., and calls the latter a stupid woman. Léonie has had attacks of natural somnambulism since she was three years old, and from 16 upwards has been frequently hypnotised by various people. Now, when Léonie II. is called to the front, she knits together the events of her natural and induced hypnotic state and forms the history of her life from them; the memories of waking life are not forgotten, but these are ascribed to Léonie I.

When Léonie II. is hypnotised more deeply there appears a third personality, Léonie III., who is grave, serious,

slow in speech and movement. This Léonie separates herself both from Léonie I. of waking life and the Léonie II. of the ordinary hypnotic state. The former she describes as a good, but rather stupid woman, and the latter as crazy. "Fortunately," she says, "there is nothing of me in either of them." Léonie I. knows herself alone; Léonie II. herself and Léonie I., while Léonie III. not only knows herself but also the two others. Léonie I. has only a visual consciousness; Léonie II. has both visual and auditory, while Léonie III. has a visual, auditory and tactile one. Léonie I. is embarassed and ashamed when Léonie II.'s friends, who are strangers to her, speak to her in the street. Léonie II. spontaneously writes letters, which Léonie I. finds and destroys, as she does not understand them. Afterwards Léonie II. hides her letters where she knows Léonie I. will never look for them. Léonie II. visits places where Léonie I. has never been, then disappears and pushes Léonie I. to the front, leaving her frightened by her strange surroundings.

According to Janet these three personalities, which deny and despise each other, not only existed in successive forms, but did so simultaneously. While Léonie I., for example, is apparently the only Léonie, other personalities are inside of the same woman, each of them sensible and wide awake and occupied with her own affairs.

In "An Experimental Study of Visions" (BRAIN, 1898) Dr. Morton Prince records some interesting experiments which he made with Miss X., a patient who suffered from hysterical neurasthenia. Miss X. was easily hypnotised and at first passed into the ordinary deep stage, then, when ordered to sleep more profoundly, a fresh condition developed, which differed both from that of waking life and ordinary hypnosis. According to Dr. Prince those stages formed three distinct personalities, viz.:—

X. I. The Miss X. of ordinary waking life, who is reserved, morbidly conscientious, self-contained, serious, deferential and dignified.

X. II. The Miss X. of the primary hypnotic condition, who is sad, serious, and apparently weak and suffering.

X. III. The Miss X. of the secondary or deeper hypnotic

state, who is flippant and jovial, free from all physical infirmities, full of fun and reckless.

X. I. remembers the events of waking life alone and knows nothing of X. II. and X. III., while X. II. remembers all that has passed in previous primary hypnotic states, also all that X. I. can recall, and, in addition, some other events of waking life which X. I. has forgotten.

X. III. remembers all the events of the secondary or deeper hypnotic stages, as well as everything X. I. and X. II. can recall. In addition, she can describe incidents in the past life of X. I. which are lost to the memory of the latter, and can thus explain much that the waking personality is at a loss to account for. She knows all about many of the little absent-minded doings of X. I., and does not hesitate to voluntarily tell of them, although X. I. is morbidly and unnecessarily reserved about her whole life.

Dr. Prince made this tripartite personage look into a globe, which took the place of the ordinary glass ball used in crystal gazing, and describes the visions which the different personages saw. The following is one of the most interesting of these :—

X. III. was the person in action and voluntarily related the following incident, telling it with great gusto as a joke against Miss X. (X. I.), whom she talked of as "She." "'She' received a letter from a photographer yesterday. 'She' put it into her pocket where 'She' had some bank-notes. Then, as 'She' walked along, 'She' took out the money and tore it to pieces, thinking it was the letter. 'She' threw the money into the street." In response to questioning X. III. repeated the words of the photographer's note and counted mentally, with some difficulty and concentration of thought, the amount of money. X. III. said that "She" was absent-minded and thinking of something else when "She" tore up the money. Hypnosis was now terminated and the ordinary personality, X. I., appeared, who, in reply to questions, stated that she had received a letter from her photographer which she had torn up, and that she had the bank-notes in her pocket. She was asked to show them and produced the letter. This surprised her,

but she thought she must have left the bank-notes at home, and could not believe she had destroyed them. The notes were undoubtedly lost, and an account of the occurrence, similar to that given by X. III., was obtained by making Miss X. (X. I.) look into the globe and suggesting that she should see what had really happened. Here, apparently, the ordinary hypnotic state, namely, X. II., was induced by indirect suggestion and fixed gazing, and the vision appeared in response to the suggestions of the operator.

