

mentioned can readily be shown to be concentric circles. The centre has the minimum intensity when the difference in the distances ab ac is an exact number of wave-lengths. The diameters of the consecutive circles vary as the square roots of the corresponding number of waves. Therefore, if x is the fraction of a wave-length to be determined, and y the diameter of the first dark ring, d being the diameter of the ring corresponding to one wave-length, then $x = \frac{y^2}{d^2}$.

There is a slight difficulty to be noted in consequence of the fact that there are two series of waves in sodium-light. The result of the superposition of these is that, as the difference of path increases, the interference becomes less distinct and finally disappears, reappears, and has a maximum of distinctness again, when the difference of path is an exact multiple of both wave-lengths. Thus there is an alternation of distinct interference-fringes with uniform illumination. If the length to be measured, the centimetre for instance, is such that the interference does not fall exactly at the maximum—to one side by, say, one tenth the distance between two maxima, there would be an error of one twentieth of a wave-length requiring an arithmetical correction.

Among other substances tried in the preliminary experiments were thallium, lithium, and hydrogen. All of these gave interference up to fifty to one hundred thousand wave-lengths, and could therefore all be used as checks on the determination with sodium. It may be noted, that in case of the red hydrogen-line, the interference phenomena disappeared at about 15,000 wave-lengths, and again at about 45,000 wave-lengths; so that the red hydrogen-line must be a double line with the components about one sixtieth as distant as the sodium-lines.

LX. *On Mr. Edgeworth's Method of Reducing Observations relating to several Quantities.* By H. H. TURNER, M.A., B.Sc., Fellow of Trinity College, Cambridge*.

IN the Philosophical Magazine for August 1887, Mr. F. Y. Edgeworth invites attention to a method of reducing observations relating to several quantities, which he has suggested as a substitute for the ordinary process of the "Method of Least Squares." I have applied this method to an example for a particular case of two variables, and venture to offer the following remarks and suggestions for consideration.

* Communicated by the Author.

P

352

A 513 f

Howard-Tilton
Memorial Library
TULANE UNIVERSITY

PROCEEDINGS

OF THE

American Society for Psychical Research.

VOL. I.

DECEMBER, 1887.

No. 3.

MEETINGS OF THE SOCIETY.

BOSTON, June 15, 1886.

Fifth meeting of the Society.

Thirty-four persons present. Professor E. C. Pickering in the chair.

Record of the previous meeting (Jan. 12, 1886) read and approved.

Election of Associate Members.

Professor Bowditch read the report¹ of the Thought-Transference Committee, and Mr. W. H. Pickering presented a report¹ on some experiments in Thought-Transference. The subject was then discussed by Drs. Minot, Prince, James Putnam, and by Professors Pickering and Watson.Dr. Minot then read a paper¹ "On the Existence of a Magnetic Sense" by Drs. Jastrow and Nuttall, of Johns Hopkins University. Dr. Minot also read the report¹ of Mr. W. H. Pickering on the Reichenbach Phenomena.Professor Royce reported¹ for the Committee on Apparitions and Haunted Houses.

Professor Bowditch read a letter which narrated certain strange occurrences which had come under the notice of the writer.

Professor James reported¹ for the Committee on Hypnotism, and also for the Committee on Mediumistic Phenomena.

The meeting then adjourned.

E. G. GARDINER, *Secretary*.

BOSTON, Jan. 11, 1887.

Sixth meeting (annual) of the Society.

The medium, and fifty persons present. Professor Bowditch in

wraps it in

they are

bundle

¹ See Proceedings, No. 2.

150

Criticism on "Phantasms of the Living."

presence of something that belonged to the apparition in its natural existence. This, and the fact that the folk-lore of the people has much to do with the peculiarities of the phantasms that appear among them, may explain why the manifestations of the supernatural fail to transcend the experience and vocations of daily life.

PEABODY MUSEUM, CAMBRIDGE, MASS., Feb. 15, 1887.

CRITICISM ON "PHANTASMS OF THE LIVING."

AN EXAMINATION OF AN ARGUMENT OF MESSRS. GURNEY, MYERS, AND PODMORE.

BY C. S. PEIRCE.

THE most imposing of the arguments of Messrs. Gurney, Myers, and Podmore, in favor of spontaneous telepathy, popularly called "ghosts," as presented in their "Phantasms of the Living," is this: Only one person in three thousand each year has a visual hallucination. Hence it is easy to calculate from the annual death-rate that in a population of fifty millions there would be each only one visual hallucination fortuitously coinciding within twelve hours, before or after, with the death of the person represented. But these gentlemen, having addressed, as they estimate, a public of only three hundred thousand persons, claim to have found thirty-one indubitable cases of this kind of coincidence within twelve years. From this they cipher out some very enormous odds in favor of the hypothesis of ghosts. I shall not cite these numbers, which captivate the ignorant, but which repel thinking men, who know that no human certitude reaches such figures as trillions, or even billions to one.

