PSYCHOMETRIC FACTS.

THERE lies before every man by day and by night, at home and abroad, an immense field for curious investigations in the operations of his own mind.

No one can have a just idea, before he has carefully experimented upon himself, of the crowd of unheeded half-thoughts and faint imagery that flits through his brain, and of the influence they exert upon his conscious life. I will describe a few of the results of my own self-examination in respect to associated ideas.

It was after many minor trials that one afternoon I felt myself in a humour for the peculiar and somewhat severe mental effort that was required to carry through a sufficiently prolonged experiment as follows. I occupied myself during a walk from the Athenæum Club, along Pall Mall to St. James's Street, a distance of some 450 yards, in keeping a half-glance on what went on in my mind, as I looked with intent scrutiny at the successive objects that caught my eye. The instant each new idea arose, it was absolutely dismissed, and another was allowed to occupy its place. I never permitted my mind to ramble into any bye-paths, but strictly limited its work to the formation of nascent ideas in association with the several objects that I saw. The ideas were, therefore, too fleeting to leave more than vague impressions in my memory. Nevertheless, I retained enough of what had taken place to be amazed at the amount of work my brain had performed. I was aware that my mind had travelled, during that brief walk, in the most discursive manner throughout the experiences of my whole life; that it had entered as an habitual guest into numberless localities that it had certainly never visited under the light of full consciousness for many years; and, in short, I inferred that my every-day brain work was incomparably more active, and that my ideas travelled far wider afield, than I had previously any distinct conception of.

My desire became intensely stimulated to try further experiments, and, as a first commencement of them, to repeat the walk under similar circumstances. I purposely allowed a few days to elapse before doing so, during which I resolutely refused to allow my thoughts to revert to what had taken place, in order that I might undergo the repetition

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of the trial with as fresh a mind as possible. Again I took the walk, and again I was aware of the vast number of extremely faint thoughts that had arisen; but I was surprised and somewhat humiliated to find that a large proportion of them were identical with those that had occurred on the previous occasion. I was satisfied that their recurrence had in only a very few cases been due to mere recollection. They seemed for the most part to be founded on associations so long and firmly established, that their recurrence might be expected in a future trial, when these past experiments should have wholly disappeared from the memory.

It now became my object to seize upon these fleeting ideas before they had wholly escaped, to record and analyse them, and so to obtain a definite knowledge of their character and of the frequency of their recurrence, and such other collateral information as the experiments might afford.

The plan I adopted was to suddenly display a printed word, to allow about a couple of ideas to successively present themselves, and then, by a violent mental revulsion and sudden awakening of attention, to seize upon those ideas before they had faded, and to record them exactly as they were at the moment when they were surprised and grappled with. It was an attempt like that of Menelaus, in the *Odyssey*, to constrain the elusive form of Proteus. The experiment admits of being conducted with perfect fairness. The mind can be brought into a quiescent state, blank, but intent; the word can be displayed without disturbing that state; the ideas will then present themselves naturally, and the sudden revulsion follows almost automatically. Though I say it is perfectly possible to do all this, I must in fairness add that it is the most fatiguing and distasteful mental experience that I have ever undergone. Its irksomeness arises from several independent causes. The chief of these is the endeavour to vivify an impression that is only just felt, and to drag it out from obscurity into the full light of consciousness. The exertion is akin to that of trying to recall a name that just, and only just, escapes us; it sometimes seems as though the brain would break down if the effort were persevered in, and there is a sense of immense relief when we are content to abandon the search, and to await the chance of the name occurring to us of its own accord through some accidental association. Additional exertion and much resolution are required, in carrying on the experiments, to maintain the form of the ideas strictly unaltered while they are vivified, as they have a strong tendency to a rapid growth, both in definition and completeness.

It is important, in this as in all similar cases, to describe in detail the way in which the experiments were conducted. I procured a short vocabulary of words, and laid it open by my side. I then put a book upon it in such a way that it did not cover the word that was about to be displayed, though its edge hid it from my view when I sat

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a little backwards in my chair. By leaning forward the word came into sight. I also took many petty precautions, not worth describing, to prevent any other object besides the word catching my attention and distracting the thoughts. Before I began the experiment, I put myself into an easy position, with a pen in my right hand resting on a memorandum book, and with a watch that marked quarter seconds in my left hand, which was started by pressing on a stop, and continued going until the pressure was released. This was a little contrivance of my own appended to one of Benson's common chronographs. When I felt myself perfectly in repose, with my mind blank, but intent, I gently leant forward and read the word, simultaneously pressing the stop of the watch. Then I allowed about a couple of ideas to present themselves, and immediately afterwards released the stop and gave my utmost power of attention to appreciate with accuracy what had taken place, and this I recorded at once. Lastly, I wrote down at leisure the word that had been displayed, and the time shown by the chronograph to have been occupied by the experiment.