Crystal gazing, the method employed by Dr. Prince, is not really necessary for the production of hypnotic visions; it simply acts by presenting a point upon which the suggested memories are concentrated, and rendered, as it were, objective. Any memory which exists in the hypnotic consciousness can be evoked by suggestion without the crystal. Under ordinary circumstances the hypnotic subject rarely visualises his memories, but when he looks into the crystal this is a direct suggestion that he should see with his eyes what has happened. I have frequently made similar experiments with hypnotic subjects, and, in place of the crystal, made them look at the top of my stethoscope, which answered equally well.

The following account is condensed from the notes kindly supplied me by Dr. Albert Wilson, of Leytonstone.

Mary W., born October, 1882, had in April, 1895, an attack of meningitis associated with influenza. During the third and fourth weeks of the illness there was high temperature, with delirium bordering on mania, and she called people snakes and did not recognise her friends. In the fifth week, during convalescence, her character changed, and she began to give those around her names which were not their own—thus, her father was Tom, her mother Mary Ann, &c. About the sixth week attacks of secondary personality appeared. The patient would suddenly turn a somersault on the bed and then assume a new character—returning suddenly to the normal, and resuming what she had been occupied with before the attack. At first the seizures lasted from ten to fifty minutes, but increased to hours, days and weeks as the time went on. The secondary self knew

nothing of the primary one and *vice versâ;* further, the secondary self had apparently lost much of the knowledge the primary one had acquired. Thus, in the second state, the patient did not know what her legs and arms were and was childish in her talk. She could write her name, however, but this she did backwards, beginning at the tail of the last letter and writing quickly from right to left—not mirror writing.

After a few months the periods of normal life become shorter, and in place of one secondary stage various others showed themselves from time to time. Of these there were sixteen in all, termed by Dr. Wilson stages *a*, *b*, *c*, *d* . . . *p*. In each stage the subject remembered what had happened during previous attacks of the same stage, but knew nothing of what had occurred in any of the other stages, while the primary personality remembered events in the normal life alone, and knew nothing regarding any of the incidents which had happened in any of the numerous other states.

At the end of a year the normal condition rarely appeared, and then only as a flash—sometimes coming to the surface for five or ten minutes, sometimes only for a few seconds.

The following stages or personalities were noted, most of them being named by the patient herself:—

(*a*) The patient calls herself "Thing"; she is vacant, knows nothing of her past life and cannot stand.

(*b*) Calls herself "Old Nick" and is passionate and mischievous.

(*c*) Here there is catalepsy with deaf-mutism, but the patient writes down all she wants.

(*d*) In this stage the patient has forgotten not only the incidents of normal life, but apparently also much of the general knowledge acquired during it. In writing she spells backwards in the manner already described.

(*e*) A stage characterised by terror.

(*f*) Here the patient calls herself "Good Thing," and is docile, but usually without power in feet or hands; this stage, however, is quite distinct from (*a*).

(*g*) The patient now calls herself "Pretty dear"; is sweet and amiable, but cannot write or spell.

(*h*) Calls herself "Mamie Wud"; in this stage she recalls the events of childhood better than when awake, but is unable to remember anything about her illness.

(*i*) This stage is somewhat like (*d*), when in it the patient knows nothing and thinks she is just born.

(*k*) Here the patient calls herself "Old Persuader," and asks for a stick to strike people with if they won't do what she wishes.

(*l*) She now calls herself "Tom's darling," and is apparently a nice child.

(*m*) In this stage she asserts that she has "no name," and is violent and unkind.

(*n*) She now calls herself "The dreadful wicked thing"; throws her slippers into the fire in a temper, &c.

(*o*) In this stage she calls herself "Tommy's lamb," and is blind and idiotic.

(*p*) In December, 1896, a further stage developed, which lasted till February, 1897. The patient now kept saying "picters," and drew beautifully, even being able to do so when she was prevented from seeing the paper on which she was drawing. The original self was unable to draw. During this stage the pupils were dilated and reacted feebly to light, while the patient was apparently insensible to sound.