But every one of their thirty-one coincidences sins against one or more of sixteen different conditions to which such an argument must conform to be valid. This I proceed to show.

1st. Every case should have occurred between January 1, 1874, and December 31, 1885, for the calculation of the probabilities depends upon this supposition. Now, Case 199 occurred in 1873; and Case 355 occurred in 1854.

2d. The percipient should in each case have been drawn from their public, which they estimate at three hundred thousand persons who are supposed to have seen the advertisement. But no person could have seen the advertisement who was dead at the time of its publication; and this was the state of the percipients in Cases 170, 214, 238, and 695.

3d. According to their calculations, there ought not to have been

among their three hundred thousand persons any having had two hallucinations fortuitously. Such cases must, if their calculations are correct, be in some way abnormal, and ought to be thrown out. Now the percipient of Case 181 seems to have hallucinations nearly every day. The percipient of Case 175 has had them frequently without any coincidence. In Cases 173 and 208 the percipients had had other hallucinations without significance.

4th. The general frequency of hallucinations, upon which the whole argument depends, was ascertained by asking of certain persons whether or not they had had any visual hallucinations, within the last twelve years, "*while in good health, free from anxiety, and wide awake.*" It is, therefore, an indispensable requisite to the validity of the argument from probabilities, that no account should be taken of coincidences where the percipient was not in good health. This happened in Cases 28, 174, 201, 202, 236, and 702.

5th. For the same reason, cases should be excluded where the percipient was not clearly free from anxiety. But they certainly were anxious in Cases 27, 28, 172, 174, 184, 231, and 240; and were probably so in Cases 182, 195, and 695.

6th. For the same reason, all cases should be excluded where the percipient would not certainly have been confident of having been wide awake, even if no coincidence had occurred. Now the percipient of Case 175 says, "I cannot yet answer to my satisfaction whether I was awake or asleep." One of the witnesses to Case 195 calls it a "vivid dream." In Case 702 the percipient is doubtful whether it was anything more than a dream. It is difficult to admit any case where the percipient was in bed, which happened in Nos. 26, 170, 172, 173, 174, 182, 184, 199, and 697. This objection applies with increased force to cases where the percipient was taking an afternoon nap, which happened in Nos. 28 and 201.

7th. All cases should be excluded in which the person who died was not clearly recognized in the apparition. This applies with great force to No. 170, where the apparition was distinctly recognized as the percipient's own mother, who did not die, though a person who resembled her did. It also applies to Case 201, where the percipient says "she could not say who it was." Also to Case 236, where the percipient's original statement was that she saw "a dark figure"; although, after having been shown the testimony of a second witness, who testifies that it "resembled her [the percipient's] brother," she assents to this statement. In Case 249 the supposed ghost only showed his hat and the top of his head. In Case 697 the percipient does not seem to have recognized the apparition until after the news of the death had reached her.

8th. It is absolutely essential to the force of the argument that the death should have occurred within twelve hours before or after the time of the apparition; and it is not sufficient that the evidence should satisfy a mind that already admits the existence of ghosts, but the proof must be strong enough to establish the fact, even if we assume that it is due only to hazard. This is a point which the authors totally fail to appreciate. They have admitted among their thirty-one cases no less than thirteen which might well enough be set down as falling probably within the twelve-hour limit, *once we have admitted any special antecedent likelihood of such an occurrence*; but which beg the question entirely when, the evidence of the coincidence being but slight, they are used to prove the existence of such a likelihood. In Case 26, for example, on the morning after the apparition, the percipient says he searched the newspapers, and that day was Saturday. His words are, "The next day, I mentioned to some of my friends how strange it was. So thoroughly convinced was I, that I searched the local papers that day, Saturday." The authors interpret this as meaning that he told his friends one day, and searched the papers the day after that, which is directly contrary to his statement, and unlikely in itself. Their only warrant for this is, that he says the vision occurred on Friday at 2 A.M. But it is certainly more natural to suppose that he inadvertently used this expression meaning the night of Friday at 2 A.M. This is the *more* likely of the two suppositions; but the case ought not to be included, unless it can be shown beyond all reasonable doubt, and irrespective of considerations drawn from the time of the death, that the vision occurred on the night of Thursday. In Case 170 the death was not heard of for months. "Time passed, and all was forgotten." Under these circumstances, as no written note was taken of the time of the apparition, the coincidence is plainly doubtful. I shall discuss Cases 182 and 197, which violate this rule, under another head. In Cases 195, 201, 202, 214, 231, 237, and 355, the date is wholly uncertain. In Case 199 the vision occurred, if at all, on Saturday; the death on Wednesday. In Case 702, the date given for the apparition differs from that of the death by one day; but this is only a blunder, for it is admitted that the date was changed, after ascertaining the day of death, by four days.

