



PRINCIPLES
OF
MENTAL PHYSIOLOGY,

WITH THEIR APPLICATIONS TO
THE TRAINING AND DISCIPLINE OF THE MIND,
AND
THE STUDY OF ITS MORBID CONDITIONS.

BY

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ETC. ETC.

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"Dr. Carpenter has built up a natural history of the mental faculties which will fully repay the most careful study that can be bestowed upon it. His account of 'Memory,' of 'Common Sense,' of 'Unconscious Cerebration,' and of 'Reverie and Somnambulism,' will be absolute revelations to the great majority of readers; and when once certain preliminary details have been mastered, the facts and arguments upon which he relies are stated and explained with a freedom from technicalities, and with a pellucid clearness of thought and diction, which leave nothing on either score to be desired. . . . Lastly, in a concluding chapter of eloquence and dignity worthy of its subject, Dr. Carpenter grapples boldly with the attitude of Science towards Religion, and with the doubts and difficulties of those who are unable to reconcile a reign of law with a personal government of the universe. In this chapter, as well as in some others, he will probably fail to satisfy the holders of extreme views on either side, but he has done much to reconcile aspects of truth which cannot be in real opposition to each other. We can only prefix to our citation of its concluding paragraph the expression of a hope that this volume may not only be read, but studied, and that it may be studied with especial care by all who are responsible for the education of the young."—*The Times*.

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TO THE MEMORY OF

THE LATE

SIR HENRY HOLLAND, BART., D.C.L., F.R.S.,

PRESIDENT OF THE ROYAL INSTITUTION,
ETC. ETC.

This Volume is Dedicated,

AS AN EXPRESSION OF THE AUTHOR'S GRATITUDE

FOR BENEFITS DERIVED FROM

HIS SCIENTIFIC WRITINGS,

HIS WISE COUNSELS,

AND HIS CORDIAL ENCOURAGEMENT,

DURING A FRIENDSHIP OF THIRTY YEARS.

PREFACE.



THE following Treatise is an expansion of the Outline of Psychology contained in the Fourth and Fifth Editions of my "Principles of Human Physiology" (1852 and 1855), but omitted from the later editions of that work, to make room for new matter more strictly Physiological. The appreciation of that Outline expressed at the time by several friends to whose opinions I attached great value, made me contemplate the separate reproduction of it, at some future date, in an enlarged form: but the fulfilment of that intention has been delayed, in the first instance, by the pressure of Official duties; and, since this has been lightened, by the diversion of all the time and thought I could spare into an entirely different line of Scientific investigation. That investigation, however, having been taken in hand by Her Majesty's Government for systematic prosecution by the "Challenger" Expedition, I found myself free to entertain a proposal made to me by the projectors of the "International Scientific Series," to republish my Outline in an enlarged form, as one of their Popular Treatises.

Not having seen reason to make any important change in

my own Psychological views since I first put them forward, but, on the contrary, having found them confirmed and extended by the experience and reflection of twenty years, I set myself to revise my former exposition of them, with the idea of simply introducing such illustrations as might lead to the more ready apprehension of the principles I aimed to enforce, and of filling-up such deficiencies as it might seem most desirable to supply. But, as I proceeded with the work, I found it grow under my hands; and it has at last so far exceeded the limits originally contemplated, as to become unsuitable to the Series for which it had been designed, from which it has been accordingly withdrawn, for issue as an independent Treatise.

I now send it forth as a contribution to that Science of Human Nature, which has yet (as it seems to me) to be built-up on a much broader basis than any Philosopher has hitherto taken as his foundation. To the character of a System of Psychology, this treatise makes no pretension whatever; being simply designed to supplement existing Systems of Physiology and Metaphysics, by dealing with a group of subjects, which, occupying the border-ground between the two, have been almost entirely neglected in both. Hence, in treating of Sensation, I have not entered into those details on the Physiology of the Senses which are readily accessible elsewhere; but have especially applied myself to the elucidation of the share which the Mind has, not only in the *interpretation* of Sense-impressions, but in the *production* of Sensorial states not less real to the Ego who experiences them than are those called-forth by external objects,

—a topic of the greatest importance in reference to the value of all Testimony given under a Mental preconception. And, in like manner, I have done no more than enumerate a large proportion of those principal modes of Mental activity, which are commonly designated as Intellectual Faculties, Propensities, and Emotions; in order that I might have space to bring into clear view that distinction between their *automatic* and their *volitional* operation, which has long appeared to me the only sound basis, on the one hand, for Education and Self-discipline, and, on the other, for that Scientific study of the various forms of *abnormal* Mental activity, which, rightly cultivated, is probably the most promising field of Psychological inquiry.

It would be ungrateful were I not to take this opportunity of renewing the expression of the special obligations I owe, in the original construction of my “fabric of thought” on this great subject, to the writings and conversation of my valued friends the late Sir Henry Holland, Professor Laycock, Dr. J. D. Morell, and Dr. Noble.—To the first of these it had been my intention to dedicate this Treatise, the title of which he had kindly permitted me to borrow from one of his own; and I have gladly, therefore, complied with the wish of his Family, that I should dedicate it to his Memory. No one can know the wonderful *suggestiveness* of Sir H. Holland’s scientific writings, who has not had the occasion (which has often occurred to myself) to trace back to them some of the best of the thoughts which he had honestly believed to be his own. This I have found

particularly the case in regard to the subject of Attention: the fundamental importance of which in relation to the Will, I first learned from him to appreciate.

Other obligations to later writers on Psychology are noted in their proper places: but all the general doctrines of importance herein set forth, will be found, I believe, either explicitly stated or clearly indicated in my original Outline: and in their fuller development I have preferred to draw either upon my own mental experience and that of others, or upon that very large group of *abnormal* phenomena which has not yet (so far as I am aware) been discussed by any professed Psychologist, but of which the careful study seems to me absolutely essential to a due understanding of the relation of the Will to the Automatic activity of the Mind, and of both to the Physiological Mechanism. Some apology may be thought due for the introduction of so many old and familiar illustrations; and especially for such numerous citations from the well-known work of Dr. Abercrombie on "The Intellectual Powers." But I have not hesitated to bring in old stories whenever they were specially to the point; and I believe that in many instances I have been able to give them an entirely new application.

In conclusion I venture to ask for a fair measure of indulgence for such errors and shortcomings (especially on the Psychological side) as will doubtless be discovered in this Treatise; on the ground that it has been impossible for me to devote to it that *continuous* thought, which is especially required for the systematic prosecution of any inquiry of this kind, and for the exposition of its results

Had I kept the work back longer in the hope of a more favourable opportunity for its production, I might have altogether lost, with the advance of years, the power of producing it. Such as it is, I offer it, on the one hand, to those who are interested in the progress of Psychological Science, and are disposed to widen its area of investigation ; and, on the other, to those who desire a definite basis and aim in the Intellectual and Moral training either of others or themselves ;—with the hope that I may at any rate stimulate some other investigator to follow-out the path I have tried to open, who shall bring to the Scientific interpretation of Physiological phenomena a knowledge of Metaphysics to which I can lay no claim, and a Mind better trained in abstract thought.

UNIVERSITY OF LONDON,

February, 1874.

P R E F A C E

TO THE FOURTH EDITION.

SINCE the first issue of the following Treatise, the question of "Human Automatism" has largely engaged the attention of that increasing portion of the public mind which interests itself in scientific enquiry. The Address of the eminent Physicist who occupied the Presidential chair at the Belfast Meeting of the British Association, embodied a philosophical creed of which it seems a necessary corollary, that all Mental as well as bodily activity, being the outcome of the "potentialities" of Matter, is subject to Physical conditions alone.

—The distinguished Biologist who brilliantly expounded at the same Meeting the Cartesian doctrine that "Animals are Automata," explicitly maintained (in direct opposition to Descartes himself) that Man is only a more complicated and variously-endowed Automaton: his bodily actions being determined solely by Physical causes; the succession of his Mental states depending entirely upon the molecular activities of his Cerebrum; and the movements he is accustomed to regard as expressing his feelings, or as executing his intentions, having their real origin in Brain-changes, of which those feelings and intentions are the mere concomitant "symbols

in consciousness.”*—Professor Huxley’s *pronunciamento* was soon followed by that of an able Mathematician, who brought to that profoundly difficult problem of “Body and Mind” which has exercised the greatest intellects from Aristotle to J. S. Mill, the training of a skilled athlete, who knocks down with one vigorous blow any opponent unprepared for his peculiar mode of attack. Relying exclusively upon Physical experiences, Professor Clifford affirmed without the smallest hesitation,† that as the only thing which can possibly be conceived to influence Matter is either the position or the motion of surrounding matter, the statement “that the Will influences Matter” is simply “nonsense;” an affirmation which assumes that Professor Clifford knows all about matter and its dynamical relations, and therefore has an unquestionable right to say that Mankind at large are wrong in the conviction that the movements of their Bodies are in any way directed by their Minds.

From the confidence with which what are asserted to be the inevitable conclusions of Physiological science, are now advanced in proof of the doctrine of Human Automatism, it might be supposed that some new facts of peculiar importance had been discovered, or some more cogent deductions drawn from the facts previously known. But after an attentive re-examination of the whole question, I find nothing in the results of more recent researches to shake the conviction at which I arrived nearly forty years ago,‡ of the

* “Fortnightly Review,” November, 1874, p. 577.

† “Fortnightly Review,” December, 1874, p. 728.

‡ “On the Voluntary and Instinctive Actions of Living Beings,” in the *Edinburgh Medical and Surgical Journal*, No. 132 (1837).

existence of a fundamental distinction, not only between the Rational actions of sentient beings guided by experience, and the Automatic movements of creatures whose whole life is obviously but the working of a mechanism,—but also between those actions (common to Man and intelligent brutes) which are determined by a preponderating attraction towards an object present to the consciousness, and those (peculiar, as I believe, to Man) in which there is, at one stage or another, that distinct purposive intervention of the self-conscious Ego which we designate Will, whereby the direction of the activity is modified.

What modern research seems to me to have done, is to elucidate the mechanism of Automatic action; to define with greater precision the share it takes in the diversified phenomena of Animal life, psychical as well as physical; and to introduce a more scientific mode of thought into the Physiological part of the enquiry. But in so far as those who profess to be its expositors ignore the fundamental facts of Consciousness on which Descartes himself built up his philosophical fabric, dwelling exclusively on Physical action as the only thing with which Science has to do, and repudiating the doctrine (based on the universal experience of mankind) that the Mental states which we call Volitions and Emotions have a causative relation to Bodily changes, they appear to me to grasp only one half of the problem, to see only one side of the shield (§ 2). That the principle of the Conservation of Energy holds good not less in the Living body, than in the Inorganic world, I was myself among the earliest to

maintain.* That in the most powerful Muscular effort which can be called forth by the Human Will, there is no more a *creation* of Energy than in an Automatic convulsion, I believe as firmly as Professor Clifford. And that the general tendency of modern Scientific research is to extend the domain of Law to every form of mundane change,—the belief in the Uniformity of Causation being now assumed as axiomatic in all scientific procedure,—I recognize as fully as Mr. Herbert Spencer (§ 574). This tendency could not be expressed more forcibly, than in the following citation from Mr. H. Sidgwick's recent Treatise :—

“The belief that events are determinately related to the state of things immediately preceding them, is now held by all competent thinkers in respect of all kinds of occurrences except Human Volitions. It has steadily grown both intensively and extensively, both in clearness and certainty of conviction, and in universality of application, as the human mind has developed and human experience has been systematized and enlarged. Step by step, in successive departments of fact, conflicting modes of thought have receded and faded, until at length they have vanished everywhere, except from this mysterious citadel of Will.”†

Before enquiring, however, whether there is adequate ground for regarding the Human Will in this exceptional light, it may be well to consider what basis there is for the assumption that the range of Physical Causation extends itself from the sphere of Matter to that of Mind,—in other words, that Moral Causation and Physical Causation are convertible terms.

It may be fairly urged, on one side, that the tendency

* “On the Mutual Relations of the Vital and Physical Forces,” *Philosophical Transact.*, 1850.

† “The Methods of Ethics,” p. 47.

modern Scientific investigation has been to show that a very large proportion (if not the whole) of those changes whose succession constitutes our Mental life, are determinately related, on the one hand, to the Mental states which immediately preceded them, and, on the other, to the Material conditions of the Bodily organism. The pure Metaphysician, who studies the "Laws of Thought" in the abstract, as if Man consisted of Mind without Body, no more doubts the former, than the Physiologist, who works upwards from Body to Mind, and studies the successions of Consciousness as functions of the Nervous System, can question the latter. And the Psychologist, whose object (to use the words of Mr. Herbert Spencer) is to elucidate "not the connection between internal phenomena, nor the connection between external phenomena, but the connection between these two connections," and who studies the relation between Psychical phenomena and Physical conditions through the whole range of the Animal kingdom, interpreting these phenomena by a scientific scrutiny of his own experiences, and applying the knowledge thus gained to the explanation of the actions of organisms whose constitution resembles his own (this enquiry being the special object of the present Treatise), finds himself irresistibly brought to the conclusion that Automatism* has a very large share in the life of every Human being; and is thus naturally led to question whether there is *any* part of

* In the term "Automatism," as used here and elsewhere, I include not merely those *Bodily* but those *Mental* activities, which are *determinately related to* (or, in other words, *are caused by*) previous bodily or mental activities, to the exclusion of all *choice* or *self-direction* on the part of the Ego.

Man's action which is exempted from the Law of Physical Causation.