As time went on, the patient, when in abnormal stages, began to have some idea of what had taken place in her ordinary life; when in the latter condition, however, she still had no recollection of anything that had happened in any of the abnormal stages. In July, 1898, she passed into a condition much more closely resembling the normal one; she was still, however, childish and called herself "Critter Wood."

At the present time (Summer, 1900) five years since the commencement of her illness, she has apparently settled down in stage (*g*), but has been taught that Mary W., not "Pretty dear," is her name. She is a fine, healthy, well-developed girl, who helps in the house and is anxious to learn typewriting in order to keep herself. Her character, however, differs slightly from her original one, and she is still somewhat childish at times.

Gurney stated that he had experimentally demonstrated the existence of positive and distinct stages of memory within the conscious portion of the hypnotic trance. The subjects of these experiments were first hypnotised lightly, and something was told them which they were asked to remember. Deeper hypnosis was then induced, when the subject was asked what he had just been told; it was found that he neither remembered what had been related to him, nor even the fact that he had been told anything at all. While in this deep stage, which Gurney termed *B*, some new incident was related to the subject which he was again asked to remember. He was then recalled to the lighter stage, termed *A* by Gurney, and asked to repeat what he had been told; he had forgotten what he had heard a few minutes before in stage *B*, but repeated instead what had been told him in the earlier stage *A*, in which he now again found himself. Brought once more to *B*, he similarly remembered what he had been told in that state, while he was again completely oblivious of what had been impressed upon him in *A*. On waking he retained no memory of anything that had been told him in either stage.

Many cases, of which the following is an example, were cited by Gurney to illustrate these alterations in hypnotic memory:—

S., a young man living at Brighton, was told in state *A*, the lighter stage of hypnotic trance, that the pier head had been washed away, and in state *B*, the deeper stage of trance, that an engine boiler had burst at Brighton station and killed several people. He was then brought from stage *B* back again to *A*, when he recalled all that had been told him about the accident to the pier. Hypnosis was again deepened; stage *B* appeared, and the following conversation took place between the operator and the subject:—

Operator: "But I suppose they will soon be able to build a new one."

Had the pier been present in S.'s mind, this remark, said Gurney, would naturally have been taken to refer to it, as it had formed the subject of conversation only a few seconds

before. S., however, at once replied: "Oh, there are plenty on the line"—meaning plenty of engines.

Operator: "The pile-driving takes time, though."

S.: "Pile-driving? Well, I don't know anything about engines myself."

The subject was now brought back to stage *A*, and the conversation continued:—

Operator: "If they have plenty more, it does not matter much."

S.: "Oh, they can't put it on in a day; it was a splendid place."

Operator: "Why, I am talking about the engine."

S.: "Engine! What, on the pier? I never noticed one there."

Here the subject's mind had evidently again reverted to what had been told him in stage *A*.

In the above case, as in all others of a like nature cited by Gurney, the normal self knew nothing of stages *A* and *B*, and these knew nothing of each other.

Before considering multiple personality, in reference to feats of calculation and time appreciation, I wish to examine the characteristics of the various examples of secondary and multiple personality we have been considering. The cases, which present many different phenomena, may be grouped as follows:—

Class I.—Those more or less closely associated with morbid states, and presenting phenomena which range from amnesiæ with alterations in character, to conditions similar to those presented by Félida X.

Class II.—Cases of ordinary hypnotic somnambulism, which afford evidence of a secondary personality.

Class III.—Cases of hypnotic somnambulism, presumably showing evidence of multiple personality.

Class IV.—Time appreciation, &c., like those of George Savage and Marcus Hartog.

Class V.—Instances where mental work, varying from the recollection of a forgotten name to the so-called inspirations of genius, have apparently been carried out by some consciousness other than the ordinary one, and in some condition other than hypnosis.

Class I.

At the lower end of this class Hyslop, in his article on "Double Consciousness," *British Medical Journal*, September 23, 1899, includes cases in which the patients, after a seizure of some sort, performed certain acts of which their ordinary consciousness was ignorant. These varied from purposeless automatic ones to thefts committed with more or less skill or cunning, and, apparently, were neither recalled in the normal state nor in subsequent attacks. At the other end of the group Hyslop cites Félida X., whose case, already reported, differs in many respects from those just referred to. The changes in memory, whether modifications or disturbances, are the most important phenomena in connection with double and multiple personalities, and in Class I. these may be grouped as follows :—

(*a*) Cases where purposeless automatic acts occur, regarding which there is no subsequent revival of memory in any normal or abnormal state.

