

## GENERIC IMAGES.

IN the pre-scientific stage of every branch of knowledge, the prevalent notions of phenomena are mainly founded on general impressions. But when that stage is passed, and the phenomena are submitted to measurement and numbering, very many of the notions that were derived from general impressions are discovered to be wrong, even absurdly so. I do not speak only of such matters as astrology and alchemy, but of those also with which most persons are acquainted. Think of the nonsense spoken every day about signs of coming weather, in connection, for example, with the phases of the moon, and firmly believed in by many respectable people. Think of the ideas about chance, held by those who are unacquainted with the theory of probabilities. Think of the notions entertained on heredity before the days of Darwin. Think of the ridiculous nostrums that have been prescribed for common ailments by gifted and experienced practitioners, the merits of which have been also vaunted by the invalids who tried them. It is not necessary to go into more detail in illustration of the fallacies of popular generalisations. The list of them is endless; they are to be abundantly found, as already observed, in every branch of knowledge, before it has been seized in the firm and sure grasp of processes that depend upon exact measurement and number. That popular notions are habitually incorrect may be taken for granted, and my purpose in this memoir is to explain one cause of their incorrectness.

I propose to call attention to an error in the operations of the mind, whenever it blends memories together, and to show why the brain is a faulty apparatus for elaborating general impressions. I shall argue that we have no means of correcting its necessarily fallacious results, except by picking them to pieces, and going back to the facts whence the general impressions were derived, and by dealing with those facts on true statistical principles. Thus if we hear that some medical nostrum is highly reputed, or that some particular appearance is an excellent prognostic of coming weather, our first step towards investigating the truth is not to ask whether the belief is firmly held, or of old standing, or shared by many, but to obtain a considerable number of instances and to set off the failures against the successes.

The general impressions and ideas to which I refer guide the great majority of our everyday actions. We have a general impression that the day looks rainy, and we take an umbrella. We find ourselves in a railway carriage with a person who looks sociably inclined and agreeable, and we accost him accordingly.

In an infinity of cases like these, the opinion on which we act has not been formed by any process of reasoning; neither has it been made by considering what similar experiences we have had, and counting their results on this side and on that, but it is the effect of blending together a large number of similar incidents. These blended memories are the subject of my present memoir. I shall try to prove that blended memories are strictly analogous to blended pictures, of which I have produced many specimens by combining actual portraits together; and I shall explain the peculiarities of the images by those of the portraits; then I shall show that the brain is incompetent to blend images in their right proportions. My conclusion will be that our unreasoned impressions are of necessity fertile sources of superstition and fallacy from which the child and the savage are never free, and with which all branches of knowledge are largely tainted in their pre-scientific stage. Lastly, that it is only by the strict methods of scientific inquiry, namely by measurement and number, that these fallacies can be cleared away and the truth discovered.

The physiological aspect of simple and blended memories is intelligible enough in its broad outlines, and may be briefly described. Whenever any group of brain elements has been excited through an impression of one of the senses, it becomes, so to speak, tender and liable to become again excited, under the influence of other kinds of stimuli. Whatever may be the cause of any new excitation, the result of its reproduction is to create an imaginary sense-impression, similar to that by which the first excitation had been caused; and this we call memory. Blended memories must necessarily follow the excitation of many associated groups of brain elements, under the influence of a stimulus that sets them simultaneously in action.

Faint memories are particularly apt to blend together, and they often defy analysis afterwards. We are shown some picture of mountain and lake, from a county we have never visited, yet it seems familiar to us; it accords with what we have seen dozens of times in Scotland or Switzerland or elsewhere, but our memories are confused and obscure, and we cannot wholly disentangle the incidents to which they relate.