The number of words used in the experiments I am about to describe is seventy-five. I had intended it to be one hundred for the convenience of writing down percentages; but my original list became reduced by mislaying papers and other misadventures not necessary to explain. The result was that I procured a list of seventy-five words, which had been gone through as described, on four separate occasions, at intervals of about a month. Every precaution was used to prevent the recollection of what had taken place before from exercising any notable influence. It was not difficult to succeed in doing so, because the method of proceeding is permeated by the principle of completely discharging from the mind the topics on which it had previously been engaged.

I am particularly anxious that the fairness of the experiments should be subject to no undue doubt, and will therefore add yet a few more words about it. It may be thought an impossible feat to keep the mind as free and placid as I have described during the first part of the experiment, when the great change of its attitude in the second part was imminent. Nevertheless, it was quite practicable to do so. The preoccupation of my thoughts was confined to a very easy task, viz., to govern the duration of the experiment. We have abundant evidence of the facility of this sort of operation. We all of us have frequent occasion to enter heart and soul into some matter of business or earnest thought, knowing that we have but perhaps five minutes' leisure to attend to it, and that we must then break off on account of some other engagement. Nay, we even go to sleep, intending to awake earlier or later than usual, and we do it. In the present case, after about two ideas had successively arisen, I succeeded, almost as a matter of routine, in lifting my finger from the spring stop, and that little act was perhaps of some assistance in

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helping me to rouse my consciousness with the sudden start that I desired.

Now for the results. I found, after displaying each word, that some little time elapsed before I took it in, chiefly because the process had been performed so quietly. If the word had been flashed upon a dark background in large and brilliant letters, or if some one had spoken it in an abrupt, incisive tone, I am sure that period would have been considerably shortened. Again, whenever we read a single substantive without any context or qualifying adjective, its meaning is too general to admit of our forming quickly any appropriate conception of it. We have no practice in doing so in ordinary reading or conversation, where we deal with phrases in block, and not with separate words. Hence the working of the mind is far less rapid in the experiments I am describing, than on common occasions, but not much less than it was in my walk along Pall Mall.

I found the average interval that elapsed between displaying the word, and the formation of two successive ideas associated with it, to be a little less than two and a quarter seconds—say at the rate of fifty in a minute or three thousand in an hour. These ideas, it must be recollected, are by no means atomic elements of thought; on the contrary, they are frequently glimpses over whole provinces of mental experiences and into the openings of far vistas of associations, that we know to be familiar to us, though the mind does not at the moment consciously travel down any part of them. Think what even three thousand such ideas would imply if they were all different. A man's autobiography, in two large volumes of five hundred pages each, would not hold them, for no biography contains, on an average, three such sequences of incident and feeling in a page. There must therefore be, of a necessity, frequent recurrences of the same thought; and this fact was brought out quite as prominently by these experiments as by my walks along Pall Mall. They were also elicited in a form in which I could submit them to measurement.

The seventy-five words gone through on four successive occasions made a total of 300 separate trials, and gave rise between them to 505 ideas in the space of 660 seconds. There were, however, so many cases of recurrence that the number of different ideas proved to be only 279. Twenty-nine of the words gave rise to the same thought in every one of the four trials, thirty-six to the same thought in three out of the four trials, fifty-seven to two out of the four, and there were only one hundred and sixty-seven ideas that occurred no more than once. Thus we see how great is the tendency to the recurrence of the same ideas. It is conspicuous in the reiteration of anecdotes by old people, but it pervades all periods of life to a greater extent than is commonly understood, the mind habitually rambling along the same trite paths. I have been much struck by this fact in the successive editions, so to speak, of the narratives of

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explorers and travellers in wild countries. I have had numerous occasions, owing to a long and intimate connection with the Geographical Society, of familiarising myself with these editions. Letters are in the first instance received from the traveller while still pursuing his journey; then some colonial newspaper records his first public accounts of it on his re-entry into civilised lands; then we hear his tale from his own lips, in conversation in England; then comes his memoir read before the society; then numerous public speeches, and lastly his book. I am almost invariably struck by the sameness of expression and anecdote in all these performances. (I myself went through all this, more than a quarter of a century ago, on returning from South-West Africa, and was quite as guilty of the fault as anyone else.) Now one would expect that a couple of years or more spent in strange lands among strange people would have filled the mind of the traveller with a practically inexhaustible collection of thoughts and tableaux; but no, the recollections tend to group themselves into a comparatively small number of separate compositions or episodes, and whatever does not fit artistically into these is neglected and finally dropped. We recollect very few of the incidents in our youth, though perhaps in old age we shall think very frequently of that little. Let any man try to write his autobiography, say between the ages of five and six, and he will find that he has exhausted everything he can recollect of that period in a very few pages. Let him meet, for the first time after very many years, with some friend of his boyhood, and talk over some interesting event in which they were both engaged, and of which his recollection is so vivid that he believes he can have forgotten none of its incidents. He will assuredly find, if his experience at all resembles my own, that he and his friend have retained very different versions of the same occurrence, that in each case persons who had played an important part in it had wholly dropped from the memory, and that the conversation will have recalled many facts to both the speakers, that had almost passed into oblivion. We recollect the memories of incidents, or the memories of those memories, rather than the incidents themselves; and the original impression, like the original anecdote in the well-known game of 'Russian scandal,' receives successive modifications at each step until it is strangely condensed and transformed.