(*b*) Where more or less intelligent acts are executed, which again are never subsequently recalled, either in primary or in secondary states.

(*c*) Here there are two or more conditions, each characterised by distinct chains of memory : (1) The primary or normal, in which the events of ordinary life alone are remembered, and (2) the secondary or multiple, in which the occurrences of these states are alone recalled.

(*d*) Here the primary state only possesses a memory of its own life, while the secondary has a memory of its own life, and that of the primary one also. Further, the secondary self can often recall much which the primary has forgotten.

Many of the cases also differ widely in their moral and physical aspect. Thus some of the patients, who were gentle and good in the normal state, became violent and criminal in the secondary one. Others changed in the reverse fashion both morally and physically; some, like Félida, who were ill-tempered, querulous invalids in their ordinary condition, became bright, cheerful, good-natured, and more intelligent in their secondary one.

CLASS II.—*Cases of ordinary hypnotic double personality.*

These correspond with the subdivision (*d*) just given under Class I., and the secondary self is always richer in memories than the primary one. It is also, generally speaking, healthier and more refined.

CLASS III.—*Cases of hypnotic somnambulism, presumably associated with multiplex personality.*

Here varying and important changes in memory are to be observed. In typical cases we have (*a*) a primary condition, which knows itself alone; (*b*) a secondary one, which knows itself and the primary one; and (*c*) a third, which knows itself and the other two also, and can recall, in addition, much which has been unconscious in the primary life, or that has been forgotten by the primary consciousness. Usually, the secondary self is superior to the primary one, morally, intellectually, and physically, while the third, in its turn, rises above the second. Sometimes, however, as in Dr. Prince's case, the third personality appears like an evil sprite, who rejoices at the misfortunes of the primary one.

In some cases, such as those cited by Gurney, the two hypnotic selves had each a separate chain of memory and held, as it were, no communication with each other.

In Miss A.'s case the third personality only showed itself in its results—calculations, time appreciation, &c., and I never succeeded in artificially tapping it for purposes of examination. Had I been able to do so, doubtless I should have found that it could recall the calculations, &c., which presumably it had made. It is to be noted that the secondary consciousness was incapable of performing the feats in arithmetic, &c., which the tertiary one found no difficulty in executing.

CLASS IV.—*Time Appreciations, like those of George Savage and Marcus Hartog.*

Neither of these observers can trace any memory of the process by which they arrived at their results. This, how-

ever, does not prove unconsciousness or forgetfulness, as far as some personality is concerned, it only shows that, as in Miss A.'s case, we have not discovered the way of evoking the memories. The repetition of Savage's early wakings on subsequent unnecessary occasions, apparently showed that he was capable of starting, but not of regulating, the mechanism on which these depended, while Hartog apparently possessed more control over his secondary self.

Class V.—*Cases of Subconscious Performance of Mental Work in Non-hypnotic Conditions.*

Here, again, it has been impossible to revive any memory as to the means by which the work has been done. Judging from the analogies of hypnotic life—we may instance particularly the dressmaking experience already referred to—it seems probable that such memories exist, and that the secondary self knows how and when it did the work, which the primary one flatters itself it has performed.

The importance of memory in relation to subconscious states is insisted on, both by William James and Myers. According to the former, the theory of "double consciousness" is only, after all, a development of what is found in Locke's famous chapter on "Identity and Diversity," namely, that personality extended no further than consciousness and that there would be two different persons in one man, if the experiences undergone by that man fell into two groups, each gathered into a distinct focus of recollection. Further, says James, "It must be admitted that, in certain persons at least, the total possible consciousnesses may be split into parts which coexist, but mutually ignore each other and share the objects of knowledge between them, and—more remarkable still—are complementary."

In Myers' opinion the formation of a secondary chain of memory is the fundamental point in hypnosis and not mere susceptibility to hypnosis. This chain of memory is essential to the grouping of the various acts which manifest the secondary consciousness. This classification excludes, and I think justly so, some of the cases cited by Hyslop.

