

Imagery

Galton's word-association experiments were to bear other and more immediate fruits. In discussing his results with scientific colleagues he was amazed to find that many of them were at a loss to understand how a stimulus word could arouse imagery, as they themselves had no experience of the phenomenon. On the other hand, many men without specialized aptitudes, and even more women, claimed that they habitually experienced imagery of a distinct and colourful kind. Variations in the intensity of imagery seemed a topic worthy of investigation and suitable for a questionnaire approach.

Entitled *Questions on visualizing and other allied faculties*, the questionnaire was issued in November 1879. In the questionnaire Galton directs the respondent's attention to his breakfast table of that morning and asks him to summon a picture of it in his mind's eye. He then asks for an estimate of its brightness, definition, completeness, colouring, and the extent of the field of view. A further series of questions refers to particular instances in which visual imagery may occur, and the questionnaire concludes with a request for similar estimates with regard to the other senses. (See Appendix IIIa.)

At first he limited its distribution to relatives and friends, but then contacted several educational establishments and had it

distributed among the pupils. The adult male respondents were largely drawn from the professional middle classes, most of them members of the learned societies of which he was a member.¹ There were also some 180 returns from women, many of whom were the wives and daughters of the male respondents.

In his published paper, Galton limits his analysis to the data supplied by 100 of the men and by the boys from one school, Charterhouse, where the science master succeeded in interesting all his 172 boys in the enquiry.² Although Galton quotes from the female returns, he characteristically omits them from any further consideration.

The variety of answers surprised Galton – as they may still surprise the reader of today. They ranged from that of the respondent who stated:

I can see my breakfast table or any equally familiar thing with my mind's eye, quite as well in all particulars as I can do if the reality is before me.³

To the man at the other extreme who experienced no visual imagery:

My powers are zero. To my consciousness there is almost no association of memory with objective visual impressions. I recollect the breakfast table, but do not see it.⁴

Galton awaited the return from Charles Darwin with some impatience. Erasmus Darwin had reported unusually strong visual imagery himself and the possibility of the inheritance of such a peculiarity was naturally of interest to Galton. He himself had strong motor imagery, as we have seen in his responses in the association experiments, but his visual imagery as an adult was no more than moderate. In this latter respect Charles resembled his cousin more than his grandfather. He was able to see his breakfast table in part only and moderately illuminated, although some objects were well defined.⁵

As in the case of the association experiments, the results were published in two versions. One fairly statistical paper appeared in the journal *Mind*; the other, originally given as a lecture at the 1880 British Association meeting at Swansea, was published by the *Fortnightly* and was intended for a lay audience.⁶

Much of the *Mind* paper is taken up with an attempt to apply a statistical treatment to his returns. Galton succeeds in taking the replies to the several questions and ordering them in terms of the strength of imagery shown by his three groups of respondents. (His schoolboys were divided into those from the upper classes of the school and those from the lower classes.) In order to compare the vividness of imagery possessed by the three groups Galton takes the middlemost, or median, answer in each series and compares these. He goes further and examines the answers falling at various positions on either side of the median, namely the quartile, octile and suboctile points.

The application of ranking methods to his data does not reveal much. Galton is content to show that his two schoolboy groups are almost identical and very similar to the adults, except that among the young subjects there is a greater vividness of colour imagery. The adults' replies did not form as regular a series as did the boys', and Galton is probably right in attributing this irregularity to the heterogeneity of his adult sample. Some people replied to his questionnaire because they had particularly vivid imagery and seized the opportunity to write about it, others were his scientific friends, and yet others his and Louisa's relatives and friends.