The corrective to this view, however, appears to me to be furnished by the intelligent study of that large class of the phenomena of Human Nature, which lies patent to every trained observer in the ordinary course of events. For the more carefully he studies these phenomena, the more clearly is he led to see that, as has been pithily said by Emerson, "*Thoughts rule the World;*" and that, though the spheres of *moral* and *physical* Causation impinge (as it were) upon one another, they are in themselves essentially distinct. The influence of a great Idea conceived by a thinker in his closet, in dominating the action of an entire Nation, is utterly disproportioned to any conceivable play of molecular forces that can be excited by the Physical agency of the thinker in putting his idea into speech or writing. The Moral power of the "thoughts that breathe, and words that burn" in the utterances of the Poet, cannot be correlated, like the mechanical Energy exerted by his muscles in the writing of his verse, with the quantity of food he may have consumed in their production. And the new direction that may be given to the whole course of two lives, by the faintest expression of Emotion in a tone, a look, or a touch, cannot be brought to any common measure, either with those Muscular contractions, or with those molecular changes in Nervous matter, which are the Physical causes of its manifestation.

But to this it may be replied that, even when we look at Human action from its Mental side, without any regard to

Physical antecedents, we cannot help recognizing in it the principle of Causation by character and circumstances ; and that without the power of prediction which we derive from organized experience, as is well stated by Mr. Sidgwick (Op. cit. p. 48), social life would be impossible. But while every one admits the existence of Uniformities in Human action which constitute the basis of our Social fabric, every one also admits that the closest observation of these Uniformities, and the most sagacious analysis of their conditions, does not justify anything more than a "forecast" of the course of action, either of individuals or of communities, in any given contingency. "Who would have thought that he would have done such a thing?" is our frequent exclamation in regard to some one of whom we considered that we had a most intimate knowledge : that "the unexpected [in Politics] is what always happens," has passed into a proverb. It is, of course, open for the Automatist to assert that the element of uncertainty here arises, as in the case of weather-forecasts, from the complexity of the conditions, and from our imperfect acquaintance with them; and he might fairly urge, on general grounds, that if we could grasp the whole of the antecedents, and measure the potency of each, no "unconditioned" or self-originating element would be found to have interfered with the regular sequence of cause and effect. But he has no right whatever to *assume* this. The whole history of Science shows that the investigation of "residual phenomena" has been a most fertile means of discovery in regard to agencies not previously suspected. And until it shall have been *proved* that

there are no Human actions which cannot be accounted for by "unconditional sequence," such an assumption cannot be admitted as an adequate disproof of the testimony borne by Human Consciousness to the opposite effect. "It is impossible for me to think," says Mr. Sidgwick, (*Op. cit.* p. 51), "in the moment of deliberate volition, that my volition is completely determined by my formed character and the motives acting upon it. The opposite conviction is so strong as to be absolutely unshaken by the evidence brought against it. I cannot believe it to be illusory. * * * No amount of experience of the sway of motives even tends to make me distrust my intuitive consciousness, that in resolving after deliberation I exercise free choice as to which of the motives acting on me shall prevail. Nothing short of absolute proof that this consciousness is erroneous, could overcome the force with which it announces itself as certain; and I cannot perceive that such proof has been given."

It is alleged, indeed, that the belief entertained by all men—except Philosophers—in their own freedom of choice (within certain limits) between different modes of action, is an illusion of ignorant "common sense," which, like the vulgar belief that the sun moves round the earth, is utterly dispelled by the light of Science. But the two beliefs rest upon an entirely different basis. The latter, like other erroneous beliefs which arise in the exercise of our senses, is an *inference* from the facts of Consciousness, which a more enlarged experience (such as that afforded by almost every railway-journey) shows to be untenable: the

former is the *immediate affirmation* of Consciousness itself, the assurance of which, its constant recurrence under a great variety of conditions only serves to confirm.

The direct Testimony of Consciousness as to any one of its primal cognitions, must be held, as it seems to me, of higher account than the deductions of Reason from data afforded by other cognitions; constituting, in fact, a "base of verification" to which all our logical triangulation must be worked back, if we desire to test its validity. And no fact of Consciousness as to which Mankind in general is in accord, can be disproved save by the contradiction afforded by some other primary cognition of superior validity. For, as has been truly said by John S. Mill, "feeling and thought are much more real than anything else; they are the only things which we directly know to be real."* We know nothing about matter, as Berkeley demonstrated, except by inference from the manner in which its states affect our consciousness; "itself we do not perceive; we are not conscious of it." And hence those so-called "experiences," on the basis afforded by which the whole fabric of Physical Science is built up, being really nothing else than "assumptions to account for our sensations" (Mill), can only be accepted as valid, in so far as they accord with those primal cognitions which we cannot dissociate from our own consciousness of personal agency. Thus, for example, when Professor Clifford affirms (*loc. cit.*) that no interaction can possibly take place between Bodily and Mental states,—the Physical facts going along by them-

* "Posthumous Essays," p. 202.

selves, and the Mental facts going along by themselves, on two utterly different platforms,—he calls upon us to receive as the indubitable teaching of Science, the result of a process of reasoning based upon one set of experiences alone; notwithstanding that this is completely contradicted by another set, which, as appealing much more directly to our own consciousness, has a stronger claim upon our acceptance. For all Mankind—except philosophers of Professor Clifford's school—accept it as a fact “based on the normal “experience of healthy men” that running a pin into one's flesh is the cause of that mental state which we call pain (Huxley, *Op. cit.* p. 574); a certain *neurosis*, or molecular change in the Nervous system, producing a corresponding *psychosis*, or affection of the Consciousness. And, conversely, since all Mankind—except the followers of Professors Huxley and Clifford—accept it as a fact “based on the normal experience of healthy men,” that the state of mind which we term Volition is the cause of the muscular movement that gives expression to it—a *psychosis* producing the *neurosis* which calls forth Muscular contraction—I cannot see that this conviction can be nullified by any inference drawn from an order of facts that is capable of an entirely different interpretation. The doctrine propounded by Professor Huxley in his Belfast lecture, that the feeling we call Volition is not the cause of the voluntary act, but the “symbol in consciousness” of that state of the Brain which is the immediate cause of that act (like the blowing of the steam-whistle, which signals, but does not cause, the starting of the locomotive), and that the strongest Volition

has therefore no power in itself to call forth a movement, seems to me to find its best answer in the explicit statement which he himself put forth not many years previously, that "the belief that our Volition counts for something as a condition in the course of events," is one which "can be verified experimentally as often as we like to try," and therefore "stands upon the strongest foundation upon which any belief can rest, and forms one of our highest truths."*

When we come to examine the reasons latterly assigned by Professor Huxley for giving up this assured belief, we find them mainly based on the fact that certain actions which would be ordinarily accounted Volitional (as being initiated by an intentional effort) in Man, can be performed under circumstances which strongly indicate a purely Automatic causation.

Thus it has been shown by Göltz, that a Frog from which the Cerebrum has been removed, and which (according to ordinary Physiological doctrine) has consequently lost the power of voluntary movement, will jump when irritated, the direction of this movement being affected by the incidence of light upon its eyes; though making no effort to feed itself, it will swallow food put into its mouth, and may thus be kept alive for weeks or months; and will utter its croak when a particular part of its back is stroked. But further, although, when put on the hand, the Frog sits there crouched, perfectly quiet, and would remain so unless stimulated to action, yet (says Professor Huxley) "if the hand be inclined very gently and slowly, so that the frog would naturally slip off, the creature's forepaws are shifted on to the edge of the hand until he can just prevent himself from falling. If the turning of the hand be continued, he mounts up with great care and deliberation, putting first one leg forward, and then the other, until he balances himself with perfect precision upon the edge, and

* "Lay Sermons," p. 160.

“in the turning of the hand over he goes through the opposite set of operations, until he comes to be seated in security upon the back of the hand.”—(*Fortnightly Review*, Nov. 1874, p. 567).

Now, that Man is himself continually making yet more elaborate adjustments of his muscular movements, under circumstances which forbid the idea that they are in any way directed by his Conscious Will, is expressly shown in various parts of the present work. Some of these actions, as coughing (§ 47) and sucking (§ 48), are originally or *primarily* Automatic; and can be experimentally shown not to depend upon Cerebral instrumentality, except when performed in obedience to a Volitional mandate. Others, as walking erect (§§ 16-18), are originally performed under the conscious purposive direction of the mind; but, when they have once become habitual, they may be repeated involuntarily, and even unconsciously, by a *secondary* or acquired Automatism, the mechanism of which has constructed itself in virtue of the tendency of the Nervous system to *grow to* the mode in which it is habitually exercised (§ 278). And this is equally true of those more special activities which have been acquired by “training,”—such as rope-dancing (§ 381), music-playing (§ 194), juggling with balls (§ 194), &c.; for these may be performed (as we are accustomed truly enough to say) “mechanically” by any individual by whom they have been so habitually repeated as to have become a “second nature.”

Of this general principle, of which numerous examples will hereafter come before the reader, the following singularly curious illustration, which I have lately received from a trustworthy source (a Clergyman in the North of England), may be here presented:—

“ While I was a student in Dublin University, I was at an evening party at which a lady was asked to play for dancing. Unfortunately she had taken far too much at supper; and was, in fact, after she had begun to play, so drunk as to be totally unable to rise off the stool. I was standing near the piano, and saw her eyes close, her head fall forward, and give every manifestation of sleep except snore aloud. But her playing went on in perfect time; and, in fact, the difficulty was, when she had ended a waltz or quadrille, *to make her stop*; for when she was shaken out of sleep, it was evidently her intention to go on the whole night. To set her going again, it was only necessary to place her hands on the keys, and she would begin a new quadrille, soon again relapsing into sleep, and yet continuing to play well. I was studying a deep course of Metaphysics at the time, for my degree in those subjects in Trinity College; and the case made a great impression on my mind. I could not account for it on any of my then principles; but I see it perfectly now.”

I have recently learned, too, that it is no uncommon experience in Telegraph offices, for transmitters of messages, when they have been for some time in the service, to work the instruments without conscious thought of what they are doing. “ They read the words,” says my informant, “ pass them through their minds, and transfer them to the sending part of the apparatus, just as unconsciously and automatically as Wheatstone’s transmitter does. I have often found myself,” he continues, “ indulging in trains of thought, or even listening to a conversation that might be going on near me, and yet continue to ‘ receive ’ and ‘ send ’ just as if I was giving my whole attention to the work; and when I came to see the messages afterwards, I knew that they had passed through my hands only by the handwriting. Once, indeed, when on night duty, I became completely unconscious whilst sending a long and monotonous ‘ group ’ message, consisting entirely of figures, and woke up bewildered; and had to ask the receiving station ‘ after what ? ’ before I could proceed. Some clerks believe that the work is done more accurately when done automatically; but I scarcely think this justified by experience.”

However strange these statements may seem, they find their parallel in our own familiar experience. For almost every one who has been much in the habit of reading aloud, is well aware that he may continue to do this with perfect articulation, punctuation, emphasis, and intonation, while

his mind is so completely engrossed by some entirely different subject, that, until his Attention is recalled to it, he is no more aware that he is reading, or conscious of the guidance he has been receiving from his visual sense, than is the philosopher of the pursuance of his walk whilst his whole mind is given to the solution of some knotty problem (§ 117). The only difference between the case of the reader-aloud and that of the telegraph-clerk, is that the words whose visual pictures have fallen on the retina, are expressed in the one case by acts of vocalisation, in the other by a special kind of finger-language. So, the case of the musical performer who continued to play quadrilles in her sleep, is analogous to that of the ambulatory thinker; a previously acquired succession of movements, once initiated, going on without conscious direction; each movement being suggested by that which preceded it, and itself suggesting the next.

The same explanation seems to me to be legitimately applicable to the case of the French Sergeant, on which great stress is laid by Prof. Huxley (*loc. cit.* p. 568) as indicating that what we are accustomed to call Voluntary action in ourselves is really Automatic. For, as a consequence of a wound in the head received at Gravelotte, this man frequently passed spontaneously into a state closely resembling that of the artificially-induced Hypnotism, whose phenomena are described in the latter part of this Treatise (§§ 493—500). The essential peculiarity of this state is the suspension of the directing and controlling power of the Will; so that the whole course of action is determined Automatically by Suggestion. And its phenomena, so far from affording any

evidence that the same is the case in our normal state, and that what we call Will is only the "symbol in consciousness" of a material change which would equally take place without it, seem to me to testify exactly the contrary. For we cannot help recognizing a marked difference between the *normal* and the *abnormal* states of such subjects; and, as I think I have demonstrated in my discussion of these and of allied states (Chaps. XIV., XV.), that difference essentially consists in the suspension in the latter state of that Volitional power, which in the former directs and controls the successions of thought and action. And on the recognition of this difference will depend our appreciation of the relative Moral "responsibility" of the subjects of these states, for the same actions performed in the normal and in the abnormal conditions respectively. Thus we should hold the French Sergeant fully "responsible" for any theft he might commit when in full possession of his wits; and yet for the very same action performed in his Automatic state, we should be ready to admit the excuse that he had no power of self-control (p. xxxviii).