I divided such part of the 279 different ideas as admitted of it into groups, according to the period of my life when the association that linked the idea to the word was first formed, and found that almost exactly the half of those that recurred either twice, thrice, or four times, dated back to the period when I had not yet left college, at the age of twenty-two. Of those that did not recur in any of the trials the proportion that dated previously to the age of twenty-two to those of later date was a little smaller, viz., as three to

four. All this points to the importance of an early education that shall store the mind with varied imagery, and may form just one-half the basis of the thoughts in after life.

The 279 different ideas fell into three groups. Those in the first and most numerous were characterised by a vague sense of acting a part. They might be compared to theatrical representations in which the actors were parts of myself, and of which I also was a spectator. Thus the word 'a blow' brought up the image of a mental puppet, a part of my own self, who delivered a blow, and the image of another who received one; this was accompanied by an animus on my part to strike, and of a nascent muscular sense of giving a blow. I do not say that these images and sensations were vivid or defined—on the contrary, they were very faint and imperfect; indeed, the imperfection of mental images is almost necessary to mobility of thought, because the portions of them that are not in mental view or even in mental focus at the same instant, admit of being changed to new shapes, and so the mental imagery shifts with less abruptness than it would otherwise do. The effect partakes more of the character of the changes in a diorama and less of that of a sudden transformation scene. I am not aware that this very common sort of ideas has ever been christened or even so clearly recognised before as I think it deserves to be; therefore I will call it 'histrionic.' I find it to be a most important agent in creating generalisations.

The second group of ideas consists of mere sense imagery, unaccompanied by any obscure feeling of muscular tension or action; such as mental landscapes, sounds, tastes, &c. I showed, in a paper read before the Anthropological Society last year,[1] how generalised images admitted of being produced. I took a number of portraits of different persons, who were all represented in the same attitudes and of the same size, and I threw photographic images of these, one on the top of the other, by a contrivance there described, on the same sensitised photographic plates. The result was a picture compounded of that of all the different persons; and so much more numerous are the points of resemblance than those of dissimilarity in different human faces, that the composite picture looked as though it had been taken from a real living individual a little out of focus, and who had somewhat moved during the process. I then pointed out that 'a composite portrait represents the picture that would rise before the mind's eye of a man who had the gift of pictorial imagination in the highest degree.' It is clear, from the evidence of these composites, that generalised images are no chimæras.

So much for the second group of ideas. The third and last group consisted of purely verbal associations, whether the mere names of persons or things, or bits of quotations in prose or verse.

[1] *Journal of the Anthropological Institute*, viii. p. 134; or *Nature*, May 23, 1878, p. 97.

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The seventy-five words were similarly divisible into three groups. The first included such words as 'abasement,' 'abhorrence,' 'adoration,' and 'acclamation,' all of which could be perfectly expressed in pantomime, and generally gave rise to histrionic ideas. The second group comprised 'abbey,' 'aborigines,' 'abyss,' and the like, all of which admitted of sense representation, either by a visual image, or, in the case of such a word as 'acid,' by some other sense. In the third group were the words 'afternoon,' 'ability,' 'absence,' 'actuality,' and others of a like abstract character, difficult to apprehend and realise, and tending to give rise to purely verbal associations. But as two ideas were registered on each occasion, the eight results were usually dispersed among all the groups, though in unequal proportions.

Experiments such as these allow an unexpected amount of illumination to enter into the deepest recesses of the character, which are opened and bared by them like the anatomy of an animal under the scalpel of a dissector in broad daylight. If we had records of the self-examination] of many persons, and compared them, I think we should be much impressed by the differences between one mind and another, in the quality, wealth, and appropriateness of their associated ideas, and we should wonder that mutual misunderstandings were not more frequent even than they are.

I found the purely verbal associations to contrast forcibly in their rapid, mechanical precision with the tardy and imperfect elaboration of highly generalised ideas; the former depending on an elementary action of the brain, the latter upon an exceedingly complicated one. It was easy to infer from this the near alliance between smartness and shallowness.