For Galton there were two notable results:

‘The one is the proved facility of obtaining statistical insight into the processes of other persons' minds; and the other is that scientific men as a class have feeble powers of visual representation. There is no doubt whatever on the latter point, however it may be accounted for. My own conclusion is, that an over-readiness to perceive clear mental pictures is antagonistic to the acquirement of habits of highly generalized and abstract

thought, and that if the faculty of producing them was ever possessed by men who think hard, it is very apt to be lost by disuse.⁷

A similar point is made more amusingly in the *Fortnightly*, where Galton describes an experiment in which he accosted a philosopher and his woman friend with the words, 'I want to tell you about a boat.' The woman immediately visualized a large boat leaving the bank, filled with men and women dressed in blue and white. The philosopher asserted that he held his mind in suspense and refused to allow himself to experience a visual image. Galton continues:

A habit of suppressing mental imagery must therefore characterize men who deal much with abstract ideas; and as the power of dealing easily and firmly with these ideas is the surest criterion of a high order of intellect, we should expect that the visualizing faculty would be starved by disuse among philosophers, and this is precisely what I have found on inquiry to be the case.⁸

But he does not think that visualizing powers should on this account be allowed to decay. The process of generalizing can be helped by a fluid visual imagery. Visual imagery is also useful in many occupations, such as those of engineer, architect, and mechanic, where spatial representation is involved. It can also bring pleasure in enabling faithful recall of scenery and works of art.⁹ Instead of starving it by disuse, it should be judiciously cultivated by as yet undiscovered educational techniques. Galton believes that conscious efforts to strengthen weak imagery are ineffective. The role of the will is to reject inappropriate ideas rather than to evoke or render more vivid appropriate ones.

In spite of the popular interest aroused by Galton's work he came in for some criticism from the early psychologists. For example, Alexander Bain pointed out that the range of visual imagery had been known since antiquity and that Galton's enquiry

had done nothing to further our knowledge of the phenomenon. The lack of precision in Galton's questions resulted in a lack of precision in the replies and led, he believed, to under- and over-estimation at the extreme ends of the continuum. He therefore doubted the replies both of those who stated that they had never known what a visual image was and those who claimed that their images had an hallucinatory quality.¹⁰ It is difficult to know how far Bain's criticisms are justified. Galton's wording did lack precision, but there is little doubt that the extremes of imagery do exist in a normal population and Bain's inability to comprehend the mental processes of others very different from himself is of common occurrence.

Further criticisms are of more recent date. The theory that people could be typed according to their predominant imagery seems to have been derived from Galton although he made no explicit suggestion to this effect. But subsequent work has shown that most persons do not have a discrete style; they use images of various sense modalities.¹¹

Galton's use of a vividness scale directed later workers' attention to this aspect of the imaginal process, and there have been many attempts to improve on his scale and to relate vividness to other capacities.¹² In the case of memory images, vividness is not related to the accuracy of recall. In contrast, recent research has shown that in skilled perceptual-motor tasks, the more vivid the imagery the better the performance.¹³ It is a pity that Galton was too easily content with the superficial success of his statistical method and did not at the time push the psychological aspects of his enquiry as far as he might have done.

One of Galton's respondents was George Bidder, son of a well known rapid calculator, who was gifted in much the same way as his father. Bidder drew Galton's attention to a peculiar way in which he visualized numbers. When a number occurred to him, he visualized it in the appropriate position on a spatial framework made up by the other numbers. Galton collected further instances of what he termed 'number forms' until he had enough material for a paper entitled, 'Visualized Numerals', which appeared in

Nature.¹⁴ Much correspondence ensued and to accompany a second paper of the same title, read two months later to the Anthropological Institute, Galton was able to demonstrate 60 examples of number forms.¹⁵ The matter continued to excite attention and a large collection was amassed by Galton, of which only a selection was ever published. Some examples are shown in Figure 14.1.

As in the case of colour-blindness, which remained undescribed until the time of Dalton, the ability to visualize numerals in this way had escaped notice until Galton discovered it. But, as he points out, the neglect of the phenomenon is understandable when we consider that the ability is even rarer than colour defect, being possessed by not more than about one man in 30, although twice as common among women.

Galton was sufficiently unsure of himself, before the Anthropological Society, that he invited six friends, including George Bidder, to attend the meeting (after a good dinner) to testify to the veracity of their reported number forms. His uncertainty probably arose from his own inability to visualize numbers in this way himself and he knew of the incredulity with which the majority would greet his second-hand assertions.