Amnesia, even when associated with alterations in character, does not constitute double consciousness. If it did the bather who had forgotten the number of his machine and lost his temper, might be described as a case of secondary personality.

What are the exciting causes of the secondary and multiple personalities ?

To this question no satisfactory answer has been given. Shock, hysteria, &c., are said to be the origin of the phenomena in Class I., but these terms explain nothing. We know little of the essential conditions associated with these morbid states, nor why they should produce a severing of the personality in some instances and not in others.

Hypnotic conditions are induced by certain well-recognised methods, but I can see no logical connection between the acts of fixed gazing, concentration of attention, suggested ideas of drowsy states, and the widely varying phenomena of hypnosis. The latter do not appear spontaneously, and some of the methods described must have been employed in every case before primary hypnosis was induced, but I cannot conceive the idea that the methods explain the phenomena.

At first, I considered cases of so-called multiple personalities—where these were hypnotic in origin—as simple subdivisions of the ordinary hypnotic state, produced artificially by suggestion. The appearance of the phenomena of appreciation and calculation of time in absolutely untrained subjects—phenomena which the secondary consciousness could not produce and of whose workings it was ignorant—has caused me to modify this view.

The time appreciation of Savage and Hartog and the so-called inspirations of genius—the results of mental work, which come suddenly, as a finished product, into the primary consciousness—are as difficult to explain, as the hypnotic cases we have just been considering.

Multiple personalities, in relation to time appreciation and calculation.

In the experiments cited, especially Miss A.'s, we noticed (1) that the ordinary hypnotic consciousness possessed no

recollection of having made the calculations necessary for finding out the terminal time, and (2) could not recall any form of time-watching. Further (3), the ordinary hypnotic memory was incapable of retaining the complicated series of suggestions; it remembered they had been made, but could not recall their details. The results of the time appreciation and calculation, presumably due to a third consciousness, appeared as a sudden uprush into whatever personality—waking, sleeping, or ordinary hypnotic—happened to be present at the moment. When the ordinary hypnotic consciousness had been asked to make the necessary calculations and did so erroneously, the third personality ignored these mistakes and did its work correctly. Further, the passage of the message from the third to the second personality, seemed to make a particularly strong impression upon the latter, or to leave, for some time at all events, the door of communication open between the two. Thus the second personality, which had forgotten the details of the suggestions before these were carried out, could recall them accurately a fortnight after they had been executed.

Granting that the third consciousness or personality performed the feats in calculation and time appreciation, the question still remains: "How was it able to do it?" It matters little whether we regard the third personality as really distinct, or as an artificial division of the secondary one, we have still to solve the problems as to the nature and origin of the powers of the hypnotic self, and particularly their capacity for dealing with time appreciations and calculations, such as we have been considering.

Theories as to the Origin of the Powers, or Phenomena, of the Secondary and Multiple Selves.

Delbœuf's Theory.—According to Delboeuf, the various animal functions which the human waking will is now unable to influence, but which the hypnotic self can control, were the revival of a power possessed by lower animal forms—the remote ancestors of our race. These powers had dropped out of the ordinary consciousness in the process of

evolution, as their association with it had become unnecessary in the struggle for existence. Granting that a limited analogy exists between lower animal types and hypnotised subjects, as to their power of influencing certain physical conditions, it would, I think, be impossible to establish an analogy between the mental and moral capacities of the latter and those of the savage or lower animal. The arithmetical powers suddenly developed by Miss A. are not likely to have been derived from some savage ancestor, who was unable to count beyond five, or from some lower animal presumably ignorant of arithmetic. Again, the same subject spontaneously solved, in hypnosis, a difficult problem in dressmaking. The ability to correctly design a garment, in accordance with the present fashion of the day, can hardly have been derived from some woad-stained ancestor, or lower animal form.