Thus, as it seems to me, the cases cited by Professor Huxley are readily explicable by the principle of *secondary* or *acquired* Automatism first explicitly laid down by Hartley; this taking the place in Man (save as regards such actions as breathing and sucking, which are essential to the life of the infant) of those which are *primary* or *original* among the lower animals. And I hold it to be the legitimate inference from the fact that certain actions of the Frog, resembling those which Man might execute Volition-

ally under like circumstances, are performed Automatically, that a provision exists in the inherited structure of the Frog, for doing that which Man only learns to do by intentional "training,"—an inference which all Physiological study tends to confirm. For the fullest recognition of Automatism in the performances of Göltz's frog does not in the least invalidate the testimony of my own Consciousness, that when, being called on to balance my body under some unaccustomed circumstances (as in crossing a stream on a narrow plank, or over a series of stepping-stones), I give my whole attention to the act, the movements of my body are executed under my intentional direction. Again, the fact that various actions have become so familiar to me by habit as to be performed Automatically, affords no real contradiction to the testimony of my own Consciousness, that when I was first trained (or was training myself) to execute them, my Will issued the mandates which were carried into effect by my muscles. I cannot believe that a piece of delicate handiwork, such as a minute dissection, or the painting of a miniature—requiring constant visual guidance, and trained exactness of muscular response—can be executed without a distinct Volitional direction of each movement. And I find myself quite unable to conceive that when I am consciously attempting, whether by speech or by writing, to excite in the minds of my readers the ideas which are present to my own consciousness at the moment, it is *not* my Mind which is putting my lips or my hand in motion, but that (as Professor Huxley maintains) it is my Body which is moving

of itself, and simply keeping my mind informed of its movements.

If this doctrine were true, not only of particular cases, but of Human life generally, it is obvious that its stream would flow on exactly as it does, if we had no Consciousness at all of what we are about; that the actions and reactions of the "ideogenous molecules" would do the work of the philosopher, even if they never generated ideas in his mind; that he would give forth its results in books or lectures, not from any intention or desire that his books should be read and his lectures heard, so as to bring the thoughts of other minds into relation with his own, but simply because certain molecular motions in his brain call forth the movements of speech or writing; and that, in like manner, the noblest works of genius—the master-pieces of the poet, the artist, and the musician—would none the less be produced, if the "symbols in consciousness" were never evoked in their producers' nature, and would prove none the less attractive to other Automata, if the molecular movements of their brains should be equally incapable of exciting either intellectual or emotional activity; such activity being, to use a legal phrase, mere "surplusage." To myself this seems like a *reductio ad absurdum*. For although I maintain in the present Treatise that an Automatic action may take place in the Cerebrum, which, without any intervention of consciousness, may evolve products usually accounted Mental, yet in all such cases *the action takes place on the lines previously laid down by Volitional direction*; being exactly parallel, in the case of cerebral action, to that

secondary or acquired Automatism, by which particular kinds of Movement, originally acquired by "training," come to be performed "mechanically."

I fail to find, then, in any of the modern developments either of Physical or Physiological science, any adequate grounds for abandoning the position maintained in the following Treatise, as to the direction and control to which the Automatic activity of Man is subject in proportion to the development of his Volitional power,—that is, the power exerted by the Ego not only with a *distinct purpose*, but with a *consciousness of effort*, the strength of which is the mark and measure of its exercise.

The direct testimony of Consciousness, in regard not only to the existence of this Volitional power, but also to the Self-determination of the Ego in the exercise of it, is borne out by numerous other considerations of various degrees of cogency, more or less intimately related to each other; the aggregate of which, like that of the mutually-supporting outworks round a citadel, adds enormously to the strength of the position, though each independently might be inefficient for its defence.

1. It is supported by the very existence of the Idea symbolised in the word *choice*; an idea which we could not entertain, if we did not find something answerable to it in our own subjective experience. For in external Nature there is nothing that can be truly termed "choice." If a piece of Iron be brought within the sphere of attraction of two Magnets placed on opposite sides of it,

one near but feeble, the other strong but remote, we feel assured that it will be drawn towards the one which makes the stronger pull upon it; and we take its motion in one or the other direction, as the indication of the superior tractive force of the magnet towards which it tends. To use the word "choice" in such a case—to say that the iron *chooses* towards which of the magnets it shall move,—would be felt by every one a misapplication of the term. The same would be the case as regards any other action determined by Physical Causation. And yet on the Determinist doctrine, if I am attracted by the temptation of an immediate but immoral pleasure, and am deterred from it either by a sense of duty or by the fear of the remote consequences of the sin, I have no more "choice" as to the course I shall take, than has the piece of iron that is attracted in opposite directions by two magnets. Now my contention is, not merely that I *have* a choice, but that the very existence of an Idea which can be derived from no other source than Human experience, confirms the testimony of my own consciousness to that effect.* And the like confirmation is afforded by the familiar reply "I have *no choice*," in cases in which we feel it to be a *necessity* (whether physical or moral) that we should take a particular line of action.

That in making our Choice, and in acting upon it, we are determined by the "preponderance of motives," I do not call in question; the Self-determining power of the Will

* The case seems to me exactly parallel to that of the notion of Force, which is based on our own *consciousness of effort* in originating or in resisting Motion (§ 575).

seeming to me to be exerted in modifying the preponderance which the motives *per se* would determine. The affirmation that our actions are determined by the strongest motives, appears to me, indeed, a mere truism; being only another mode of saying that the motive which prevails is the strongest. For we have no other test of the relative strength of motives, than that which is afforded by our experience of their action in each individual case. If we put into a balance two bodies of known densities, we can predict, by the comparison of their dimensions, which will preponderate. But, if the density of one or both is unknown, we can only determine which is the heavier by seeing which scale goes down. And so we can have no other measure of the relative strength of Motives of different orders, than that which is afforded by their respective effects in the determination of the conduct. Now, all experience shows that Motives which may exert a preponderating influence at one moment, are comparatively powerless at another; on the other hand, Motives whose influence at one moment is scarcely felt, may come to acquire a force that makes them far outweigh those which at first over-balanced them. This is especially apparent when we exert our Volitional power of "self-control" to check the immediate action which is prompted by some Automatic impulse; time being thus gained for the excited feeling to subside, and for the "second thoughts" of the higher Reason to make themselves heard.*

* It is not always, however, that "second thoughts are best." For the immediate impulse may be a *benevolent* one, and the "second thoughts" *deliberately selfish*.

And a further reflection on our own mental experiences will satisfy us, that these variations in the relative strength of Motives mainly arise from the degree of Attention that we give to each respectively. An excited Feeling which would soon die-out if left to itself, will retain its potency, or even gain augmented force, if we allow ourselves to brood over it; whilst, on the other hand, the power of those remoter considerations which deliberation suggests, increases in proportion as they are dwelt on. And just as, in the case of the two magnets, we may reverse their relative attractions by changing their respective distances from the iron between them, so can each Ego who has acquired the power of directing his own course of Thought and Feeling, alter the relative potency of different motives or sets of motives, by *determinately directing his attention* to those which would draw him in one direction, and by partially or completely *excluding* those of an opposite tendency from his mental view.

If it be urged by the Automatist that this fixation of the Ego's attention on one set of motives to the exclusion of the other, is really due to the superior strength of the motive (supplied by his previously-formed character) which leads him to *desire* so to fix it, I reply that no experience of which I am conscious is more real to me, than that if I did not *make an effort* to keep my attention fixed, the *desire* alone would fail to do it. I am further conscious that a great deal more is "taken out of me" (to use an expressive colloquialism) by the prolongation of such a struggle, than by a far larger measure of undistracted mental action.

And I ask, "Why, on the Automatist theory, should this "be?"—To myself it seems clear that it is in the control he thus acquires over the Automatism of his nature, that Man's *freedom of choice* essentially consists; whilst, on the other hand, it is in virtue of his want of power to gain a complete control, that his *freedom is limited*.

This view seems to me to find its strongest support in the experience of those who have been most largely and most successfully engaged in the Education of the young. For, as I have had abundant opportunities of learning, they watch for the dawn of this power of reflection and deliberation in the child, endeavour to strengthen his feeble resolution by judicious encouragement, lead him to reflect upon the consequences of his misdoing to himself or to others, and give additional force to his sense of Duty by earnest appeals to it, so as to sustain him in a conflict to which he is as yet unequal if left to himself; but at the same time they make him feel that he must not always expect such help, and that it rests with himself, by habitually fixing his attention upon what his Reason and his Moral Sense tell him he *ought* to do, to be able to *will* to do it against his inclination.

No experience is so remarkable in its bearing on this question, as that of the Philanthropic men and women who have taken the largest and most efficient share in the work of Juvenile Reformation. For they have to deal with a class of boys and girls, who have grown up to a most unmanageable age, in habits of entire unrestrainedness of Thought and Feeling, and in no more restrainedness of Action than has been imposed on them by external coercion

or by fear of punishment. These young "reprobates" have not the least idea of self-control, or of doing anything else than that which their inclinations prompt; their notions of "right" are all based upon limited self-interest; and they hold everything to be "wrong" which interferes with what they conceive to be their own "rights." Now the first lesson that has to be taught them is that of obedience to discipline, for which punishment has often to be used as a motive. But in proportion as the habit of *self*-control is acquired, appeals to the better nature come to have a force superior to that of mere coercion: and the greatest success is attained when that controlling power is *spontaneously* exerted under the direction of the *ought* or *ought not*. So, in the cultivation of the dormant Moral Sense, the first teaching goes to show that what the pupil considers his [or her] "rights" are some one else's "wrongs"; and the Golden Rule is enforced by the practical applications which are found most suitable to impress it on each individual nature. Thus a foundation is laid for the development of that higher Moral sense, on which the principle of Religious obligation is most securely based (§§ 209-215). But the result of the most successful effort in this direction is only considered to have been attained, when the subject of it has been awakened to a full consciousness of possessing a power *within himself* to resist temptation and to act as duty directs; which power it rests with himself to exert, and for the non-exercise of which he is responsible.*

* My information on this subject is mainly derived from my sister, Mary Carpenter; than whom no one can speak with a greater weight of authority.

Of course it will be replied by the Automatist, that all such "training" is part of the external influences which go to the formation of the Character; and that its efficacy depends upon the degree in which the sense of Duty can be thus developed by judicious culture into efficient predominance. But I affirm it to be a matter of notorious experience, that it is the reiteration of the assurance that the Child or Juvenile offender *can* govern his temper, if he will try hard enough; that he *can* overcome a difficulty, if he will summon courage to make a vigorous effort; that he *can* choose and act upon the right, in spite of strong temptation to do wrong, by *determinately keeping before his mind* the motives and sanctions of duty,—which constitutes the most effectual means of calling forth that power of "Self-control," which the most enlightened Writers of antiquity, and the most successful of modern Educators, concur in regarding as the most valuable result alike of Moral and of Intellectual discipline.—To the consistent Automatist, who denies the existence in the Ego of any self-determining power, and who puts his whole trust in the Motives brought to bear from without, it seems to me that the word *try* can really have no more meaning than the word *choice*.

2. That the self-consciousness of Freedom involved in the very idea of *choice* is not illusory, is further indicated by the universal existence of a *Moral Consciousness* absolutely inconsistent with the notion of Automatism. The conception of Freedom, as Mr. Sidgwick remarks (Op. cit. p. 50), "is, so to say, the pivot upon which our Moral sentiments naturally play." Our feelings of approval and disapproval in regard to Human conduct, are of an order quite different from those we entertain in regard to any kind of Mechanical action. I have no moral approbation for a chronometer whose perfect time-keeping gives the true place of a ship at sea, or the true longitude of a transit-station; such as I have for the maker of that chronometer, whom I know to have put forth his utmost skill in its construction, careless of advantage to himself,

but thinking only of the human lives he helps to save, or the accuracy of the scientific researches in which he thus bears an honourable part. Nor have I any moral disapproval for a watch whose stopping or bad-going causes me to incur serious detriment by missing a railway-train; such as I have for the workman whose carelessness in putting that watch together proves to be the occasion of my misfortune. Yet, upon the Automatist theory, neither of these Human agents could *help* doing exactly what he did; and I am therefore alike unreasonable in blaming the man who has caused me injury, and in commending the man who has done good service. So, again, our feelings, in regard to the actions of brutes, or of human beings whose brute condition seems to justify us in considering them as Automata (§ 8), are very different from those with which we view the like actions of men whom we regard as possessing a self-regulating power.* We should never think of blaming a wasp for stinging us, or a poisonous snake for biting us; neither do we esteem a bee deserving of credit for its industry in laying up honey for our use, or deem the silkworm an object of gratitude for the toilsome ingenuity with which it spins the cocoon whose thread furnishes the material of our most beautiful fabrics;—each of these creatures

* See the “*Psychologie Naturelle*” of M. Prosper Despine; in which the mental mechanism of Crime is studied from nature, under the guidance of views as to the relation between the Automatism of Man's nature and the controlling power of the Will, which essentially correspond with those set forth in the present work. A large proportion of Criminal offenders, according to M. Despine, are so devoid of Moral Sense, that they must be accounted “moral idiots;” and in many more, that sense is temporarily overborne by a passion which the subject of it has never been trained to control.

doing that which it is its "nature" to do, and having no power to do otherwise. We make the like allowance for young children, or even for "children of a larger growth" (§ 337), in whom the moral sense and the power of self-control have not yet been developed; as we do also for the Insane, who are either deficient in the power of self-direction, or whose will is overborne by some uncontrollable impulse (§ 557). We hold them "not responsible" for any injury they may do us; and justify the discipline to which we subject them, as alike needful for the welfare of society at large, and likely to be beneficial to themselves. But we view in a very different light the acts of simple recklessness, still more those of deliberate selfishness, and yet more again those of treacherous and unmanly brutality, that are committed by men who knowing better have preferred the worse; acting on the suggestions of slothful folly, or the cool calculations of self-interest, or the fierce impulses of malignant passion, without regard to the sufferings which their misdeeds may bring upon others.