In spite of their great variety, number forms do have certain characteristics in common. They more frequently curve to the right than to the left and they typically plunge up and down in the vertical plane. Sometimes they are three-dimensional and some of Galton's correspondents sent him wire models to illustrate this fact. They are more typically fixed in space with regard to the visualizer's position. For example, one person had a form that swept backwards high over his head to end in his pocket!

Galton believed that the reason behind the idiosyncratic shape of a number form lay in a 'natural fancy for different lines and curves', which was also evident in an individual's handwriting. Thus he thought he was able to discern a resemblance between handwriting and the general shape of the number form.

He thought it probable that number forms originate early in childhood, although they may be developed later to encompass

the higher values and even negative numbers. Although historical dates, days of the week, months of the year, and letters of the alphabet may also be visualized in a spatial framework, it seems that these forms are of later construction, frequently being based on the number form or on diagrams used in class or derived from books. Being the oldest of all, the number form is of most interest. It seems to be developed as a natural mnemonic diagram when the child first learns to count, a diagram to which he refers the spoken words, ‘one’, ‘two’, etc. As soon as he begins to read, the child supplants the verbal sounds by the visual symbols of the figures, which establish themselves permanently on the form. In a few cases children learn their numbers up to 12 from the clock face and the number form reveals this influence. The origin of some other forms can be traced to experience with dominoes, cards, the fingers, or other simple counting devices.

The names that numerals are given may also influence the form. In this respect Galton makes the interesting point that the numbers from 10 to 20 are spoken ‘in defiance of the beautiful system of decimal notation in which we write these numbers’.¹⁶ This usage may, he thinks, prove a serious hindrance to the ready adoption of a decimal system of weights and measures, and he proposes the replacement of our ‘barbarous nomenclature’ by one consistent with the higher numbers. Thus, we should say something like ‘on(e) one, on(e) two, on(e) three,’ instead of ‘eleven, twelve and thirteen.’ (‘Onty’ suggests itself as a more consistent term.)

Number forms do appear to provide evidence for a conflict between the visual and verbal systems, in that the teens nearly always show a deviation from the general shape of the form. A hitch usually occurs at 10 or 12 and the space devoted to the teens is usually greater than is their due. It is as though we see in the number form a pictorial representation of the efforts and ingenuity of the child in coping with this problem.¹⁷

A paper read in May 1881 to the Royal Institution has the title, ‘The visions of sane persons.’¹⁸ In it Galton classifies number forms and colour associations as primitive forms of the visionary

tendency, remarkable for the fact that they occur in normal individuals. Various other kinds of subjective visual experience are discussed, ranging from patterns seen when the eyes are closed to actual hallucinations, or visions, experienced by normal persons in good health. His variety of cases leads him to accept a continuity among all forms of visualization from the extreme of no imagery at all to the other extreme of a complete hallucination. The continuity is not a simple one of degree of intensity but of variations in the process itself. Some good visualizers who are also able to see visions claim that visions are different from vivid visualizations in that they characteristically appear and disappear suddenly and without warning and are quite involuntary.

In the draft of a letter, probably intended for *Nature* but apparently never published, Galton describes a near hallucination which he himself experienced when ill with influenza and bronchitis.

When fancies gathered and I was on the borderland of delirium I was aware of the imminence of a particular hallucination. There was no vivid visualization of it, but I felt that if I let myself go I should see in bold relief a muscular blood-stained crucified figure nailed against the wall of my bedroom opposite to my bed. What on earth made me think of this particular object I have no conception. There was nothing in it of the religious symbol, but just a prisoner freshly mauled and nailed up by a brutal Roman soldier. The interest in this to me was the severance between the state of hallucination and that of ordinary visualization. They seemed in this case to be quite unconnected.¹⁹

Galton's Royal Institution paper concludes with an attempt at explanation. The weirdness of visions lies in their vividness and in the suddenness with which they come and go. He draws an analogy with a common experience at the zoo when a seal is under observation. At one moment the water surface is unbroken, at another the head of the seal protrudes, and a little later the surface is again placid. If there is a sheen on the water the movements of the animal before and after its appearance are shrouded in mystery

and one link in a continuous chain of actions stands isolated for our observation. Similarly in visions a single stage in a whole series of mental operations emerges into consciousness. The reason for this isolation Galton ascribes to an ‘oversensitiveness’ of certain brain tracts and an ‘undersensitiveness’ of others. Thus, certain stages in a mental process are vividly conscious while other stages occur outside awareness.

