ROYAL INSTITUTION.

MR. F. GALTON ON "THE JUST-PERCEPTIBLE DIFFERENCE."

Mr. F. GALTON, F.R.S., lecturing at the Royal Institution on Friday night, said that every organ of sense had its own internal activities, the effects of which were occasionally perceived in illness, such as ringings in the ear or a bad taste in the mouth, but they were too faint to be perceived in health. Their unfelt effects might, however, concur with an ordinary sense impression, and intensify it. If the latter should be too faint when it was acting by itself to produce a complete sensation it might be competent to do so in combination with the effects of the internal activity of the sense organ. The concurrence of two incomplete sensations, might thus be able to evoke a complete one. There existed, however, a concurrent cause of another kind, which had hitherto been partially and inadequately dealt with, under the titles of expectation and attention, and which deserved frank and full recognition—namely, the imagination. Instances were familiar of the frequency with which the imagination produced effects that had been mistaken for faint sensations, and sometimes for plainly perceptible ones. One of the most suitable subjects for such experiments was the auditory imagination, associated with words perused by the eye. The lecturer described experiments frequently made by himself at meetings of scientific societies, where he had obtained unrevised copies in print of the papers about to be read. Owing to some deafness, he often found himself able to follow every word distinctly only so long as his eyes rested on the paper; he could detect the fact of any alteration in the wording, but was quite unable to make out the substituted words. On these occasions, when he raised his eyes from the paper, he could not follow the reader at all. He usually found it necessary to approach him by one quarter of the previous distance, in order to follow his voice by means of the ear alone. Hence the power of the imagination, *plus* the power of the hearing, bore the same relation to the power of the hearing alone as the loudness of the sound at four units of distance did to its loudness at three units. Their proportion was as the square of those numbers, or as 16 to 9. It followed that the power of the auditory imagination had 7-16ths of the power of a just audible sound—namely, of those overtones in the voice by which articulate words were distinguished. Passing on to the second part of his lecture, Mr. Galton said the angular distance apart of two dots when they first began to merge into one was usually reckoned at one minute of a degree. When a row of 300 similar objects of any size was viewed at such a distance that the space they occupied in the visual field should not be wider than that occupied by 1in. on the page of a book, they would produce the effect of a perfectly continuous and uniform line. If the dots were replaced by discs touching one another, and arranged with moderate exactness along any flowing line, even 50 of them to the inch would give a fairly good impression of continuity. The following method was explained and illustrated by which the positions of 50 equi-distant dots could be defined by as many letters, or else by twice as many figures, which, according to the telegraphic scale of five figures to a word, was equivalent in cost to 20 telegraphic words. Counting the top of the paper as north, the bearing of each dot from its predecessor was recorded to the nearest of the 16 principal points of the compass by means of one or other of the first 16 letters of the alphabet. The effect of error in laying down any one dot had but a trifling effect on its successors. A severe test of the applicability of this method was made by comparing the profile of a girl copied from a Greek gem with its reproduction from a formula containing 400 letters, which was the equivalent of 160 telegraphic words. The two portraits, the original and the reproduction, were reduced photographically to various sizes. When the scale was such that 50 dots were included in the length of 1in. of lineation the effect was unexpectedly good. When the portrait was reduced to the size of that on a postage stamp it had all the appearance of a delicate line engraving. Notwithstanding the success of the result the process by which this profile had been formulated and reproduced was rough and makeshift. But this and other tests showed that the method was feasible of reproducing characteristic lines of any description from a written formula. It was pointed out that the power of doing so might become of practical utility, considering the large and increasing space given in newspapers to telegraphic intelligence, the gradual introduction of illustrations into the daily papers, and the not infrequent occurrence of local events of high importance which did not admit of a clear description without an accompanying sketch or plan, however rude. The cost of sending by telegram from the United States the formula for any plan or design containing the same total amount of lineations as in the profile mentioned would be £8. Though this sum was large in itself it was not large relatively to the immense cost occasionally bestowed upon obtaining full telegraphic information of very important occurrences in distant lands. Telegraphic errors in signalling were rare. The experience of the Meteorological Office showed that in each 1,000 figures received from Continental stations little more than two were erroneous.