It so happens that my mental imagery concerns itself more with aspects of scenery than with the faces of men, as I have rather a good memory for localities, and much pleasure in thinking about them, while I am distressed by natural inaptitude for recollecting features. I was therefore surprised to find that the names of persons were just twice as frequent in my associations as that of things, including places, books, and pictures. The associated words that formed part of sentences or quotations were twenty-seven in number, and tended strongly to recurrence. The majority were of good verse or prose; the minority were doggrel. I may as well specify their origin. Four of the verse quotations were from Tennyson, two from Shakespeare, and eight from other sources partly doggrel. Of the prose, five were from the Bible, and seven from other sources, partly grotesque, and some of them family phrases. I suspect there is a great deal of rubbish in the furniture of all our brains.

The occasional vividness of an idea is very startling, and I do not see my way to explaining it fully; but sometimes I am sure it is due to the concurrence of many associations, severally of small intensity, but in the aggregate very effective. An instance of this is the

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powerful effect produced by multitudes subject to a common feeling of enthusiasm, religious fervour, or pure panic. In the few occasions on which I have had the opportunity of experiencing such manifestations, it seemed to me that every one of the multitudinous sounds and movements that reached the ear and eye, being inspired by a common feeling, added its effect to that of all the others. When we are in the presence of a single person or of a small company, the empty background fills a large part of the field of view and dilutes the visual effect of their enthusiasm. Nay, the larger part of the forms of the persons themselves are similarly inexpressive, unless they be consummate actors. But nothing is seen in an enthusiastic multitude but excited faces and gestures, nothing is heard but excited voices and rustlings. Their variety is such that every chord in the heart of a bystander, that admits of vibrating in sympathy with the common feeling, must be stimulated to do so by some of them.

The background of our mental imagery is neither uniform nor constant in its character. It changes in colour, tint, and pattern, though, in my case, all these are usually very faintly marked, and it requires much attention to study them properly. Its peculiarities have nothing to do with associated ideas; they appear to depend solely upon chance physiological causes, to which some of our ideas are also undoubtedly due.

The usual faintness of highly generalised ideas is forcibly brought home to us by the sudden increase of vividness that our conception of a substantive is sure to receive when an adjective is joined to it that limits the generalisation. Thus it is very difficult to form a mental conception corresponding to the word 'afternoon;' but if we hear the words 'a wet afternoon,' a mental picture arises at once, that has a fair amount of definition. If, however, we take a step further and expand the phrase to 'a wet afternoon in a country house,' the mind becomes crowded with imagery.

The more we exercise our reason, the more we are obliged to deal with the higher order of generalisations and the less with visual imagery; consequently our power of seeing the latter becomes blunted by disuse. Probably, also, the mind becomes less able to picture things to itself as we advance in age. I am sure there is wide difference between my mental imagery now and what it was when I was a child. It was then as vivid and as gorgeous as in a dream.

It is a perfect marvel to me, when watching the working of my mind, to find how faintly I realise the meaning of the words I hear or read, utter or write. If our brain work had been limited to that part of it which lies well within our consciousness, I do not see how our intellectual performances would rise much above the level of those of idiots. For instance, I just now opened a railway prospectus, and the following words caught my eye, the purport of which was taken in block—'An agreement will be submitted for the consideration and

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approval of the proprietors on Friday next'—yet I am certain that I had not, and I doubt if I could easily obtain, a good general idea corresponding to any one of the six principal words in the passage, 'agreement,' 'submitted,' 'consideration,' 'approval,' 'proprietors,' and 'Friday.' If I puzzle over the words in detail until I fully realise their meaning, I lose more than I gain; there is time for the previous words to slip out of mind, and so I fail to grasp the sentence as a whole.

The more I have examined the workings of my own mind, whether in the walk along Pall Mall, or in the seventy-five words, or in any other of the numerous ways I have attempted but do not here describe, the less respect I feel for the part played by consciousness. I begin with others to doubt its use altogether as a helpful supervisor, and to think that my best brain work is wholly independent of it. The unconscious operations of the mind frequently far transcend the conscious ones in intellectual importance. Sudden inspirations and those flashings out of results which cost a great deal of conscious effort to ordinary people, but are the natural outcome of what is known as genius, are undoubted products of unconscious cerebration. Conscious actions are motived, and motives can make themselves attended to, whether consciousness be present or not. Consciousness seems to do little more than attest the fact that the various organs of the brain do not work with perfect ease or cooperation. Its position appears to be that of a helpless spectator of but a minute fraction of a huge amount of automatic brain work. The unconscious operations of the mind may be likened to the innumerable waves that travel by night, unseen and in silence, over the broad expanse of an ocean. Consciousness may bear some analogy to the sheen and roar of the breakers, where a single line of the waves is lashed into foam on the shores that obstruct their course.

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