9th. Cases ought to be excluded in which it is possible that a real person was seen. In Case 202 the percipient, who "had been ordered by the doctor to take absolute rest, and not read at all, and do no work whatever," and who is excessively near-sighted, when she was out driving in the neighborhood of London, met a carriage containing, as she thought, the person who died [although this person's

head was turned away] together with another who did not die. It surely seems a little unnecessary to suppose that this was anything more than a case of mistaken identity. In Case 249, a man, looking out of his window on Christmas-day, saw, on the other side of a brick wall, the hat and the top of the head of what he took to be one of his neighbors coming to see him. He turned round to remark upon it to the persons in the room; and his first surprise came when there was no knock at the door [we may assume after the lapse of more than a minute]. Then, looking out of the window, he did not see anything at all. It appears quite unnecessary to suppose any hallucination here, unless, possibly, some slight aberration of the senses connected with the festivities of the season. I should suggest, as possible, that some boy had stolen the old man's hat, and was perpetrating some Christmas joke, which he was ashamed to confess when it turned out that the person impersonated was at that moment dying. When so simple a hypothesis is admissible, it cannot be said that the appearance of something that was not there has been positively established. There are several other cases which might easily be explained by supposing that a real person was seen.

10th. Every case should be excluded which can be explained on the supposition of trickery. In Case 350, one evening three maid-servants in the kitchen saw a face outside the window. They could see all around it, so that there was no body attached to it; and, while they were looking at it, it turned slowly through a considerable angle, about a vertical axis. Now, the lady of the house is so exceedingly superstitious that she gravely testifies that her dog howls whenever there is a death in the village; and it is more than likely that the maids take after the mistress in this respect. The dog was howling at the moment that the face appeared, so that this circumstance may have helped them to identify the face with that of a woman who was at that moment expiring under the surgeon's knife, in an operation for cancer. Although the mistress thinks that they were unaware of the operation, yet, as the cook shortly afterward married the widower, it is not impossible that the servants were better informed than the mistress thought, and that they were, in fact, talking about the woman and her danger (and perhaps even dared to hint at another wedding) when they were confounded by this dreadful sight. One of the three servants testifies that it looked like the "face of a skeleton"; while the other two identify it with that of the woman who died. Meantime, it appears that there were certain young men who had a way of tapping at that window in the evening, and looking in and smiling at the girls, and who had not been treated with quite the politeness to which they probably thought

themselves entitled. What, then, can possibly be more natural than to suppose that these young men had contrived, in some way, to let down a skull by a string from above, perhaps from the roof, to frighten the girls and punish them for their rudeness? Clearly, this cannot be admitted as a proved case of seeing something that was not there.

11th. No case should be admitted upon the unsupported and unverified statement of a superstitious, ignorant, and credulous person. And a common sailor or skipper may be assumed to be such a person. This throws out Cases 300 and 355.

12th. Cases should be excluded in which there is any room to suspect that the percipient was intoxicated. This applies to Nos. 29 and 249; and no doubt to others.

13th. Cases should be excluded which can possibly be explained by the delirium of fever. In Case 214, the percipient first told of the apparition after four months of severe illness, with constant delirium or unconsciousness. It is not at all unlikely that the whole story is the product of a delirious imagination.

14th. No case should be admitted which can be attributed to the effect of imagination. In Case 195 the percipient herself is inclined so to explain her vision.

15th. All cases ought to be excluded in which the percipient did not tell of having seen the vision until after the news of the death had been received; otherwise, all sorts of exaggerations would creep in. There might even be cases of downright lying, besides cases in which the well-known sensation of having undergone a present experience on some previous occasion might have given rise to the idea of an apparition which was really not experienced. This would be a rare case, but we are dealing with rare cases. This objection applies to Cases 172, 173, 174, 184, and 214.

16th. No case can be admitted which rests largely on the testimony of a loose or inaccurate witness. Inaccuracies of more or less importance can be detected in Cases 27, 170, 182, 197, and 199. For example, in Case 182, a young lady on shipboard, going from London to the Cape of Good Hope, saw one night, a good while after the lights were out, an apparition of a young girl, a friend or acquaintance of hers, who, as she knew, was out of health, and who had the consumption. She is positive that this vision took place at half-past ten; and, as no bell is rung at that time, this positive precision is already suspicious. She also testifies positively that she mentioned the occurrence the next morning to four persons, who all severally took written notes of it; but the only two of these persons who can be reached now profess to know nothing whatever of the matter.