Memories that are extremely vivid may at the same time be very mobile, and capable of blending together. Much instruction on these matters can be derived from those who possess the power of what is called the visualising faculty, in a high degree. The objects of their memory are conspicuous images; they can retain them for a

long time before the eye of their mind, they can dismiss or change them at will, and they can, if they please, subject them to careful examination from every side. I do not know any faculty that varies so much as this in different persons. None can vary more, because its range lies between perfection and nothingness. It is sometimes absolutely deficient, for there are persons who never see mental images even in dreams, and there are others who are said to have lost the power of seeing them. I need not speak of cases where the visualising power is feeble, as they are common. Many are like those to whom St. James alludes when he speaks of 'a man beholding his natural face in a glass, who beholdeth himself and goeth his way, and straightway forgetteth what manner of man he was.' It will be more to my point to show how perfect the visualising faculty sometimes is, at the same time that the images may be moved with the utmost facility in the field of the mind's eye, which is a first step towards their blending together. Out of the many available instances I will only quote one, and will choose that one chiefly because it has recently excited some public attention. There appeared in the *Spectator*, of December 28 last, two very interesting letters concerning a peculiar form of visualising possessed by the late Mr. Bidder, the engineer, known in early life as the 'calculating boy,' and this gift is possessed in a high though less degree by several of his descendants. Thus the eldest son, Mr. George Bidder, Q.C., can mentally multiply fifteen figures by fifteen, though not with the same precision and rapidity as his father. One of the two letters is from Mr. Bidder's friend, Professor Elliot, who writes thus:—

If he saw or heard a number, it seemed permanently photographed in his brain. In like manner he could study a complicated diagram without seeing it, when walking and apparently listening to a friend talking to him on some other subject. The diagram stood before him in all its lines and letters.

The second letter is from Mr. George Bidder, who writes:—

His memory was of a peculiar cast, in which figures seemed to stereotype themselves without an effort . . . (accompanied) by an almost inconceivable rapidity of operation. I speak with some confidence on the former of these faculties, as I possess it to a considerable extent myself (though not to compare with my father). Professor Elliot says he always saw mental pictures of figures and geometrical diagrams. I always do. If I perform a sum mentally it always proceeds in a visible form in my mind; indeed, I can conceive no other way possible of doing mental arithmetic.

Mr. Bidder continues in a letter addressed to myself:—

If my mind is engaged solving a geometrical problem including the relations of lines, plans, &c., I *deliberately* build up in my mind a figure plane or solid as the case requires; but there is a limit to my power in this respect, *e.g.* if the problem includes the relative positions and intersections of many surfaces, it becomes a painful effort to grasp them all simultaneously.

All this shows that mental impressions of extreme vividness may at the same time have great mobility and be subject to 'an almost

inconceivable rapidity of operation,' and that they need not be fixed in the way that hallucinations often are.

Next as regards actual blending. Mr. G. Bidder, in very kindly replying to some questions that I put, writes :—

Nothing is easier than to imagine, and to watch mentally, the rotation of anything to which such motion is natural, *e.g.* a wheel, a crank, &c. In many such cases I incline to think the process consists in calling up a sort of typical image formed out of innumerable bygone experiences.

This was Mr. Bidder's own view, quite independent of any suggestions from myself, and is therefore all the more valuable.

The strongest proof that those who have vivid memories of special objects are also capable of blending them, is found in the works of such men as Macaulay. I am assured on excellent authority that his visual memory of book, page, and line was of the clearest possible character; it was described to me as having been 'spectral' in its perfect definition. Yet no one better than Macaulay had the power of vivid generalisation, that is, of creating a single clear image out of a multitude of allied facts. Many poets and painters have had the visualising faculty in an extraordinary degree, while it is in the brains of poets and painters generally that we find the artistic power to reside of producing pictures that are not copies of any individual, but represent the characteristics of large classes. Painters and poets create blended portraits in profusion, and we who are not gifted as they are, can nevertheless understand and appreciate their works. In other words, their blended images are well-defined representations of what we ourselves had already conceived in a dim and confused way.