He now examines the distinction normally made between hallucinations and illusions, the former being defined as due solely to the imagination, while the latter are misrepresentations of objects actually present to the senses. He believes that most hallucinations are of a hybrid nature as they are probably triggered off by the ever-varying visual patterns that can be seen when the eyes are closed but to which attention is not normally paid.

To understand the establishment of illusions he describes the process of trying to see faces in the fire or on wallpaper when one is confined to bed with illness. In health, the process is normally too rapid to observe, but illness may slow it down. The first essential is for the field of vision to be restricted so that a whole picture can only be made up by slow movements of the eyes. There are idiosyncratic contractions of the eye muscles that lead to certain preferred eye movements. The presence of these preferences is demonstrated in the individual peculiarities of the number form. There are also influences from the associations of the moment and from the subject’s mood. The eye thus tends to follow a favourite course and dwells on the marks that coincide with that course. These marks are then strung together, with incongruities disregarded and with deficiencies supplied by the fantasy, until a picture is formed.

An unpublished rough sketch by Galton suggests the way in which an innocuous scene may be invested with menace through the process of dwelling on certain aspects and adding from the imagination (Figure 14.2). It is not a very convincing demonstration, which may have led to its remaining unpublished. Also unpublished was a Cornish coastal scene transformed into a face

of Christ, and many trials were made with pictures of clouds in which faces could be discerned.²⁰

Visions are often patchworks of bits of recollections, which may be blended together to give an appearance of novelty. He compares the process with that seen in making a composite portrait when a 'new' face will emerge from familiar superimposed faces. Similarly in the case of the creative type of vision, many blended memories may be involved and the number of possible combinations is almost endless.

Galton believes that the visionary tendency has an hereditary foundation. In this way he explains familial and racial differences in the ability to have visions. Although inheritance will set the limits, illness, solitude, food and sleep deprivation may be necessary before a person may reach those limits. The number of great men who have been subject to hallucinations – he describes Napoleon's guiding star – is explained by the conditions of social isolation under which they must live.

It follows that the spiritual discipline undergone for purposes of self-control and self-mortification has also the incidental effect of producing visions. It is to be expected that these should often bear a close relation to the prevalent subjects of thought, and although they may be really no more than the products of one portion of the brain, which another portion of the brain is engaged in contemplating, they often, through error, receive a religious sanction.²¹

Similarly, social conditions may favour the production of visions:

It is remarkable how largely the visionary temperament has manifested itself in certain periods of history and epochs of national life. My interpretation of the matter, to a certain extent, is this: that the visionary tendency is much more common among sane people than is generally suspected. In early life, it seems to be a hard lesson to an imaginative child to distinguish between

the real and the visionary world. If the fantasies are habitually laughed at and otherwise discouraged, the child soon acquires the power of distinguishing them. Any incongruity or non-conformity is quickly noted, the vision is found out and discredited, and is no further attended to. In this way the natural tendency to see them is blunted by repression. Therefore, when popular opinion is of a matter-of-fact kind, the seers of visions keep quiet. They do not like to be thought fanciful or mad and they hide their experiences, which only come to light through inquiries such as these I have been making. But let the tide of opinion change and grow favourable to supernaturalism, then the seers of visions come to the front. It is not that a faculty previously non-existent has been suddenly evoked, but that a faculty long smothered in secret has been suddenly allowed freedom to express itself, and it may be to run into extravagance owing to the removal of reasonable safeguards.²²

With this paper Galton concluded his original work in the field of imagery. It remained for him to bring the material together and to add more instances in his next book, where the place of individual differences within a eugenic theme becomes again more evident.