When, for example, a man throws down stones from a house-top without looking to see who is below, or fires a pistol in a crowded thoroughfare without care as to who may be in the line of the bullet, not only does the law regard him as fully "responsible" for any injury that may be caused by his act (holding him guilty of murder if death ensues), but public feeling sanctions the infliction of severe punishment, although he had not *intended* to do harm to anyone; and this because he *could have helped* doing what he did, and must have *wilfully shut his eyes* to its possible or probable consequences.—So, when a man deliberately plans to blow up a house or a ship, at the sacrifice of scores or (it may be) of hundreds of human lives, for the sake of gaining a few scores or hundreds of pounds by a fraudulent policy of nsurance, the primary instincts of humanity would protest against

his being punished with a view merely to the prevention of similar crimes and to his own reformation, and everyone feels that he "richly deserves" the heaviest penalty of the law.*—And we have no terms of reprobation strong enough for the cowardly ferocity of a Nana Sahib; who gratified his hatred of the British to whom he had previously professed to be a friend, by the brutal murder of the defenceless women and children who had trusted themselves to his protection; and who, if he had been taken "red-hand," would assuredly have been deemed by the world in general a fitting object of "retributive justice."

But, as has been pithily remarked, if vice and virtue are products like sugar and vitriol, the laws of whose production Science may be expected to discover, "it will be as "irrational to feel indignation at base and cowardly actions, as "it would be to feel angry about the chemical affinities." And the like may be said of the irrationality, on the Automatist hypothesis, of the moral approval we feel for acts of noble self-sacrifice;—such as that of the steersman of the burning ship, who held his place at the wheel, so as to run the ship towards shore, though the fire beneath was roasting the soles of his feet;—or that of the handful of brave men who blew open the gate of Delhi, the stronghold of the Indian mutineers, in the face of what seemed certain annihilation;—or that of the six hundred soldiers who kept their stations on the deck of the sinking *Birkenhead*, while the women and children were being lowered into the boats. Could we entertain that feeling, if we really believed the men whose deeds and sufferings we hold among our most precious memories, to be nothing more than well-regulated machines?

* I here allude not merely to the recent Bremerhaven explosion, but to a case in which the blowing up of a pile of building that contained two hundred people, was attempted in Glasgow, fortunately without success, when I was studying in Edinburgh about forty years since.

One of the most admirable sayings of Fred. W. Robertson has always seemed to me to be his reply to the remonstrance addressed to him by one of his churchwardens, as to the displeasing effect of the outspokenness of his preaching upon some of the principal supporters of his church. "I don't care," he said; meaning, of course, "I must preach as my own sense of duty prompts me."—"You know what 'don't care' came to?" said the remonstrator.—"Yes, sir," replied Robertson, "it came to Calvary." That the sympathetic thrill which every true Christian disciple must feel when he realises the full force of these pregnant words, is the illusion of an unenlightened nature, which the revelations of Science will dispel by proving their utterer to have been an Automaton whose choice between duty and self-interest was determined solely by "circumstances," may be the conclusion of the unimpassioned closet-philosopher; but the experience of all who, like Robertson, make the sublimest of all acts of self-sacrifice the rule and guide of their own lives, recognises in such sacrifice a Moral power far transcending in probative value any logical deduction of the Intellect.

3. I find the embodiment of that Moral consciousness in all Language and Literature; for whatever may be the judgment of Ethical philosophers as to the nature and source of the fundamental distinction between *right* and *wrong*, and whatever may be the direction given to that notion by the *Nómos* by which the judgment of each individual is shaped as to *what* is right and *what* is wrong (§ 292), the sense in which these terms are universally accepted is based on the

idea of a *self-determining* capability to *do* the right and to *avoid* the wrong.* This seems to me perfectly clear, when we compare this acceptation with the sense we attach to the very same words when applied (figuratively) to a piece of pure Mechanism. If I say that my watch goes "right," I do not assign to it any moral credit, but merely mean that it keeps time well. And if I say that it goes "wrong," I do not speak of it as an object of blame, but merely mean that it wants regulating.

If the "wrong" movement of the self-acting points of a Railway gives such a direction to the train which passes over them as causes a terrible sacrifice of life, we do not imply by our use of the word the moral criminality with which we charge a pointsman whose drunken carelessness has brought about a similar calamity. The machine *could not* help acting as it did; we assume that the pointsman *could*. If the machine proves to have been ill-constructed, or to have got out of order by neglect, we blame the man

* It is not a little instructive to find the Moral Intuitions of men like Prof. Clifford rising up to assert themselves against their Philosophy. In his Lecture on "Right and Wrong" (*Fortnightly Review*, Dec., 1875), it is distinctly affirmed not only that there is a Moral Sense or Conscience, which is "the whole aggregate of our feelings about right or wrong, regarded as tending to make us do the right actions and avoid the wrong ones," but, that there are feelings of moral approval and disapproval which imply "choice;" that "a particular motive is made to prevail by the fixing the attention upon that class of remembered things which calls up the motive," and that in so far as this act of directing the attention is voluntary, "I am responsible because I made the choice;" and that "within certain limits I am responsible for what I am now, because within certain limits I have made myself." In all this he seems to me implicitly to recognize that direction of Bodily action by the Mind of the Ego, which in his previous Lecture he distinctly denied (p. xxi.); and, whilst still upholding the principle of Uniformity of Sequence, to surrender all that essentially constitutes Automatism.

whom we believe to have been in fault; but if its working was deranged by a snow-storm of unprecedented violence, we cannot say that any one is chargeable with moral "wrong." So, if the pointsman can excuse himself by showing that he had been on duty for eight-and-forty hours continuously, and did not know what he was about, we shift the blame on the Directors who wrongly overtaxed his brain; whilst, if it turns out that his inattention was due, neither to drunkenness nor to over-fatigue, but to sudden illness, we cannot say that any one was in fault. But, on the Automatism theory, the pointsman could no more help getting drunk, than, when drunk, he could help neglecting his work; and the railway-directors could no more help keeping the pointsman on duty for forty-eight hours, than he could help the bewilderment which was caused by this overstrain of his powers. And, neither the drunken pointsman nor the reckless directors were any more morally responsible for the loss of life, in the one case, than were the self-acting points in the other: each being a machine whose movements were determined by the law of its construction and the conditions in which it was placed; and the term "wrong," as applied to the action of the man, having no other meaning than it has when applied to the working of the self-acting points.—The Moral Consciousness of Mankind protests against such an identification.

So, again, I am unable to attach any definite import to such words as ἐγκράτεια, σωφροσύνη, continentia, or temperantia, —to see any meaning in the ancient proverb that "he that is "slow to anger is better than the mighty, and he that ruleth

“his spirit than he that taketh a city,”—or to feel any admiration for the hero who “has gained that greatest of all victories, “the victory over himself,” if the course of action results from no other agency than either physical or mental Automatism, and no independent power be put forth by the Ego in determining it. And if I felt obliged to accept that doctrine as scientific truth, I should look to its honest and consistent application to the training of the young as the greatest of social calamities. For I can imagine nothing more paralyzing to every virtuous effort, more withering to every noble aspiration, than that our children should be brought up in the belief that their characters are entirely formed *for* them by “heredity” and “environments”; that they *must* do whatever their respective characters impel them to do; that they have no other power of resisting temptations to evil, than such as may spontaneously arise from the knowledge they have acquired of what they ought or ought not to do; that if this motive proves too weak, they can do nothing *of themselves* to intensify and strengthen it; that the notion of “summoning their resolution,” or “bracing themselves “for the conflict,” is altogether a delusion; that, in fine, they are in the position of a man who is floating downstream in a boat without oars, towards a dangerous cataract, and can only be rescued by the interposition of some *Deus ex machinâ*.—How the perception of this, as the logical outcome of the doctrine of Automatism, weighed “like an incubus” upon the spirit of John Stuart Mill, when he first fully awoke to it, he has himself told us in his Autobiography (p. 169). “I felt,” he says, “as if I was scientifically proved

“ to be the helpless slave of antecedent circumstances ; as
“ if my character and that of all others had been formed for
“ us by agencies beyond our control, and was wholly out of
“ our own power.” And it is not a little curious that, while
continuing to advocate as scientific truth the determination
of human conduct by the formed character of each indi-
vidual, and while excluding any interference, at the final
stage, with the strict sequence of cause and effect, he impli-
cantly admitted the independence or unconditioned agency of
the Ego in the formation of his character. “ I saw,” he
says, “ that though our character is formed by circumstances,
“ our own desires can do much to shape those circum-
“ stances ; and that what is really inspiring and ennobling
“ in the doctrine of Freewill, is the conviction that *we have*
“ *real power over the formation of our own character* ; that our
“ will, by influencing some of our circumstances, can modify
“ our future habits and capacities of willing.” I can attach no
other meaning to this remarkable passage (the teaching of
which is more fully developed in chap. i. of Book VI. of the
“ System of Logic”); than that it recognises a factor in the
formation of our characters, which is something else than
“ heredity *plus* environments.” For I can scarcely suppose
J. S. Mill not to have seen that if a man’s desires are them-
selves the results of antecedent “ circumstances,” the incu-
bus of hopeless slavery to those circumstances can no more
be removed by any desires for self-improvement which *ex*
hypothesi arise out of them, than a weight which bears down
on a man’s shoulders can be lifted off by its own pressure.
And any one who reads in De Quincey’s “ Confessions ” the

graphic narrative of his miserable experiences from the abuse of opium (§ 543), will see how ineffectual are the strongest *desires*, without the *will* to carry them into effect.

4. It may be confidently stated as a result of universal experience, that our "capacity of willing," that is, of giving a preponderance to the motive on which we elect to act, depends, *first*, upon our conviction that we really have such a self-determining power, and, *secondly*, upon our habitual exercise of it. The case which is unfortunately but too common, of a man who habitually gives way to the desire for Alcoholic excitement, and is ruining himself and his family by his self-abandonment, will bring into distinct view the practical bearing of the antagonistic doctrines.

The Automatism of his nature (purely physical so far as the bodily craving for Alcohol is concerned, § 155, but including, in most cases, some play of social instincts) furnishes an aggregate of powerful attractions to the present gratification. On the other side is an aggregate of Moral deterrents, which, when the Attention is fixed upon them in the absence of the attractive object, have a decided preponderance, so far as the *desires* are concerned. The slave of intemperance is often ready to cry out, "O wretched man that I am, who shall deliver me from the body of this death?"—and he proves his sincerity by his readiness to take every indirect precaution that does not interfere with his personal liberty. But when the temptation recurs, the force of the attraction is intensified by its actual presence; the direct sensory presentation makes a

more vivid impression than the ideal representation of the deterrent motives; and the balance, which previously turned against the indulgence, now preponderates in favour of it. What, then, is it within the power of the Ego to do? On the Automatist theory, *nothing*. For not only is he unable to call to his aid any motive which does not spontaneously arise, but he cannot make any alteration in the relative strength of the motives which are actually present to his consciousness. He says, to himself and to others, "I could "not help yielding"; and Automatism sanctions the plea. Society may be justified in imposing on him either restraint or punishment, alike for its own security and for his welfare; but no consistent Automatist can regard him as an object of the *moral reprobation* which we instinctively feel for the self-degraded sot; and experience shows that the system of external repression almost invariably loses its potency as a deterrent, as soon as the restraining influence is withdrawn.

Now, although I hold it beyond question that a state *may* be induced by habitual Alcoholic indulgence, in which the unhappy subject of it loses all power of resistance (§§ 544-547), I affirm it to be "the normal experience of healthy "men," that the ordinary toper *has* such a power in the earlier stages of his decadence, and that he is justly held culpable for not exerting it. This power is exercised in the determinate fixation of the Ego's attention on the deterrent motives which he knows *ought* to prevail, and in the determinate withdrawal of his mental vision from the attraction which he knows *ought not* to prevail; so that the intensification of the former, and the weakening of the latter give to the

claims of duty a preponderating force in the regulation of the conduct. The deliverance of the universal experience of Mankind upon this point, seems to me to take a rank equal to that of our common-sense decision in regard to the reality of an external world (§ 5). And it is confirmed by the superior efficacy of our appeal to the better nature of the individual we are endeavouring to rescue, when this is backed by the assurance that he *has* the power of escape from the enslavement which he feels to be gradually closing in upon him, if he will but resolutely exert it. We say to him:—
“ You *can* conquer, if you *will*. And it rests with *yourself*
“ to will. You have every possible motive of the highest
“ kind on the one side, and nothing but the attraction of a
“ selfish indulgence on the other. Be a man, and not a
“ beast. Exert the power which you know and feel your-
“ yourself to possess; keep your thoughts and affections
“ steadily fixed upon the right; avoid the first step in the
“ downward path; and when the moment of unexpected
“ temptation comes, make a vigorous effort, determine to
“ succeed, and you will come off victorious. And when you
“ have once done so, you will feel a more assured conviction
“ that you *can* do so again; each victory will make the next
“ easier to you; and, by steady perseverance, you will re-
“ acquire that power of self-direction which will enable you
“ to keep straight without an effort.”—I appeal to the ex-
perience of such as have had to deal with these sad cases, whether this is not the more effective method.

Whatever allowances Society may be ready to make for individual cases—such, for instance, as that of Hartley

Coleridge, who was the victim of a strong hereditary predisposition, accompanied by a constitutional weakness of will,—it recognizes as a fixed conviction, and consistently acts upon that conviction, that the incipient drunkard *has* a power over himself; that *he can not only abstain if he chooses*, but that *he can choose to abstain* because he knows that he *ought* to do so; and that when, by voluntarily giving way to his propensity, he brings himself into a condition in which he is no more responsible for his actions than a Lunatic, he is not thereby exempted from the penalty that may attach to them, but must be held responsible for having knowingly and deliberately brought himself into the condition of irresponsibility. On the Automatist theory, a drunkard who deserts a comfortable home for the tap-room (I make large allowance for those who have *uncomfortable* homes), who neglects an attached wife and loving children for the society of profligates, and who, with ample means of higher enjoyment, surrenders himself without a struggle to the allurements of sensual pleasure, and at last renders himself amenable to the law by fatal outrage on the patient wife who has long borne with his brutality, is no more a subject of moral reprobation than poor Hartley Coleridge; who, when he strayed from the loving care of his friends, would be found in the parlour of some rural public-house, delighting the rustics with his wonderful stories, and indulging to his heart's content in the unlimited beer which the publican was only too glad to allow him. When, on the other hand, the subject of a strong hereditary Alcoholic craving maintains a daily conflict with his tempter, uses

every means he can think of to avoid or weaken its seductions, puts forth all his energy in resisting them, and, through occasional failures, comes off on the whole victorious, the consistent Automatist can have no other approbation to bestow upon him, than that which he would accord to a self-governing steam-engine, or a compensation-balance watch.