There seems then to be no doubt, from whatever side we may approach the subject of memory—whether from its material or its mental aspect, and, in the latter case, whether the visualising faculty be faint or vivid—that different special memories admit with facility of being blended into a common image. From blended memories to general impressions and ideas is a step on which we need not linger, the latter being derived from the former. They are faint traces of them, and they inherit all their errors.

I conclude, then, that the formation of blended images is an habitual operation of the mind, whence those general impressions have arisen by which the great majority of our daily actions are guided.

I will now proceed to speak of blended portraits, in order to illustrate the formation of blended memories and the effect of the resultant images; or let me henceforth describe them as generic portraits and generic mental images. The word generic presupposes a genus. The objects to be portrayed must all have many points of likeness in common, and it is of especial importance that characteristics of a medium quality should be much more common among them than those that deviate widely. No statistician dreams of grouping heterogeneous facts in the same table; no more do I propose to

group heterogeneous forms in the same picture. Statistical averages, and the like, are nonsensical productions unless they apply to objects that cluster towards a common centre; and composite pictures are equally monstrous or meaningless unless they are compounded of objects that have a common similarity to a central ideal type.

It might be thought that blended portraits would form mere smudges, and so they would if only a few specimens of extremely different casts of features were combined, but in all groups that may be called generic the common points of resemblance are so numerous, and medium characteristics are so much the most frequent, that they predominate in the result. All that is common to the group remains; all that is individual disappears.

Generic portraits are made by a method which I described for the first time last year, under the title of composite portraiture. I showed that it was possible in many ways to combine two or more portraits into a single one, if they are of the same size and taken in the same attitude. I have produced the combination by various optical means, such as the convergence of images from different magic lanterns upon the same screen, and by a small apparatus which is, in fact, six cameras in combination, in which six different images may be simultaneously viewed, and afterwards thrown upon the same photographic plate. In addition to these is the plan I originally employed, of throwing carefully adjusted images of different portraits in succession upon the same portion of the same sensitised photographic plate. It is by the latter process that blended memories are illustrated. In all these methods the general result is substantially the same, subject only to such discrepancy as will always exist between a photograph and the image from which it is made. A composite portrait is in all cases produced, in which the whole of the components co-exist. It is surprising with what excellent effect we can combine the features of persons who are not too dissimilar in their general appearance. We obtain from them a composite portrait that is identical with no one of the components, but which comprises all, each having its own fractional share in the total effect. I have made several composites from medals of historical personages; such as from different coins bearing the effigy of Alexander the Great, none of which are closely alike. Thus I have brought out the common features of all of them and produced what is presumably a nearer approach to the ancient ideal type than has ever previously existed. I am much indebted to the kindness of Mr. R. Stuart Poole, the learned curator of the magnificent collection of medals and gems in the British Museum, for having selected the best and most suitable specimens, and having procured plaster casts of them for me, whence my photographs were made. The portraits on coins are very convenient for composites, as they are pure profiles. I have also various criminal types, composed from the photographs of men convicted of heinous crimes. They are

instructive as showing the type of face that is apt to accompany criminal tendencies, *before* (if I may be allowed the expression) the features have become brutalised by crime. The brands of Cain are varied; therefore the special expressions of different criminals do not reinforce one another in the composite, but disappear. What remain are types of faces on which some one of the many brands of Cain is frequently destined to be set. I am particularly struck by three of these types that were each deduced from six or seven components; two of the groups are of men convicted of manslaughter and crimes of violence, the other of habitual thieves. These three composites are as alike as brothers; the compound composite gives a low class of face, but not one, I think, that most persons would associate with especial villany. I have also two other composites very like these three, and I find that whenever I put any three of the five together, I arrive at very nearly the same typical face.<sup>1</sup>

The process is one of pictorial statistics, suitable to give us generic pictures of man, such as Quetelet obtained in outline by the ordinary numerical methods of statistics, as described in his work on *Anthropométrie*. He procured the measurements of the limbs of a large number of persons of both sexes and of various ages, and of the distances between such points on the surface of the body as are sufficiently defined to measure from. From these numerical data he calculated and laid down upon paper the average positions of those points, and therefrom constructed sketches of the typical man at various periods of his growth, like Flaxman's drawings or Retsch's outlines. By the process of composites we obtain a picture and not a mere outline. It is blurred, something like a damp sketch, and the breadth of the blur measures the variability of individuals from the central typical form.