Hyslop's Theory.—Hyslop ("Double Consciousness," *British Medical Journal*, September 23, 1899), attempts to explain the phenomena of double consciousness, by a supposed *inhibition of the amœboid movements in the pseudopodic protoplasmic prolongations of the neurospongium.* As the result of this, the connection between the nerve-cells is interrupted, and the nerve currents which, under ordinary circumstances, would pass freely from one to another, now cease to do so. These physiological phenomena, he says, have their psychical counterpart; the interruption of the nerve currents, on the physical side, being represented, on the mental one, by a breaking of the seriality of thought and a loss of the elements, which go to make up consciousness and consciousness of self. To this theory various objections might be raised:—(1) The conditions which Hyslop would explain by it—"the amnesic defects which," he says, "go so far to constitute what we call double consciousness" are just those conditions which are not characteristic of secondary consciousness. It is true that some of the cases he cites, as illustrating double consciousness, were practically characterised by amnesia alone, but these, as I pointed out, must be excluded from the category, as they lack that chain of memory which is essential to the manifestation of double

consciousness. Félida X., also cited by Hyslop as an example of double consciousness, must be taken as the characteristic and fully developed type of the condition we are discussing. Here, the secondary self was not only superior physically and mentally to the primary one, but it also far surpassed it in memory. As time went on, the primary self only appeared as occasional attacks of amnesia, and thus, if it is essential to have a theory to explain amnesic defects, it is those of the primary, and not of the secondary self, which demand solution. Further, those very amnesiæ of the primary consciousness form a part of the memories of the secondary one. In Félida's case the secondary personality ultimately gained a complete ascendancy over the primary one, and, after a time, her periods of normal life—rare of occurrence and short in duration—appeared to her only as an illness, characterised by forgetfulness of events occurring in what was now, to her, her normal existence. In this secondary state, there was neither decrease of volition nor anything wanting of that complete self which forms consciousness.

Hyslop, it is true, confines himself to instances of double consciousness, associated with morbid conditions, but the phenomena presented by Félida X., notably those of memory, are closely analogous to those characteristic of the hypnotic state, and his theory, if correct, should be equally applicable to both conditions. Until recently, the mental states involved in hypnosis have been little understood; the subjects have been supposed to be automata, wanting in volition and consciousness of self. The contrary, however, is the case; volition and memory are increased in hypnosis, consciousness of self is as vivid as in the normal state, and the general intelligence is often improved. It is these phenomena which demand an explanation, not the suppositious ones, which are based on mal-observations. Starting from erroneous premises, many authorities have attempted to explain the phenomena of hypnosis by an inhibition of some form or another of mental activity, and Hyslop's theory itself is simply a very old and well-known one masquerading in a novel garb. Indeed, it was clearly stated by John Hughes Bennett in 1851.

Bennett's Physiological Theory.—According to Bennett, hypnosis was characterised by alterations in the functional activity of the nerve-tubes of the white matter of the cerebral lobes. He suggested that a certain proportion of these became paralysed through continuous monotonous stimulation, while the action of others was consequently exalted. As these tubes connect the cerebral ganglion cells, suspension of their functions was assumed to bring with it interruption of the connection between the ganglion cells.

Bennett's Psychical Theory.—From the psychical side he explained the phenomena of hypnosis by the action of predominant and unchecked ideas. These were able to obtain prominence from the fact that other ideas, which under ordinary circumstances would have controlled their development, did not arise, because the portion of the brain with which they were associated had its action temporarily suspended, *i.e.*, the connection between the ganglion cells was broken, owing to the interrupted connection between the fibres of association. Thus, he says, the remembrance of a sensation can always be called up by the brain; but under ordinary circumstances, from the exercise of judgment, comparison and other mental faculties, we know it is only a remembrance. When these faculties are exhausted, the suggested idea predominates, and the individual believes in its reality. In this manner, we attribute to the faculties of the mind, as a whole, a certain power of correcting the fallacies, which each one of them is liable to fall into, in the same way that the illusions of one sense are capable of being detected by the healthy use of the other senses. There are illusions mental and sensorial; the former caused by predominant ideas, and corrected by proper reasoning; the latter caused by perversion of one sense, and corrected by the right application of the others.

In hypnosis, then, according to this theory, a suggested idea obtained prominence and created mental and sensorial illusions, because the check action—the inhibitory power—of certain higher centres had been temporarily suspended.