5. Further, the existence of the ideas currently attached to the words *duty* and *responsibility*, is an evidence of the acceptance by Mankind at large, of the belief that every normally-constituted individual has a power of *choice* and *self-regulation*,—"ought" necessarily implying "can." And this evidence is not invalidated by the discrepancy which must always exist between *legal* and *moral* responsibility. For the Law, looking mainly to the protection of Society, necessarily deals rather with acts than with motives; and punishments must often be inflicted with a deterrent view, which we may not regard the criminal as having morally deserved.

Thus, in the rescue of the Fenian conspirators at Manchester, the men who made the attack on the prison-van which involved the death of police-sergeant Brett, were doubtless animated by what they deemed noble and patriotic motives. They had no ill-will towards Brett individually; but, as the Judge laid it down in his charge to the Grand Jury, they were all guilty of murder, as being concerned in the common design of using dangerous violence towards any police who might resist their efforts in procuring the rescue of the prisoners. The man Allen, who fired the fatal shot, seems to have done so in the full knowledge that the sacrifice of his own life would be the consequence:—"I will free you, Colonel," he is reported to have said, "if I swing for it." If the same thing had been done to rescue an

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escaped slave, or to re-take a ship captured by pirates or mutineers, or by an enemy in war, it would have been accounted a glorious act of heroism. But it can scarcely be doubted that the infliction of capital punishment on the ringleaders in this outrage, was necessary to maintain the supremacy of Law and Order.—The same may be said of the execution of Orsini for his attempt on the life of the Emperor Louis Napoleon. Orsini, it is now well known, was simply the instrument of the Carbonari Society to which the Emperor had belonged in the earlier part of his life, for inflicting the condign punishment decreed by its laws, as the penalty incurred by any of its members who failed to do everything in his power for the liberation of Italy. The Emperor, having been formally tried and condemned for his inaction, was decreed worthy of death, according to the oath which he had himself taken; and lots were cast to select the individual who should be charged with the execution of the sentence. The lot fell upon Orsini, who was summoned from Birmingham for the purpose; and the summons was one (as he hinted to his friends there) which he felt that he must obey, though at the risk of his own life. It is clear that the Emperor felt no personal ill-will against him, and regarded his execution as a political necessity; the publication in the *Moniteur* of the will in which Orsini bequeathed to the Emperor the liberation of Italy and the charge of his children, being understood at the time by well-informed politicians as an acceptance, on the Emperor's part, of both legacies, of which acceptance the liberation of Italy has been the direct or indirect consequence. It is difficult to see in what respect Orsini's act of self-sacrifice, under what we may deem a mistaken sense of duty, was less noble than that of other patriots whom the world holds in honour.

Omniscience alone can rightly assign the *moral* responsibility of each individual for his several acts; the degree of that responsibility being determined (as in the cases cited under the last head) by the proportion which his Will or self-regulating power bears to the strength of the dominant motives by which he is urged in each case. This ratio, as already shown, will be a "general resultant" of the whole previous course of life; every exercise of the Will increasing its vigour and controlling efficiency, while every weak con-

cession to a dominant passion tends to make the individual its slave. And thus a man (or woman) may come at last so far to have lost the power of self-control, as to be unable to resist a temptation to what is known to be wrong, and to be therefore morally irresponsible for the particular act; but such an individual, like the drunkard in the commission of violence, is *responsible for his irresponsibility*, because he has wilfully abnegated his power of self-control, by habitually yielding to temptations which he knows that he ought to have resisted.

The Moral judgments which *we* form of the actions of other men, are necessarily as imperfect as our predictions of their conduct; since no one can fully estimate the relative potency of heredity and environments, on the one side, and of the sense of duty and capacity of willing, on the other: and the consciousness of our own weakness in resisting the temptations which we feel most attractive to ourselves, should lead us to make large allowance for the frailties and shortcomings of others. There are too many, who, as old Butler pithily said,

“Compound for sins they are inclined to,
“By damning those they have no mind to.”

Kindly allowance for the offender (“considering thyself, lest thou also be tempted”) is perfectly consistent with reprobation of the offence. And thus the “charity” which “beareth all things, believeth all things, hopeth all things, endureth all things,” is in strict accordance with the results of Psychological enquiry into the influences

which form the character and determine the relative potency of motives.

It seems to me (as to Mr. Sidgwick, *Op. cit.*, p. 50) quite clear that on the Automatist or Determinist theory, such words as "ought," "duty," "responsibility," have to be used, if used at all, in new significations. The welfare of that aggregate of Automata which we call Society, may require that every individual automaton shall be prevented from doing what is injurious to it; and punishment for offences actually committed may be reasonably inflicted as a deterrent from the repetition of such offences by the individual or by others. But if the individual has *in himself* no power either to do the right or to avoid the wrong, and if the potency of that aggregate of feelings about actions as being "right or wrong" which is termed Conscience, entirely depends upon "circumstances" over which he neither has, or ever has had any control, I fail to see in what other sense he should be held "responsible" for doing what he knows that he "ought not" to have done, or for not doing what he knows that he "ought" to have done, than a Steam-engine, which breaks away from its "governor" in consequence of a sudden increase of steam-pressure, or which comes to a stop through the bursting of its steam-pipe, can be accounted responsible for the damage thence arising.

The idea of "responsibility," on the other hand, which is entertained by Mankind at large, rests upon the assumption, not only that each Ego has a Conscience which recognises a distinction between right and wrong, and which (accord-

ing to the training it has received) decides *what* is right and *what* is wrong in each individual case, but also that he has a Volitional power which enables him to intensify his sense of "duty" by fixing his attention upon it, and thus gives it a potency in determining his conduct which it might not have otherwise possessed. That this power is a part of the Ego's "formed character," and that it can only be exerted within certain limits, is fully admitted on the doctrine I advocate; but the responsibility of the Ego is shifted backwards to the share he has had in the formation of his character and in the determination of those limits. And here, again, the results of Scientific investigation are in complete harmony with the precepts of the greatest of all Religious Teachers. For no one can study these with care, without perceiving that Jesus and Paul addressed themselves rather to the formation of the Character than to the laying down rules for Conduct; that they endeavoured rather to cultivate the dispositions which should lead to right action, than to fix rigid lines of duty, the enforcement of which under other circumstances might be not only unsuitable but actually mischievous; and that they not only most fully recognised the power of each individual to direct the habitual course of his thoughts, to cherish his nobler affections, and to repress his sensual inclinations, but made the possession of that power the basis of the entire system of Christian Morality.

That system has been found to harmonize with the experience of the best and wisest of our race; which has proved its capability of strengthening every virtuous effort, of

giving force to every noble aspiration, of aiding the resistance to the allurements of self-interest, and of keeping at bay the stronger temptations of vicious indulgence. The tendency of the Automatist philosophy, on the other hand, which represents Man as nothing but "a part of the great series of causes and effects, which, in unbroken continuity, composes that which is, and has been, and shall be—the sum of existence,"* seems to me to be no less certainly towards the discouragement of all *determinate effort*, either for individual self-improvement, or for the general welfare of the race. For though it fully recognizes, as factors in Human action, the most elevated as well as the most degraded classes of motives, and gives all the encouragement to the culture of the one and to the repression of the other that faith in the Uniformity of Causation can afford, yet by refusing to the Ego any capability of *himself* modifying the potency of those factors, it dries up the source of that sense of independence which springs from the conviction that Man's "volition counts for something as a condition in the course of events," and leaves him a mere instrument in the hands of an inexorable Fate.

To myself it seems as if nothing was wanting either in my own Self-consciousness, or in what I know of the conscious experiences of other men, to establish the existence of the "self-determining power" for which I contend. I cannot conceive of any kind of evidence of its existence more cogent than that which I already possess. And feeling assured that the sources of my belief in it lie deep down

* Prof. Huxley in "Fortnightly Review," Nov. 1874, p. 577.

in the nature of every normally-constituted Human being, I cannot anticipate the time when that belief will be eliminated from the thought of Mankind;—when the words “ought,” “duty,” “responsibility,” “choice,” “self-control,” and the like, will cease to have the meaning we at present attach to them;—and when we shall really treat each other as Automata who cannot help doing whatever our “heredity” and “environments” necessitate.

UNIVERSITY OF LONDON,

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BOOK I.

GENERAL PHYSIOLOGY.

CHAPTER I.

OF THE GENERAL RELATIONS BETWEEN MIND AND BODY.

1. THE Conscious Life of every individual Man essentially consists in an action and reaction between his Mind and all that is outside it,—the *Ego* and the *Non-Ego*. But this action and re-action cannot take place, in his present stage of existence, without the intervention of a Material Instrument; whose function it is to bridge over the *hiatus* between the individual Consciousness and the External World, and thus to bring them into mutual communication. And it is the object of this Treatise to take up and extend the inquiry into the action of Body upon Mind, as well as of Mind upon Body, on the basis of our existing knowledge; so as to elucidate, as far as may be at present possible, the working of that Physiological Mechanism which takes a most important share in our Psychological operations; and thus to distinguish what may be called the *automatic* activity of the Mind, from that which is under *volitional* direction and control.—This inquiry has been started more than once, but has not until recently been systematically prosecuted. “There is one view of the connection between Mind and Matter,” says Prof. Dugald Stewart, “which is perfectly agreeable to the just rules of philosophy. The object of this is, to ascertain the laws which regulate their union, without attempt-

ing to explain in what manner they are united. Lord Bacon was, I believe, the first who gave a distinct idea of this kind of speculation ; and I do not know that much progress has yet been made in it." Considering his own province, however, to be purely Metaphysical, the eminent Professor just quoted gave no further attention to the subject ; and those who have more recently taken it up, having for the most part been Physiologists and Physicians, rather than professed Psychologists, have been too often looked upon by the latter as opponents rather than as allies. But so long as either the Mental or the Bodily part of Man's nature is studied *to the exclusion* of the other, it seems to the Writer that no real progress can be made in Psychological Science ; for that which "God hath joined together," it must be vain for Man to try to "put asunder."

2. To the prevalent neglect of the study of the *mutual relations* of Mind and Body, may be traced many of the fallacies discernible in the arguments adduced on each side, in the oft-repeated controversies between the advocates of the *Materialistic* and the *Spiritualistic* hypotheses ;—controversies in themselves almost as absurd as that mortal contest, which (as fable tells us) was once carried on by two knights respecting the material of a shield seen by them from opposite sides, the one maintaining it to be made of gold, the other of silver, and each proving to be in the right as regarded the half seen by himself. Now the Moral of this fable, as respects our present inquiry, is, that as the entire shield was really made-up of a gold-half and a silver-half *which joined each other midway*, so the Mind and the Brain, notwithstanding those differences in *properties* which place them in different philosophical categories, are so intimately blended in their *actions*, that more valuable information is to be gained by seeking for it at the points of contact, than can be obtained by the prosecution of those older methods of research, in which the Mind has been studied by Metaphysicians altogether without reference to its material instrument,

whilst the Brain has been dissected by Anatomists and analyzed by Chemists, as if they expected to map-out the course of Thought, or to weigh or measure the intensity of Emotion. The Psychologist who looks at his subject in the light of that more advanced Philosophy of the present day, which regards Matter merely as the vehicle of Force, has no difficulty in seeing where both sets of disputants were right and both wrong ; and, laying the foundations of his Science broad and deep in the *whole* constitution of the individual Man and his relations to the Universe external to him, aims to build it up with the materials furnished by experience of every kind, Mental and Bodily, normal and abnormal,—ignoring no fact, however strange, that can be attested by valid evidence, and accepting none, however authoritatively sanctioned, that will not stand the test of thorough scrutiny.

3. Although few (if any) Philosophers would be disposed to question that the Brain is the instrument of our higher Psychical powers, the ideas which are entertained of the nature of this instrumentality have been seldom clearly or consistently defined. Some, who have attended exclusively to the close relationship which indubitably exists between Corporeal and Mental states, have thought that *all* the operations of the Mind are but manifestations or expressions of material changes in the Brain :—that thus Man is but a *thinking machine*, his conduct being entirely determined by his original constitution, modified by subsequent conditions over which he has no control, and his fancied power of self-direction being altogether a delusion ;—and hence that notions of *duty* or *responsibility* have no real foundation, Man's character being formed *for* him, and not *by* him, and his mode of action in each individual case being simply the consequence of the reaction of his Brain upon the impressions which called it into play. On this creed, what is commonly termed Criminality is but one form of Insanity, and ought to be treated as such ; Insanity itself is nothing else than a disordered action of the Brain ; and the

highest elevation of Man's *psychical* nature is to be attained by due attention to all the conditions which favour his *physical* development.