It may be objected that the contribution from each portrait when there is a multitude of them is so small that, in the great majority of cases, it might perhaps leave no trace at all in the generic portrait, or, at all events, on the photograph; consequently, that the result may not be what it professes, but is perhaps due to a comparatively small portion of the components, in which the lights and shades happen to be sufficiently marked to create a decided impression. I therefore tried a simple experiment, which leaves no doubt that this objection is unfounded under even very exceptional circumstances, so far as the photographs are concerned, and, therefore, *à fortiori*, as regards composite results by purely optical means. I contrived a small apparatus to be held in one hand. It had a receptacle behind for sensitised paper, in front of which was a hole closed by a shutter, that sprang back when I pressed my finger on a

<sup>1</sup> I exhibited many photographic composites at the Royal Institution on the 25th of April. Some were transparencies thrown upon a screen, others were made before the audience by converging magic lanterns.

catch, and closed at the moment that I released the pressure. In the other hand I held a chronograph, in which the hand that marked quarter-seconds began to travel the instant I pressed a catch, and stopped when I released it. I worked these two instruments simultaneously, holding one in each hand. The chronograph readings gave me the sum of the successive short periods of exposure of the sensitised paper, and I could watch the length of each of them. Thus provided, I made several experiments, and can testify to the identity of the tint made by one thousand short exposures with that made by a single exposure of the same length of time as all the thousand put together. What differences there were, lay well within the limits of error in experimenting.

Composite portraits are, therefore, much more than averages, because they include the features of every individual of whom they are composed. They are the pictorial equivalents of those elaborate statistical tables out of which averages are deduced. There cannot be a more perfect example than they afford, of what the metaphysicians mean by generalisations, when the objects generalised are objects of vision, and when they belong to the same typical group, one important characteristic of which is that medium characteristics should be far more frequent than divergent ones. It is strange to notice how commonly this conception has been overlooked by metaphysicians, and how positive are their statements that generalisations are impossible, and that the very idea of them is absurd. I will quote the lucid writing of Sir W. Hamilton to this effect, where he epitomises the opinions of other leading metaphysicians. I do so the more readily because I fully concede that there is perfect truth in what he says, when the objects to be generalised are not what a cautious statistician would understand by the word generic.

Sir W. Hamilton says:<sup>2</sup>—

Take, for example, the term *man*. Here we can call up no notion, no idea, corresponding to the universality of the class, or term. This is manifestly impossible. For as *man* involves contradictory attributes and as contradictions cannot exist in one representation, an idea or notion adequate to *man* cannot be realised in thought. The class *man* includes individuals, male and female, white and black and copper-coloured, tall and short, fat and thin, straight and crooked, whole and mutilated, &c., and the notion of the class must therefore at once represent all and none of these. It is therefore evident, though the absurdity was maintained by Locke, that we cannot accomplish this; and this being impossible, we cannot represent to ourselves the class *man* by any equivalent notion, or idea. All that we can do is to call up some individual image and consider it as representing, though inadequately representing, the generality. This we can easily do, for as we can call into imagination any individual, so we can make that individual image stand for any or for every other which it resembles, in those essential points which constitute the identity of the class. This opinion, which, after Hobbes, has been in this country maintained among others by Berkeley, Hume, Adam Smith, Campbell, and Stewart, appears to me not only true but self-evident.

<sup>2</sup> *Lectures* ii. 297.

If Sir W. Hamilton could have seen and examined these composite portraits, and had borne in mind the well-known elements of statistical science, he would certainly have written very differently. No doubt, if what we are supposed to mean by the word *man* is to include women and children and is to relate only to their external features and measurements, then the subject is not suitable for a generic picture, other than of a very blurred kind, such as a child might daub with a paint-brush. If, however, we take any one of the principal races of man and confine our portraiture to adult males, or adult females, or to children whose ages lie between moderate limits, we ought to produce a good generic representation.