Bennett's theory, before it was finally enshrined by Hyslop in charmingly simple scientific phrase, had prac-

tically served the turn of all those who regarded the hypnotic personality as a limited or degraded form of the normal one. Thus, according to Heidenhain, the phenomena of hypnotism owed their origin to the arrested activity of the ganglion cells of the cerebral cortex. Because these were inhibited, sensory impressions, which usually produced movements, after passing to the higher centres and evoking consciousness, now did so by passing directly to the motor centres. This theory was accepted by Professor McKendrick, of Glasgow, and restated by him in the last edition of the "Encyclopædia Britannica," as giving a true and scientific explanation of the phenomena of so-called animal magnetism. Many objections have been successfully raised to this theory, while the supposed facts upon which it is based have been amply demonstrated to be without foundation.

Heidenhain simply reproduces the physical side of Bennett's theory, while Bernheim, although he denies all physiological change in hypnosis, faithfully reproduces the corresponding psychical one.

Bennett's theory crops up again in Vincent's "Hypnotism." Thirty-two pages are devoted to "neurons" and "dendrons," "inaptic" and "aptic" acts and reasons for rejecting the term "reflex." Finally we arrive at the hypnotic theory, which is founded simply on an inhibition of one set of functions—with an increased capacity of action in the others—the inhibition and dynamogeny of Brown-Séquard. "The stimulus," Vincent says, "instead of being dissipated amongst an indefinite number of neuronic groups, is confined to those whose function is the pure appreciation of the stimulus; the other groups, whose function is the consideration of the reasonableness of the suggestion, and the development of the stimulus in other conscious directions, are inhibited."

Sidis, in the "Psychology of Suggestion," explains the phenomena of hypnosis in exactly the same way. "There is," he says, "a functional dissociation between the nerve cells. The association fibres that connect groups into systems, communities, clusters, constellations—contract. The fine processes of the nerve cells, the dendrons, or the

termination, arborisation, or the collaterals that touch these dendrons, thus forming the elementary group—retract and cease to come into contact." He further discusses which association fibres give way first, and whether the neuraxon is contracted as a whole or whether the fibrillæ alone contract and so withdraw the terminal arborisations for minute distances. All this might be of interest if it were related in any way to the subject in dispute. The phenomena to be explained, however—increased memory, intelligence, &c.—are just the exact opposite of those which have been assumed, and theories, no matter how elaborate, nor how learned in terminology, are valueless when founded upon imaginary mental states, the existence of which is simply assumed by the operator. What does it matter whether lack of consciousness or loss of memory be produced by interruption of association fibres, arrested action of ganglionic cells of the cerebral cortex, retracted dendrons or disconnected neurons, or even by *an inhibition of the amœboid movements in the pseudopodic protoplasmic prolongations of the neurospongium*, if the problems we are dealing with are actually an increase of intelligence, consciousness, volition and memory?

Janet's Theory.—According to Pierre Janet, the secondary self is always a symptom of hysteria, while the essential fact about hysteria is its lack of synthetising power, and the consequent disintegration of the field of consciousness into mutually exclusive parts. Further, the secondary and primary consciousness added together never exceed the normally total consciousnesses of the individual.

Here the generalisation is certainly far too wide. Doubtless many cases of secondary consciousness correspond with Janet's description, others, however, present conditions which are its exact opposite. Thus, while hysteria is a prominent symptom in cases of spontaneous secondary consciousness, it is, on the other hand, not necessarily connected in any way with hypnotic form. Thousands of healthy men, absolutely devoid of any trace of hysteria, have been hypnotised, while hysteria itself, instead of favouring the induction of hypnosis, renders it more difficult.

Further, as to the relation between the severed personalities and the normal total consciousnesses, James justly points out that many instances have been noted, in which the secondary self is more highly developed than the primary one. It knows, for example, all that the ordinary self ever knew, and also much that the other had forgotten, or never known. Dr. Prince's case is a typical example of this. Here, the third personality not only knew all about her own life and that of the secondary personality, but also could recall (*a*) all that the normal personality could remember, and further (*b*) many things that the primary personality had known but forgotten, and (*c*) acts which the normal self had performed automatically, or absent-mindedly, and which had only reached normal consciousness partially, if at all; (*d*) finally, the third personality recalled events which had occurred in the delirium of fever, things of which the primary self was absolutely ignorant, and indeed had never known.

None of the theories we have been examining can be considered satisfactory. No revival of powers supposed to be possessed by lower animal forms can possibly explain the entire range of hypnotic phenomena; neither, again, can they be accounted for by an interrupted connection between the nerve cells, nor by that elastic term hysteria. Gurney's theory that the secondary consciousness calculates and watches the time, just as the primary one might do, is satisfactory for those instances in which it has been proved that this has occurred. It fails, however, when we attempt to apply it to those in which the facts were absent, and in which the feats in calculation and time appreciation were beyond the powers of the secondary self.