The most thorough-going expression of this doctrine will be found in the "Letters on the Laws of Man's Nature and Development," by Henry G. Atkinson and Harriet Martineau. A few extracts will suffice to show the character of this system of Philosophy. "Instinct, passion, thought, &c., are effects of organized substances." "All causes are material causes." "In material conditions I find the origin of all religions, all philosophies, all opinions, all virtues, all 'spiritual conditions and influences,' in the same manner that I find the origin of all diseases and of all insanities in material conditions and causes." "I am what I am; a creature of necessity; I claim neither merit nor demerit." "I feel that I am as completely the result of my nature, and impelled to do what I do, as the needle to point to the north, or the puppet to move according as the string is pulled." "I cannot alter my will, or be other than what I am, and cannot deserve either reward or punishment."

It seems to the Writer that every system of Philosophy which regards the succession of Mental Phenomena as determined *solely* by the ordinary laws of Physical Causation, and which rejects the *self-determining* power of the Will (or, which is the same thing, regards the Will as only another expression for the *preponderance of Motives*, or as the *general resultant* of the action of the Physiological Mechanism), virtually leads to the same conclusion.

4. Now this honestly-expressed *Materialistic* doctrine recognises certain great facts, as to which the unprejudiced and observant Physiologist can entertain no doubt; notwithstanding that their validity may be denied by those who have had comparatively little opportunity of studying them, or who have so made up their minds to a foregone conclusion, as to be ready to admit nothing which is not in accordance with it. The whole series of phenomena which so plainly mark the influence of the Body on the Mind, of *physical* upon *psychical* states,—the obvious dependence of the

normal activity of the Mind upon the healthful nutrition of the Brain, and upon its due supply of Oxygenated Blood,—the effect of Intoxicating agents and of Morbid Poisons in perverting that activity, and especially in withdrawing the “ Mechanism of Thought and Feeling ” from Volitional control,—the remarkable influence of local affections of the Brain, traceable in some cases to defective supply of blood, in others to blows on the head, in producing strange disturbances of Memory,—the large share which certain states of bodily disorder on the part of Parents, or conditions tending to induce defective nutrition during the periods of Infancy and Childhood, have been proved to possess in the induction of Idiocy and Cretinism,—the distinct Hereditary Transmission of *acquired habits*, which, modifying the Bodily constitution of the Parent, repeat themselves in that which he communicates to his Offspring,—these and numerous other phenomena (hereafter to be considered) might be cited in support of the Materialistic doctrine, and *must* be taken account of by any one who would seek the solution of this mystery.

5. But these phenomena are not to be looked-at to the exclusion of the facts of our own internal Consciousness. In reducing the Thinking Man to the level of “ a puppet that moves according as its strings are pulled,” the Materialistic Philosopher places himself in complete antagonism to the positive conviction, which—like that of the existence of an External World—is felt by every right-minded Man who does not trouble himself by speculating upon the matter, that *he really does possess a self-determining power*, which can rise above all the promptings of Suggestion, and can, *within certain limits* (§ 25), mould external circumstances to its own requirements, instead of being completely subjugated by them.

The Writer entirely agrees with Archbishop Manning, in maintaining that we have exactly the same evidence of the existence of this *self-determining power within ourselves*, that we have of the

existence of a material world outside ourselves. For however intimate may be the functional correlation between Mind and Brain (§§ 11, 12),—and Archbishop Manning seems disposed to go as far as the Writer in recognizing this intimacy —“there is still another faculty, and more than this, another Agent, distinct from the thinking brain.” * * * “That we are conscious of Thought and Will, is a fact of our internal experience. It is a fact also of the universal experience of all men; this is an immediate and intuitive truth of absolute certainty. Dr. Carpenter lays down as an axiomatic truth ‘that the Common-sense decision of Mankind, in regard to the existence of an External World, is practically worth more than all the arguments of all the logicians who have discussed the basis of our belief in it.’ What is true in this case of a judgment formed upon the report of Sense, by the interpretation of the Intellect, is still more evidently true of the decisions of our Consciousness on such interior facts as Thought or Will, and of the existence of an Internal World which is our living Personality, the Agent who thinks and wills. I may therefore lay it down as another axiom, side by side with that of Dr. Carpenter, that the decision of Mankind, derived from consciousness of the existence of our living self or personality, whereby we think, will, or act, is practically worth more than all the arguments of all the logicians who have discussed the basis of our belief in it.” (*Contemporary Review*, Feb. 1871, p. 469.)

We can scarcely desire a better proof that our possession of this power is a reality and not a self-delusion, than is afforded by the comparison of the *normal* condition of the Mind with those various *abnormal* conditions hereafter to be described (Chaps. XIV.—XVI.), in which the directing power of the Will is in abeyance. For the “subjects” of these conditions may *really* be considered (so long as they remain in them) as mere thinking Automata, puppets pulled by directing-strings; their whole course of thought and of action being determined by Suggestions conveyed from without, and their own Will having no power to modify or direct this, owing to the temporary suspension of its influence.—To whatever extent, then, we may be ready to admit the dependence of our Mental

operations upon the organization and functional activity of our Nervous System, we must also admit that there is *something beyond and above* all this, to which, in the fully-developed and self-regulating Intellect, that activity is subordinated: whilst, in rudely trampling on the noblest conceptions of our Moral Nature as mere delusions, the purely Materialistic hypothesis is so thoroughly repugnant to the intuitive convictions of Mankind in general, that those who really experience these are made to *feel* its fallacy, with a certainty that renders logical proof unnecessary.

6. Let us turn now to the opposite doctrine held by *Spiritualists* * in regard to the nature and source of Mental phenomena; and consider this in its Physiological relations. To them the Mind appears in the light of a separate Immaterial existence, mysteriously connected, indeed, with a Bodily instrument, but not dependent upon this in any other way for the conditions of its operation, than as deriving its knowledge of external things through its Organs of Sense, and as making use of it to execute its determinations—so far as these are accomplished by Muscular effort. On this hypothesis, the operations of the Mind itself, having no dependence whatever on those of Matter, are never themselves affected by conditions of the Bodily organism; whose irregularities or defects of activity only pervert or obscure the outward manifestations of the Mind, just as the light of the brightest lamp may be dimmed or distorted by passing through a bad medium: while, further, as the Mind is thus independent of its Material tenement, and of the circumstances in which this may chance to be placed, but is endowed with a complete power of Self-government, it is responsible for *all* its actions, which must be judged-of by certain fixed standards.

7. Now this doctrine fully recognizes all that is ignored in the preceding; but, on the other hand, it ignores all that *it* recognized

* This term is here used in its older or Philosophical sense; not as designating *modern* "Spiritualists" (or rather "Spirit-rappers"), who have little in common with those whose name they have adopted.

and served to account for ; and is not less opposed to facts of most familiar experience. For in placing the Mind altogether *outside* the Body, and in denying that its action is ever disordered by Bodily conditions, the Spiritualist puts us in the dilemma of either rejecting the plainest evidence, or of admitting that, after all, we know nothing of the nature of the Mind itself ; all that we *do* know, being that lower part of our Mental nature which operates on the Body, and is in its turn affected through it.—Those who would fully and consistently carry out this doctrine, are driven to maintain that even in the state of Intoxication there is no truly *mental* perversion ; and that, in spite of appearances, the *mind* of the Lunatic (*divinæ particula auræ*) is perfectly sound, its bodily instrument being alone disordered. But it cannot be overlooked, that in the delirious ravings of Intoxication or of Fever, or in the conversation and actions of the Lunatic, we have precisely the same evidence of *mental* operation, that we have in the sayings and doings of the same individuals in a state of sanity ; and ample testimony to this effect is borne by those who have observed their own mental state during the access of these conditions, and who have described the alteration which took place in the course of their Thoughts, when as yet neither the Sensorial nor the Motor apparatus was in the least perturbed (§ 537). Nothing can be more plain to the unprejudiced observer, than that the introduction of Intoxicating agents into the Blood-circulation really perverts the action of the *Mind* ; disordering the usual sequence of phenomena most purely *psychical*, and occasioning new and strange results which are altogether at variance with those of its normal action. And when once the reality of this influence of Physical conditions upon purely-Mental states is forced upon the Physiologist, he cannot avoid recognizing it as a general fact of our nature ; so that he comes to be impressed by the conviction, that whilst there is something in our Moral constitution beyond and above any agency which can be attributed to Matter, the operations

of the Mind are *in a great degree* determined (in our present state of being) by the Material conditions with which they are so intimately associated.

8. This combination of two distinct agencies in the Mental constitution of each individual, is recognized in the whole theory and practice of Education. For whilst, in its earlier stages, the Educator aims to call-forth and train the Intellectual Faculties of his Pupil, and to form his Moral Character, by bringing appropriate *external* influences to bear upon him, every one who really understands his profession will make it his special object to foster the development, and to promote the right exercise, of that *internal* power, by the exertion of which each Individual becomes the director of his own conduct, and *so far* the arbiter of his own destinies. This power is exercised by the Will, in virtue of its domination over the *automatic* operations of the Mind, as over the *automatic* movements of the Body (§ 14); the real *self-formation* of the Ego commencing with his consciousness of the ability to determine *his own* course of thought and action. Until this self-directing power has been acquired, the Character *is* the resultant of the individual's original constitution, and of the circumstances in which he may have been placed; and so long as the circumstances are unfavourable to its development, and to the operation of those higher tendencies which should furnish the best motives to its exercise, so long the Character of the individual *is* formed *for* him rather than *by* him. A being entirely governed by the lower passions and instincts, whose higher Moral Sense has been repressed from its earliest dawn by the degrading influence of the conditions in which he is placed, who has never learned to exercise any kind of self-restraint (or, if he has learned it, has only been trained to use it for the lowest purposes), who has never heard of a God, of Immortality, or of the worth of his Soul,—such a being, one of those heathen outcasts of whom all our great towns are unhappily but too productive,—can surely be no more morally responsible for his

actions, than the Lunatic who has lost whatever self-control he once possessed, and whose moral sense has been altogether perverted by bodily disorder. But let the former be subjected to the training of one of those benevolent individuals who know how to find out "the holy spot in every child's heart;" let patient kindness, continually appealing to the highest motives which the child *can* understand, progressively raise his Moral standard, and awaken within him the dormant susceptibilities which enable him to feel that he has a Conscience and a Duty, that he has a power within himself of controlling and directing his thoughts and actions, and that the highest happiness is to be found in the determinate pursuit of the *true* and the *good*,—then, but not till then, can he be justly considered *responsible* for his actions, either morally or religiously,—then only does he rise above the level of the brute, and begin to show that he is indeed made in the image of his Creator.

9. Thus we see that the Materialistic and the Spiritualistic doctrines alike recognize, and alike ignore, certain great truths of Human Nature; and the question returns upon us, whether any general expression *can* be framed, which may be in harmony alike with the results of Scientific inquiry into the relation of Mental to Physiological action, and with those simple teachings of our own Consciousness, which must be recognized as affording the ultimate test of the truth of all Psychological doctrines. Towards such an expression we may make a step, as it appears to the Writer, in strict accordance with true Philosophy, by withdrawing ourselves entirely from the futile attempt to bring Matter and Mind into the same category, and by fixing our attention exclusively on the relation between *Mind* and *Force*. Although far from thinking that the views here offered express the *whole* truth, or solve *all* the difficulties of the subject (the *originating power* of the Human Will,—i. e. its independence of Physical Causation,—being the essential difficulty of *every* system

which recognizes it), he ventures to think that they deserve the attention of such as feel, with him, the importance of fearlessly pushing the inquiry to its utmost practicable limits, and of attaining such definite conceptions as the present state of Scientific knowledge may justify.

10. It is now generally admitted that we neither know, nor can know, anything of *Matter*, save through the medium of the impressions it makes on our Senses; and those impressions are only derived from the *Forces* of which *Matter* is the vehicle. Thus, of those most general Properties of *Matter*, *resistance* and *ponderosity*, our information is entirely derived through our own Tactile Sense (under which general head may be combined the Sense of Touch, the Sense of Muscular Exertion, and the Mental Sense of Effort), by which we recognize the *Forces* that attract its particles to each other and to the Earth; and what is ordinarily regarded as its distinctive characteristic, its "extension" or occupation of Space, we know only as an inference from our own Sense-perceptions. In fact, instead of *Matter* (as some affirm) being the object of our immediate cognizance, and the Laws of *Matter* our most certain form of knowledge, there seems valid ground for the assertion that our notion of *Matter* is a conception of the Intellect, *Force* being that externality of which we have the *most* direct—perhaps even the *only* direct—cognizance. And in this way, *Force*—of the existence of which we are rendered cognizant by the direct testimony of our own Consciousness, which is to us the most certain of realities—comes into immediate relation with Mind. Moreover, while *Matter* is essentially *passive*,—since, when left to itself, it always impresses our Consciousness in one and the same mode, any change in that impression being the consequence of an agency external to itself,—all its *Activities* are manifestations of the *Forces* of which it is the vehicle, and to the exercise of which all the phenomena of the Material Universe are due.

Water, for example, would continue unchanged so long as its Temperature remains the same, and no decomposing agency is brought to bear upon it: but Heat communicated to it occasions that repulsion between its particles, which transforms it from a non-elastic liquid into an elastic vapour exerting a proportionate Mechanical Force; and the same measure of Power is again given forth from it, either as Heat or as Motion, with the transformation of the aqueous vapour back to the liquid state.—In like manner, the transmission of a sufficiently strong Electric current through Water resolves it into its two component gases, which, when made to re-unite, give off the equivalent, in the form of Light and Heat, of the Elastic Force which kept their particles asunder, and which was itself more remotely derived from Electricity, developed by Chemical change.

But *Mind*, like *Force*, is essentially *active*; all its states are states of *change*; and of these changes we become directly or immediately conscious by our own experience of them. In fact, every term—as Sensation, Perception, Idea, Emotion,—which expresses a Mental state, is a designation of a phase of Mental existence that intervenes between other phases, in the *continual succession* of which our idea of Mind consists; and Consciousness itself is nothing else than the designation which we give to the condition which is common to all these forms of activity.