It will, I trust, be quite understood that, although for the sake of brevity I chiefly confine my remarks to visual representations, they are intended to apply equally to all the senses.

A generic image appears to be nothing more than a generic portrait stamped on the brain by the successive impressions made by its component images. Professor Huxley, from whom I have borrowed the apt phrase, has expressed himself to a similar effect in his recent *Life of Hume*, p. 95. I am rejoiced to find that from a strictly physiological side this explanation is considered to be the true one, by so high an authority, and that he has, quite independently of myself, adopted a view which I also entertained and had hinted at in my first description of composite portraiture, though there was not occasion at that time to write more explicitly about it.

When I am adjusting portraits to make a composite, and at the moment when the adjustment is being effected, I always experience a quick sense of satisfaction curiously analogous to that which is felt on the first recognition of a doubtful likeness of any kind. I have the same disagreeable feeling of the existence of a puzzle which I cannot make out, accompanied by the conviction that the puzzle is on the point of being solved. In the next instant coalescence takes place between what is seen and what was recollected. I am as sure as it is possible to be on such grounds as these, that the analogy between catching the coincidence of two similar portraits when optically superposed, and that of the coincidence of a visible object with a past impression or with a pre-existent general idea, is true and not metaphorical only.

It is very instructive to note the first appearance of a generic image and to watch the way in which the mind carves images out of the medley of its available material. It cannot grasp an image of any complexity unless the elements of which it consists form a congruous composition, that is to say, one whose parts are connected by such easy lines of association that the mind runs rapidly over the whole of it, and takes it all in by what seems to be a single glance. Generic images begin, at least according to my own experience, by being exceedingly imperfect and vague because they are very com-

prehensive. Then limitations commence, each of which is the cause of a more distinct picture being formed, and so the mind runs first through genera, then through species, continually seeking more congruity and clearer definition, but at each step with a loss of comprehensiveness. If allowed to do so, it descends to individuals. Let us, as an example, call up a generic image of a clergyman preaching. I first see a pulpit of somewhat undefined height, with a vague figure in it. This figure becomes white, in a surplice; a competing figure in a black ground temporarily yielding place. Then I see various accessories suitable to the surplice, such as Gothic architecture, Ritualistic decorations, and the like. After this the interiors of particular churches begin to present themselves, but as I wish to confine my thoughts to generalities, I refuse to dwell upon single cases. While waiting for some new general idea to suggest itself, I have the consciousness of there being many competing images struggling to appear, which do not belong to the same genus, and therefore restrain instead of reinforcing one another. At length the black-robed figure suddenly reappears; on viewing which, the accessories assume an appropriate character, and the mind wanders among a variety of these, as it had previously done among the others. In the course of the degradation of highly generalised pictures to individual ones, many generic representations are sure to appear which are good so far as they go, but are not complete pictures. Whenever the mind has halted in a vain effort to make the image more comprehensive without injuring its congruity, the dead-lock is relieved by the sudden obliteration of a large part of it, leaving a vacancy which is filled by some one of the competing associations overcoming the others, and presenting itself within the narrow field of view of our full consciousness and attention.

Other conditions being the same, it is reasonable to suppose that the idea that has been most frequently dwelt upon will have left the deepest impression on the brain, and will have precedence. Thus, in making a drawing of a pendulum in the act of swinging, we should always represent it at one or other side of its excursion, when it delays, stops for an instant, and returns. We see it longer in either of those extreme positions than in any of the intermediate ones. Similarly, we draw a man walking, or otherwise in motion, in the attitude where there is a momentary change of direction, and consequently more or less of rest at or about that position. It is different when the movement is continuous; the wheel of a moving carriage is drawn in a blur, with, however, numerous radial streaks, showing, if I mistake not, that attentive observation is never continuous, but acts in rapid pulses, so that the revolving wheel is seen in many momentary positions. I have endeavoured, in this way, to measure the intervals between the successive throbs of close attention. If a wheel revolves

rapidly, it is impossible to analyse its motion, and its spokes form an apparently equable shade.