As the secondary self is often intellectually superior to the primary one, though we don't know why, we might be inclined to admit, although equally without reason for it, that the third self transcends the second one. As all the selves inhabit one body, and as the secondary and tertiary ones have presumably access to all the information which reaches the primary, are we to suppose that they have proved the apter scholars? It seems more than fanciful

to imagine that while the schoolboy's ordinary self was learning his lessons, a second boy was peering over his shoulder, as it were, and doing the work still better. What must we say, however, to the idea of a third boy learning along with Nos. 1 and 2, and surpassing both of them?

The examples, of time appreciation, we have been considering, present problems still more difficult. As we have seen, there is a marked difference between knowing a particular day on its arrival, and recognising which is the terminal one amongst a long series of minutes. For example, suppose that a suggestion to be fulfilled in 20,840 minutes fell due at 3.15 on a certain afternoon, and that from 12.20 p.m. of the same day the subject of it remained in a room, where she was deprived of all ordinary means of determining the passage of time. Granting that the subject's third personality had calculated 3.15 as the terminal time, that she had noted the time on entering the room and calculated that 3 hours and 55 minutes had to expire before the suggestion was due, and even admitting that she was able to impart this information to her primary consciousness, and to enlist its aid in her attempt to hit upon the exact moment, viz., 3.15, the question still remains, how was this done?

According to William James, our usual time appreciations—minutes, hours and days—have to be conceived symbolically and constructed by successive mental additions. To realise an hour, we must count "now!" "now!" "now!" indefinitely. Each "now" is the feeling of a separate bit of time, and the exact sum of the bits never makes a very clear impression on our minds. We have no sense for empty time and have to subdivide the time by noticing the sensations; after we have received a certain number, our impression of the amount told off becomes quite vague, and our only way of knowing it accurately is by counting, noticing the clock, or some other symbolical conception. Our estimation of the length of time varies from many causes. A time full of interesting experiences seems short in passing, but long when looked back upon; time empty of incident is long in passing, but seems short in

retrospect. Time passes quickly when we are so occupied with what is happening as not to notice the time itself. When we do nothing and feel little we grow more and more attentive to the passage of time. The length of a watched minute seems incredible, because the attention is devoted to the feeling of the time itself, such attention being capable of extremely fine subdivision.

In conclusion James says, "We are constantly conscious of a certain duration—the spacious present—varying in length from a few seconds to probably not more than a minute, and that this duration (with its content perceived as having one part earlier and the other later) is the original intuition of time. Longer times are conceived by adding, shorter ones by dividing, portions of the vaguely bounded unit, and are habitually thought by us symbolically. Kant's notion of *intuition* of objective time as an infinite necessary continuum has nothing to support it. The *cause* of the intuition, which we really have, cannot be the *duration* of our brain processes or our mental changes. That duration is rather the *object* of the intuition which, being realised at every moment of such duration, must be due to a permanently present cause. This cause—probably the simultaneous presence of brain processes of different phase—fluctuates; and, hence, a certain range of variation in the amount of the intuition and its subdivisibility accrues."

Further, "the direct *intuition* of time is limited to intervals of considerably less than a minute. Beyond its borders extends the immense region of *conceived* time, past and future, into one direction or another of which we mentally project all the events which we think of as real, and form a systematic order of them by giving to each a date."

If we accept James' explanation as to the methods by which time appreciations are carried out—and I know of no other more plausible—the time appreciations of Miss A. seem still more remarkable and inexplicable.

While I have endeavoured to show that the theories as to the origin of secondary and multiple personalities—both as to the states themselves and their phenomena—are entirely inadequate, I have no theory of my own to bring

forward in substitution for these. The fresh facts I have cited, although interesting, only add to the complexity of the problems we have to solve. As William James truly says, these manifestations of the "hidden self" are immensely complex and fluctuating things, which, we have hardly begun to understand and concerning which sweeping generalisation is sure to be premature. Meanwhile, he adds, a comparative study of subconscious states is of the most urgent importance for the comprehension of our nature.

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