11. Now, nothing can be more certain, than that the primary form of Mental activity,—*Sensational* consciousness,—is excited through Physiological instrumentality. A certain Physical impression is made, for example, by the formation of a luminous image upon the Retina of the Eye; a change being thereby produced in that Nervous expansion, which is clearly analogous to that which a similar image would make upon a sensitive Photographic surface. But instead of recording itself by a permanent effect upon the Retinal surface, the effect of this Visual impression is to excite the activity of the Optic Nerve; through the instrumentality of which, again, an active condition is excited in the Optic Ganglion to which it proceeds,—just as, in the transmission of a Telegraphic

message, the movements of the signalling needle at one end of the wire repeat themselves in the movements of the magnetic needle at the other. So far, we are concerned with a Physiological mechanism alone ; through which (probably by Chemical changes in the Nerve-substance) Light excites Nerve-force, and the transmission of this Nerve-force excites the activity of that part of the Brain which is the instrument of our Visual Consciousness. Now in what way the *physical* change thus excited in the Sensorium is translated (so to speak) into that *psychical* change which we call *seeing* the object whose image was formed upon our Retina, we know nothing whatever ; but we are equally ignorant of the way in which Light produces Chemical change, and Chemical change excites Nerve-force. And all we can say is, that there is just as close a succession of sequences—as intimate a causal relation between antecedent and consequent—in the one case, as there is in the other. In other words, there is just the same evidence of what has been termed *Correlation*, between *Nerve-force* and that primary state of Mental activity which we call *Sensation*, that there is between *Light* and *Nerve-force* ;—each antecedent, when the Physiological mechanism is in working order, being invariably followed by its corresponding consequent. And true Visual consciousness of an external object can no more be excited without an active condition of the Sensorium corresponding to it, than that active condition of the Sensorium can be called forth without the transmission of Nerve-force from the Retina ; or than that active condition of the Retina which generates and transmits the Nerve-force, can be produced without Light or some other equivalent Force.*

12. The like Correlation may be shown to exist between Mental states and the form of Nerve-force which calls forth *Motion* through the Muscular apparatus. We shall hereafter see that

* The case of those "Subjective Sensations" which imitate the sensations called up by external objects, will be considered in its proper place (§§ 139—147).

each kind of Mental activity,—Sensational, Instinctive, Emotional, Ideational, and Volitional,—may express itself in Bodily movement ; and it is clear that every such movement is called forth by an active state of a certain part of the Brain, which excites a corresponding activity in the Motor Nerves issuing from it, whereby particular Muscles are called into contraction. No Physiologist can doubt that the Mechanical force exerted by the Muscles is the expression of certain Chemical changes which take place between their own substance and the oxygenated Blood that circulates through them ; or that the Nerve-force which calls forth those changes, is intimately related to Electricity and other Physical forces. But this Nervous activity has its source in molecular changes in the Nerve-centres ; the transmission of Nerve-force along the motor nerve being just as dependent upon Chemical changes taking place between the substance of the Ganglionic centre from which it proceeds and the oxygenated Blood that circulates through it, as is the transmission of an Electric current along the Telegraph-wire upon the Chemical changes taking place between the metals and the exciting liquid of the Galvanic battery. But these changes are themselves capable of being brought about by the various forms of Mental activity just enumerated. Just as a perfectly constructed Galvanic battery is *inactive* while the circuit is “interrupted,” but becomes *active* the instant that the circuit is “closed,” so does a Sensation, an Instinctive tendency, an Emotion, an Idea, or a Volition, which attains an intensity adequate to “close” the circuit, liberate the Nerve-force with which a certain part of the Brain, while in a state of wakeful activity, is always “charged.” That Mental antecedents can thus call forth Physical consequents, is just as certain as that Physical antecedents can call forth Mental consequents ; and thus the Correlation between Mind-force and Nerve-force is shown to be complete *both ways*, each being able to excite the other.

13. Now using these facts as our basis, we seem justified in going further ; and in asserting that the same kind of evidence justifies the belief, that a Physiological mechanism of the like nature furnishes the instrumentality through which all kinds of Mental operation take place. For no Scientific Psychologist has any doubt that there are "Laws of Thought" expressing sequences of Mental activity, which (if we could thoroughly acquaint ourselves with them) would be found as fixed and determinate as the "Laws of Matter ;" the difficulty in ascertaining them arising solely from the difficulty in subjecting Mental phenomena to precise observation, and in analysing the complex conditions under which they occur. And whilst these laws comprehend that large part of our Mental activity which may be designated as *automatic*,—consisting in a succession of Mental states, of which each calls forth the next by Suggestion, without any interference from the Will,—it will be further shown that there are a great number of Mental phenomena which cannot be accounted for in any other way, than as resulting from the operation of a Physiological mechanism, which may go on not only *automatically*, but even *unconsciously* (Chap. XIII.). That we are not always conscious of the working of this Mechanism, is simply because our Sensorium is otherwise engaged : for just as we may not see things which are passing before our eyes, or be conscious of the movements of our legs in walking, if our Attention be wholly engrossed by our Cerebral "train of thought," so may we not be conscious of what is going on in our Cerebrum, whilst our Attention is wholly concentrated upon what is passing before our Eyes (§ 117). But the Physiological mechanism has this peculiarity,—that it *forms itself* according to the mode in which it is *habitually* exercised ; and thus not only its *automatic* but even its *unconscious* action comes to be indirectly modified by the controlling power of the Will (§ 95).

14. It may serve to promote the right understanding of the general doctrine as to the relation of Will to Thought which it is the

chief object of this Treatise to set forth, if we briefly inquire into the relation of the Will to Bodily Movements. It has been customary to classify these as *voluntary* or *involuntary*, but it will be found preferable to distinguish them as *volitional* and *automatic*: the former being those which are called forth by a distinct effort of Will, and are directed to the execution of a definite *purpose*; whilst the latter are performed in response to an internal prompting of which we may or may not be conscious, and are not dependent on any preformed intention,—being executed, to use a common expression, “mechanically.” Some of these are *primarily* or *originally* Automatic; whilst others, which were Volitional in the first instance, come by frequent repetition to be performed independently of the Will, and thus become *secondarily* Automatic.* Some of the Automatic movements, again, can be controlled by the Will; whilst others take place in opposition to the strongest Volitional effort. There is a large class of secondarily-automatic actions, which the Will can initiate, and which then go on of themselves in sequences established by previous Habit; but which the Will can stop, or of which it can change the direction, as easily as it set them going; and these it will be convenient to term *voluntary*, as being entirely under the control of the Will, although actually maintained Automatically.

15. Those movements of which the uninterrupted performance is essential to the maintenance of Life, are *primarily* automatic; and are not only independent of the Will, but entirely beyond its control. The “beating of the Heart,” which is a typical example of such movements, though liable to be affected by *emotional* disturbance, cannot be altered either in force or frequency by any *volitional* effort. And only one degree removed from this is

* The sagacity of Hartley enabled him to anticipate on this point the discoveries of modern Physiology; for in designating as *secondarily automatic* the whole of the actions which come to be performed by Habit without Will or even Consciousness, though *originally* learned and practised with *conscious intent*, he showed a discernment of their true character which later researches have entirely justified.

the act of Respiration ; which, though capable in Man of being so regulated by the Will as to be made subservient to the uses of Speech, cannot be checked by the strongest exertion of it for more than a few moments. If we try to "hold our breath," for such a period that the aëration of the blood is seriously interfered with, a feeling of distress is experienced, which every moment increases in intensity until it becomes absolutely unbearable ; so that the automatic impulse which prompts its relief can no longer be resisted. So when a crumb of bread or a drop of water passes "the wrong way," the presence of an irritation in the windpipe automatically excites a combination of muscular movements, which tends to an expulsion of the offending particle by an explosive Cough. The strongest exertion of the Will is powerless to prevent this action ; which is repeated in spite of every effort to repress it, until that result has been obtained. If the irritation be applied to the nasal entrance of the air-passages, as in snuff-taking, a peculiar valvular action at the back of the mouth automatically directs a part of the explosive blast through the nose ; and this Sneeze, if the stimulus be applied in sufficient strength, is altogether beyond Volitional control.—It is worthy of note that whilst the act of coughing can be excited by a mandate of the Will, through the instrumentality to be hereafter explained (§ 47), we cannot thus execute a true sneeze, the stage-imitation of which is ludicrously unlike the reality.

16. There can be no doubt that in the lower tribes of Animals, a large part of the ordinary movements of Locomotion are of the same primarily automatic character ; being executed in direct response to a stimulus that acts through the Nervous centres with which the locomotive members are directly connected, and being performed by the headless trunk with just the same perfect co-ordination as by the entire creature (§ 54). In Man, however, the power of performing these movements is acquired by a process of education ; and no one can watch this process, without perceiving

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how gradual is the acquirement of the co-ordinating power, especially in the *balancing* of the body during each successive step. As Paley says : "A child learning to walk is the greatest posture master in the world." Yet, when this co-ordination has been once established, the ordinary movements of Locomotion—though involving the combined action of almost every muscle in the body—are performed automatically ; the Will being only concerned in starting, directing, or checking them.—Of this we have familiar experience in the continuance of the act of *walking*, whilst the attention is occupied by some "train of thought" which completely and continuously engrosses it. Though we set out with the intention of proceeding in a certain direction, after a few minutes we may lose all consciousness of where we are, or of whither our legs are carrying us ; yet we continue to walk-on steadily, and may unexpectedly find ourselves at the end of our journey before we are aware of having done more than commence it (§ 71). Each individual movement here *suggests* the succeeding one, and the repetition continues, until, the Attention having been recalled, the automatic impulse is superseded by the control of the Will. Further, the direction of the movement is given by the sense of Sight, which so guides the motions of our legs that we do not jostle our fellow passengers or run up against lamp-posts ; and the same sense directs also their general course along the line that *habit* has rendered most familiar, although at the commencement of our walk we may have intended to take some other.—Suppose our walk to be so prolonged, however, that the sense of *fatigue* comes-on before we have reached its appointed conclusion. This calls off our Attention from what is going on in the *mind*, to the condition of the *body* ; and in order to sustain the movements of locomotion, a distinct exertion of the Will comes to be requisite for each. With the increasing sense of fatigue, an increased effort becomes necessary ; and at last even the most determined Volition may find itself unable to evoke a respondent movement from the exhausted Muscles.

17. In this familiar experience we can clearly trace three distinct modes of action,—the Automatic, the Voluntary, and the Volitional. Whilst we are all unconscious of the movements which our legs are executing for us, those movements are purely *automatic*. When our attention is not so completely engrossed elsewhere, but that we know where we are and what we are doing, the movements of locomotion are not only *permitted* by the Will, but may be *guided* by it into some unusual direction ; such movements are *voluntary*. But when the sense of fatigue attending each movement makes it necessary that a distinct effort of the Will shall be exerted for its repetition, the act comes to be *volitional*.—The explanation of these phenomena lies in the fact, that the Nervo-muscular mechanism immediately concerned in *executing* the movement (of which an account will be given hereafter, §§ 54, 71) is the same throughout, but that it is *started* by different means ; the Will replacing the stimulus to action otherwise furnished by an external impression. Of this we have a typical example in the act of Coughing. When we *will* to cough (as for the purpose of giving a signal, or putting down a tedious speaker), we merely touch the spring, as it were, of a mechanism, which *automatically* combines the multitude of separate actions that are required to produce the result (§ 47) ; just as when we pull the trigger of a gun, or open the valve which admits steam into the steam-engine. And the only difference in kind between the act of Coughing and that of Walking consists in this,—that whilst the mechanism concerned in the *former* is ready for action from the first, that by which the *latter* is performed requires to have its various springs and levers adjusted to harmonious operation. But when this adjustment has been once made, it remains good for life ; in virtue of that remarkable peculiarity of our Bodily constitution, which keeps up the Nutrition of each part in accordance with the use that is made of it (§ 276).

18. There may still be Metaphysicians who maintain that

actions which were originally prompted by the Will with a distinct intention, and which are still entirely under its control, can never cease to be Volitional; and that either an infinitesimally small amount of will is required to sustain them when they have been once set going, or that the will is in a sort of pendulum-like oscillation between the two actions,—the maintenance of the train of *thought*, and the maintenance of the train of *movement*. But if only an infinitesimally small amount of Will is necessary to sustain them, is not this tantamount to saying that they go on by a force of their own? And does not the experience of the *perfect continuity* of our trains of thought during the performance of movements that have become habitual, entirely negative the hypothesis of oscillation? Besides, if such an oscillation existed, there must be *intervals* in which each action goes on *of itself*; so that its essentially automatic character is virtually admitted. The Physiological explanation, that the Mechanism of Locomotion, as of other habitual movements, *grows to* the mode in which it is early exercised, and that it then works automatically under the general control and direction of the Will, can scarcely be put down by any assumption of a hypothetical necessity, which rests only on the basis of ignorance of one side of our composite nature.

19. But we may go a step further, and assert that it may now be regarded as a well-established Physiological fact, that even in the most purely Volitional movements—those which are prompted by a *distinct purposive effort*,—the Will does not *directly* produce the result; but plays, as it were, upon the Automatic apparatus by which the requisite Nervo-muscular combination is brought into action.