In my memoir, read about a year ago before the Anthropological Institute, on composite portraits, I used a phrase, which I wrote with a little misgiving, which I have since quoted, and which I wish now to amend. I desired briefly to convey the idea that composite portraits were in a true sense generalisations and analogous to the images stamped on the brain, as already described, and I used these words: 'A composite portrait represents the picture that could rise before the mind's eye of an individual who had the gift of pictorial imagination in an exalted degree.'

The question we have now to answer is this:—

If a person gifted with the visualising power in perfection should pose his eye in the place of the object-glass of the camera, would the generic image in his brain be identical with the photographic composite? (I am assuming, for argument sake, that the photograph gives a true rendering of any optical image, which, in strictness, it does not.) Suppose a succession of many different pictures are to be displayed, each for the same brief period, and if a single other picture is displayed fifty times in succession, or for fifty times as long, would its share in the generic image be fifty times as large as that of any of the others, or if not, what would its share be?

The reply is, that both in the photographic composite and in the processes of numerical statistics, its effect would be exactly fifty times as great, but in mental imagery this would certainly not be the case, and therein lies a fertile source of error in our general impressions. I have made some experiments on the subject, which are not as yet sufficiently advanced to be worth recording, but I may say that at present I see nothing in the results incompatible with the very reasonable supposition that the relation between the varying periods of exposure and the strength of the corresponding mental impression follows the law of Weber. This law is founded in the fact that the more highly our senses are stimulated, the more is their discriminative power blunted. Thus a double number of candles does not double the apparent illumination; it only increases it by a certain amount, which is always the same, whether the light of a single candle be added to that of another single candle, or the light of a 1,000 candles be added to that of another 1,000 candles. The law is true of all the senses. The difference of noise made by dropping one shilling or two shillings on a table, is not always distinguished by the ear, neither is that of discharging one or two 38-ton guns from the turret of the same ironclad ship, as was shown in evidence concerning the recent frightful accident on board the 'Thunderer.' That is to say, the same increment of noise may be produced by the fall of a shilling on a table, in the one case, as by a 38-ton gun in the other.

Let me take the present opportunity of saying that one effect of Weber's law is that a true composite never appears true, and is never what our uncorrected senses teach us to expect. If we mix a very dark grey with a very light grey, we might on first thoughts expect that their mixture would appear to be a medium grey, but Weber's law tells us that the eye judges differently, and we find, in trying the experiment, that the mixture is brighter than we had expected.<sup>3</sup> Of course, we could learn by much practice to correct the judgment of our senses, but it is only in rare and special cases that we have the necessary practice. I have often noticed my own ludicrous failures in estimating the relative depths of two parts of the same pool by the relative obscurity of the bottom. Maps of ocean depths are never made on what may be called natural scales, but always on symbolic ones, in which consecutive increases of tint, as judged by the eye, correspond to successive increases of depth. According to Weber's law (which I content myself here with expressing in its original and approximative form) if it requires a tenfold period of exposure to make a doubly deep impression on the mind, it would require a hundredfold period to make a trebly deep one, a thousandfold period to make it quadruply deep, and so on. The one series follows an arithmetical, the other a geometrical progression.