She gives May 4th as the date of the vision, but the death occurred on May 2d. She says, however, that she is sure she wrote to her father from the Cape, giving the date of the vision, before she heard of the death. Her father, on the other hand, is certain he wrote to his daughter the news of the death by the very next mail after it occurred. Now, since taking this testimony, the letter which she wrote to her father has been found by him. The whole passage about the apparition is not given, as it should be; but it is stated that the letter gives the date of May 4th. Now, the date of the letter is June 5th; and it only takes three weeks or less for news to go from London to the Cape of Good Hope, so that she must have already heard of the death, if her father's statement is accurate. But why is the passage of this letter withheld?

In Case 197, the percipient is a lady. She was at Interlaken at the time of the vision, and the death took place in Colorado. She testifies positively that written notes were taken at the time of the occurrence, both by herself and another; but she is unable now to give the date, and the other witness has not been called upon. Now Messrs. Gurney, Myers, and Podmore request us to accept this as a positively proved case of coincidence, because this one witness avers, with all the solemnity the matter calls for, that, when the news of the death did arrive, it was found to be absolutely simultaneous with the vision, after making the necessary allowance for difference of longitude. But the lady remembers the time of day at which the vision occurred, namely, it was before breakfast when she was lying on her bed. The time of day of the death is also known; and the best supposition that can be made with regard to the date of the vision will make it eight hours from the time of death. We are asked, in the face of this demonstrated inaccuracy, to accept a coincidence of date as beyond question, because this witness testifies that it was a coincidence exact to the minute.

17th. No case can be admitted where there is only a meagre story told in outline, and we are not furnished with any means of judging of the reliability of the witnesses, or where questions might have been asked which would have brought the matter to a test, and have not been asked. Thus, in Case 231 the date is quite doubtful; but it could have been verified by means of the letter which the percipient wrote that day to a newspaper. In Case 236, whatever precision the story possesses is due to the statements of a second witness, who does not seem to have been cross-examined at all. In Cases 237, 240, 298, 300, 355, 695, and an unnumbered case, the story is so excessively meagre as to be worthless.

18th. After all, the reader, who cannot cross-examine the wit-

nesses, and search out new testimony, must necessarily rely upon Messrs. Gurney, Myers, and Podmore having on the whole performed this task well; and we cannot accept any case at all at their hands, unless, as far as we can see, they have proved themselves cautious men, shrewd observers, and severe logicians.

Although there is not a single one of the 31 cases considered which can be accepted for the purpose of the argument, yet some of them may be genuine for all that. It can only be guess-work to say how many; but in my opinion not more than two or three.

Let us now glance at the other numerical data used in the argument. The ratio of frequency of hallucinations without coincidences has been ascertained by inquiries addressed to a large number of persons, going back for twelve years. The authors have thus assumed that a hallucination with coincidence of the death of the person represented, is no more likely to be remembered for a period of twelve years than one which is unaccompanied by such a coincidence. Yet there are numerous cases in their book in which, the death not having been heard of, the vision had been totally forgotten after the lapse of a few months, and was only brought to mind again by the news of the death. I think it would be fair to assume that, in considering so long a period as twelve years, a coincidental apparition would be four times as likely to be remembered as one without coincidence. I also strongly dissent from the authors' estimate that their coincidences have been drawn from a population of only three hundred thousand. I should reckon the matter, for my part, in this way: Every case of an apparition simultaneous with the death of the person represented, or nearly so, becomes known to a circle of two hundred to three hundred persons, on the average. If any one of this circle of persons, some of whom have had an interest in apparitions excited by the story, learn and are interested in the advertisement of Messrs. Gurney, Myers, and Podmore, these gentlemen would learn of the case. Now, I suppose that the advertisement, being of a very peculiar and sensational character, interests one person for every hundred copies of the newspaper printed. On this assumption, since a million and a half is given as the circulation of the newspapers, the instances obtained would really have been drawn from a population of three to four millions. Adopting these figures, they ought to have heard, on the doctrine of chances, of three or four purely fortuitous cases of visual hallucination with coincidence of death. In view of the utter uncertainty of all the data, it would be very rash to draw any conclusion at all. But the evidence so far as it goes, seems to be rather unfavorable to the telepathic character of the phenomena. The argument might certainly have been

constructed more skilfully; but I do not think that there is much prospect of establishing any scientific fact on the basis of such a collection as that of the "Phantasms of the Living."

MILFORD, PA., May 14, 1887.

O

853