Whatever the true law may be that connects the strength of the impression with the time that the object is before our eyes, or with the frequency with which it is seen, its form is certainly not very dissimilar to that of the law of Weber. Otherwise it would not accord with the fact that sights on which we have not lingered, often leave abiding impressions, while the pictures that hang on our walls, before our eyes, every day of our life are not always remembered with vivid distinctness. The effect of the law, whatever its precise form may be, is to prevent generic images from having the same definition and simplicity as the corresponding photographs. The most extreme elements will always leave their traces very visibly because the medium elements are not present in sufficient number to overpower them. These images cannot be otherwise than blurred and sur-

<sup>3</sup> Weber's law may be well illustrated by placing in a row, say, five cards, painted quite black, each the size of half a sheet of note paper. Then taking a whole sheet of white note paper, tear it in half and lay one half on card 5 so as to cover it entirely. Tear the remaining half exactly across its middle, and lay one half upon card 4; again tear the remainder in half and lay one half on card 3. Proceed similarly up to card 1; the fragment that remains is not wanted. Cut these papers into shreds (excepting No. 5, which can be left as it is), and distribute the shreds as evenly as possible over their respective cards. Then 1 will have one portion of white, 2 will have two portions, 3 will have four portions, 4 will have eight, and 5, which is wholly covered with white, will have sixteen. The effect of the scattered white on the cards is to produce various greys which the eye will judge to be separated by equal intervals of tint. Card 4, which contains eight portions, has the medium amount of white (eight and a half is the precise medium), but the eye reckons differently; it places the medium tint at card 3, which contains only four portions of white.

rounded by monstrous and faint imagery. The attention is unable to deal with such pictures, because when it is engaged on one part of them the remainder slips out of memory. All parts of an image must be congruous and well defined before the attention can sweep so swiftly over the entire field of view as practically to bring it all at once into sight. If an image is incongruous and vague, the mind follows the course already described when the illustration was used of a clergyman in a pulpit.

The conclusions to be drawn from what I have said are that composite portraits are perfectly trustworthy when made by optical means and with proper precautions, and that photographic composites are as correct representations of these as photographs ever are of the pictures from which they are taken. Composite portraits are therefore to be considered as pictorial statistics. Also it is conceivable that general mental images should sometimes closely resemble these portraits except in one important respect; namely, that the effect produced by the huge bulk of ordinary facts is never in proportion to their numbers. Consequently we find that undue consideration is inevitably given in generic images to all exceptional cases. When the exceptions in excess are balanced by those in deficiency, the value of the average will not be affected, and there is always a tendency towards that result. The fault that remains wholly uncorrected is that the great prevalence of mediocre instances is overlooked, and the number and importance of the deviations are largely over-estimated. The tendency of the mind of the child and of the savage, and in all branches of knowledge in their pre-scientific stage, is necessarily towards the marvellous and the miraculous.

The generic images that might arise in a mind superhumanly logical and active would be subject to no other error than this, but in the human mind it is not so. Some of the images in every presumed generic group are sure to be aliens to the genus and to have become associated to the rest by superficial and fallacious resemblances, such as common minds are especially attentive to. Again, the number of pictures that are blended together is sure to fall far short of the whole store that would be available if the memory were immeasurably stronger than it is, and more ready in its action. Knowing also, as I do, from considerable experience of composites, what monstrous and abortive productions may result from ill-sorted combinations of portraits, and how much care in selection and nicety of adjustment is required to produce the truest possible generic image, I cease to wonder at the numerous shortcomings in our generalisations and at their absurd and frequent fallacies. The human mind is a most imperfect apparatus for the elaboration of true general ideas. Compared with the mind of brutes, its powers are marvellous; but for all that they fall vastly short of perfection. The criterion of a perfect mind would be the power of always creating

vivid images of a truly generic kind, deduced from the whole range of its past experiences.

General impressions are the faint traces left by generic images, and have all their defects, as well as others due to their own want of definition. They are never to be trusted. Unfortunately, when general impressions are of long standing they become fixed rules of life, and assume a prescriptive right not to be questioned. Consequently those who are not accustomed to original inquiry entertain a hatred and horror of statistics. They cannot endure the notion of submitting their sacred general impressions to cold-blooded verification. But it is the triumph of scientific men to rise superior to such superstitions, to devise tests by which the value of beliefs may be ascertained, and to feel sufficiently masters of themselves to discard contemptuously whatever may be found untrue.

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