20. No better illustration of this doctrine could be adduced, than that which is furnished by the act of *Vocalization*; either in articulate Speech, or in the production of Musical tones. In each of these acts, the co-ordination of a large number of muscular movements is required; and so complex are their combinations, that the professed Anatomist would be unable, without careful

study, to determine what is the precise state of each of the muscles concerned in the production of a given musical note, or the enunciation of a particular syllable. Yet we simply *conceive* the tone or the syllable we wish to utter, and say to our automatic Self "Do this :—" and the well-trained Automaton does it. The delicate gradations in the action of each individual muscle, and the harmonious combination of the whole, are effected under the guidance of the Ear, without (save in exceptional cases) the smallest knowledge on our own parts of the nature of the mechanism we are putting in action. In fact, the most perfect acquaintance with that mechanism would scarcely afford the least assistance in the acquirement of the power to use it. The "training" which develops the inarticulate Cry of the infant into articulate Speech or melodious Song, mainly consists in the fixation of the Attention on the *audible result*, the *selection* of that one of the imitative efforts to produce it which is most nearly successful, and the *repetition* of this until it has become habitual or *secondarily automatic*. The Will can thenceforwards reproduce any sound once acquired, by calling upon the Automatic apparatus for the particular combination of movements which it has *grown into* the power of executing in response to each preconception ; provided, at least, that the apparatus has not been allowed to become rusty by disuse, or been stiffened by training into a different mode of action. Even the strongest Will, however, may fail to acquire complete control over the complex Automatic mechanism. The articulation of the Stammerer is disturbed by spasmodic impulses, which he vainly endeavours to keep under subjection :— the Vocalist's ear may tell him that he is singing out of tune, and yet he may be unable to correct his fault :—and even a Viardot or a Patti would feel unfit either for the performance of a new *rôle*, or for the repetition of an old one long laid by, however perfect might be her mental conception of it, until she had trained or re-trained her organ to execute that conception.

21. Another illustration, drawn from the movements of the Eyes, may place this doctrine in a still clearer light ; inasmuch as the action of the living Automaton can be watched either by a bystander, or by the *Ego* that calls it forth. Let the reader *will* to fix his gaze on the face of a person directly opposite to him, and then *will* to move his head from side to side ; his eyeballs will be seen to roll in their sockets *in the contrary direction*, and this not only without any volitional effort on his part, but even without his being in any way conscious of the act, except by a process of reasoning. Or, if he move his head upwards and downwards, his eyes (still fixed on the opposite face) will roll conversely *downwards and upwards*. And if, instead of looking at the face of another, he fix his gaze upon the reflection of his own eyes in a mirror, and then move his head as before, he will be able to satisfy himself that his Automaton is directing his eyes for him ; every alteration in the position of his head being accompanied by a roll of his eyeballs *in the opposite direction*, so that their axes continue to be turned towards the reflected image, so long as he *wills* to keep them so.

22. The same may be shown to be true of all the so-called Voluntary movements. What we *will* is, not to throw this or that muscle into contraction, but *to produce a certain preconceived result*. That result may be within the capacity of our ordinary Mechanism ; but, if it be not, we have to create a new mechanism by a course of training or practice ; the effect of which (as already shown) is to make the Automatic apparatus *grow to* the mode in which it is habitually exercised.—That this is the true theory of these movements, is evident from several considerations, of which a few must here suffice. If the performance of a Voluntary movement required a transmission of Nervous power direct from the Brain (which may be assumed to be the instrument of the Will) to the Muscles concerned in its production, then we should need to know what those muscles are, and to select and combine

them intentionally ; which is so far from being the fact, that the consummate anatomist is no better able than the completest igno-
ramus to execute a movement he has never practised. Again, if our Muscles were under the direct control of the Will, we could single out any one of them, and make it contract by itself ; which we cannot really do, except in the few instances in which *willing* the result calls only a single muscle into action. So again, if an accomplished Musician should wish to play upon an instrument he has never practised, but of which he thoroughly understands the mechanism, it would be sufficient for him to *will* the movements he knows to be requisite for the production of the desired tones, instead of having to acquire the power of performing them by a laborious course of training ; and the man who, on being asked whether he could play the fiddle, said that " he did not know till he had tried," *might* have shown himself a very Joachim when the instrument was put into his hands.

23. The doctrine that the Will, which carries into action the determinations of the Intellect, has no direct power over the muscles which execute its mandates, but operates through the automatic mechanism, is in entire harmony with the knowledge acquired of late years in regard to the relative functions of the *Cerebrum* and of the *Axial Cord* on which it is superimposed. For it will be shown (Chap. II.) that the latter, which receives all the nerves of Sense, and gives forth all the nerves of Motion, constitutes the fundamental and essential part of the Nervous System, and is alone concerned in the performance of all those movements which are *primarily* automatic or Instinctive : whilst the *Cerebrum*, the development of which seems to bear a pretty constant relation to the degree in which Intelligence supersedes Instinct as a source of action, is superadded to this *Axial Cord* ; through which, on the one hand, it receives Sense-impressions, whilst, on the other, it calls the Muscles into action. And thus, when we *will* to cough, certain Cerebral fibres (§ 89)

convey the same stimulus to the centre of Respiratory movement, that is brought to it by the Sensory nerves when a crumb of bread or a drop of water "goes the wrong way," and calls forth the same respondent action.

24. Thus, then, the relation between the Automatic activity of the body, and the Volitional direction by which it is utilized and directed, may be compared to the independent locomotive power of a horse under the guidance and control of a skilful rider. It is not the rider's whip or spur that furnishes the *power*, but the nerves and muscles of the horse; and when these have been exhausted, no further action can be got out of them by the sharpest stimulation. But the rate and direction of the movement are determined by the Will of the rider, who impresses his mandates on the well-trained steed with as much readiness and certainty as if he were acting on his own limbs. Now and then, it is true, some unusual excitement calls forth the essential independence of the equine nature; the horse takes the bit between his teeth, and runs away with his master; and it is for the time uncertain whether the independent energy of the one, or the controlling power of the other, will obtain the mastery. This is just what we see in those Spasms and Convulsions which occur without loss of consciousness, and in which the muscles that we are accustomed to regard as "voluntary" are called into violent contraction, in spite of the strongest Volitional resistance. On the other hand, the horse will quietly find his way home, whilst his rider, wrapped in a profound reverie, entirely ceases to guide him; just as our own legs carry us along a course which habit has made familiar, while our Mind is engaged only upon its own operations, and our Will is altogether in abeyance. And, to complete the parallel, the process by which a Horse is taught any unusual performance—as when in "training" for the Circus or the Stage—entirely corresponds with that by which we "train" our own automatic mechanism to any novel action: the *result* desired by the master being indicated to the

learner, every effort that tends to produce it being encouraged and fixed by repetition, and every unsuitable action being repressed; until the entire sequence comes to be automatically executed at the first touch of the suggesting spring which expresses the directing Will.

25. Now all this will be found to be as true of the *Mind*, as it is of the body. Our Mental activity is, in the first instance, entirely *spontaneous* or *automatic*; being determined by our congenital nervous Organization, and by the conditions of its early development. It may be stated as a fundamental principle, that the Will can never *originate* any form of Mental activity. Thus, no one has ever *acquired* the creative power of Genius, or *made himself* a great Artist or a great Poet, or *gained by practice* that peculiar insight which characterises the original Discoverer; for these gifts are Mental Instincts or Intuitions (§ 408), which, though capable of being developed and strengthened by due cultivation, can never be generated *de novo*. But the power of the Will is exerted in the *purposive selection*, from among those objects of consciousness which Sensations from without and the working of the internal "Mechanism of Thought and Feeling" bring before the Ego (whether simultaneously or successively), of that which shall be determinately followed up; and in the *intensification of the force of its impression*, which seems the direct consequence of such limitation. This state is what is termed *Attention*; in regard to which it was well said by Sir William Hamilton, that its *intensity* is in a precisely inverse ratio to its *extensity*. And it will be the Writer's object to show, that it is solely by the Volitional *direction of the attention* that the Will exerts its domination; so that the acquirement of this power, which is within the reach of every one, should be the primary object of all Mental discipline. It is thus that each individual can perfect and utilize his natural gifts; by rigorously training them in the first instance, and then by exercising them only in the manner most fitted to expand and elevate, while restraining

them from all that would limit or debase.—In regard to every kind of Mental activity that does *not* involve origination, the power of the Will, though limited to *selection*, is almost unbounded. For although it cannot directly bring objects before the consciousness which are not present to it (§ 371), yet, by concentrating the Mental gaze (so to speak) upon any object that may be within its reach, it can make use of this to bring in other objects by associative Suggestion. And, moreover, it can virtually determine what shall *not* be regarded by the Mind, through its power of keeping the Attention fixed *in some other direction*; and thus it can subdue the force of violent impulse, and give to the conflict of opposing motives a result quite different from that which would ensue without its interference (§ 332). This exercise of the Will, moreover, if habitually exerted in certain directions, will tend to form the Character, by establishing a set of *acquired habitudes*; which, no less than those dependent upon original constitution and circumstances, help to determine the working of the “Mechanism of Thought and Feeling.” In so *utilising* it, the Will can also *improve* it by appropriate discipline; repressing its activities where too strong, fostering and developing them where originally feeble, directing all healthful energy into the most fitting channel for its exercise, and training the entire Mental as it does the Bodily organism to harmonious and effective working. And thus in proportion as our Will acquires domination over our Automatic tendencies, the spontaneous succession of our Ideas and the play of our Emotions show the influence of its habitual control; while our Character and Conduct in Life come to be the expression of our best Intellectual energies, directed by the Motives which we *determinately elect* as our guiding principles of action.

26. It is obvious that the view here taken does not in the least militate against the idea, that Mind may have an existence altogether independent of the Body which serves as its instrument. All which has been contended for is, that the connexion between Mind and

Body is such, that the actions of each have, in this present state of existence (which is all of which Science can legitimately take cognizance), a definite *causal relation* to those of the other; so that the actions of our Minds, *in so far as they are carried on without any interference from our Will*, may be considered as "Functions of the Brain."—On the other hand, in the control which the Will can exert over the *direction* of the thoughts, and over the *motive force* exerted by the feelings, we have the evidence of a new and independent Power, which may either oppose or concur-with the automatic tendencies, and which, according as it is habitually exerted, tends to render the Ego *a free agent*. And, truly, in the existence of this Power, which is capable of thus regulating the very highest of those operations that are causally related to corporeal states, we find a better evidence than we gain from the study of any other part of our Psychological nature, that there *is* an entity wherein Man's nobility essentially consists, which does not depend for its existence on any play of Physical or Vital forces, but which makes these forces subservient to its determinations. It is, in fact, in virtue of the Will, that we are *not* mere thinking Automata, mere puppets to be pulled by suggesting-strings, capable of being played-upon by every one who shall have made himself master of our springs of action.

27. It may be freely admitted, however, that such thinking Automata *do* exist : for there are many individuals whose Will has never been called into due exercise, and who gradually or almost entirely lose the power of exerting it, becoming the mere creatures of habit and impulse ; and there are others in whom (as we shall hereafter see) such Automatic states are of occasional occurrence, whilst in others, again, they may be artificially induced. And it is (1) by the study of those conditions in which the Will is completely in abeyance,—the course of thought being *entirely* determined by the influence of suggestions upon the Mind, whose mode of reaction upon them depends upon its original peculiarities and its sub-

sequently-acquired habits,—and (2) by the comparison of such abnormal states with that in which the Ego, in full possession of all his faculties, and accustomed to the habitual direction of his thoughts and control of his feelings, determinately applies his judgment to the formation of a decision between contending impulses, and carries that decision into action,—that we shall obtain the most satisfactory ideas of what share the Will really takes in the operations of our Minds and in the direction of our conduct, and of what must be set down to that automatic activity of our Psychical nature, which is correlated with Cerebral changes.

28. Thus, then, the Psychologist may fearlessly throw himself into the deepest waters of speculative inquiry in regard to the relation between his Mind and its Bodily instrument, provided that he trusts to the inherent buoyancy of that great fact of Consciousness, that *we have within us a self-determining Power which we call Will*. And he may even find in the evidence of the intimate relation between Mental activity and Physical changes in the Brain, the most satisfactory grounds which Science can afford, for his belief that the phenomena of the Material Universe are the expressions of an Infinite Mind and Will, of which Man's is the finite representative. (See Chap. XX.)

CHAPTER II.

OF THE NERVOUS SYSTEM AND ITS FUNCTIONS.

SECTION 1. *Relation of the Nervous System to the Body generally.*

29. THE Body of Man, or of any one of the higher Animals, may be regarded as made up of two portions which are essentially distinct, though intimately blended as well in their structure as in their actions,—viz. (1), the Apparatus of *Animal Life*, and (2) the Apparatus of *Vegetative or Organic Life*.

30. To the Apparatus of Animal Life belongs the whole Mechanism of those actions which essentially distinguish the Animal from the Plant; namely, Sensation, the higher Psychical changes which Sensation initiates, and the Movements which are consequent upon them. And thus the Apparatus of Animal Life may be said to consist of the Nervous System, the Organs of Sense, and the Organs of Motion,—these last including the Skeleton or jointed framework (composed of bones, cartilages, and ligaments), and the Muscles which give motion to its parts. It is in virtue of the *contractility* possessed by the Muscles, that all the sensible movements of the higher Animals are performed: the skeletal framework being merely *passive*, and furnishing a system of levers by which the contractile *power* of the muscles may be advantageously applied; and the muscles being either directly united to the bones, or being connected with them by means of the cords termed Tendons, which simply communicate the tension or “pull” produced by the contraction of the muscles. Thus, the closure of the fingers in grasping is for the most part produced by the contraction of

Muscles that form the fleshy part of the fore-arm, the strong tendons of which may be felt on the front of the wrist-joint ; and in like manner, the propulsive movement of the foot in walking is effected by the large Muscles forming the calf of the leg,—these pulling upwards the heel by means of the great Tendo Achillis into which they are continued.

31. The Apparatus of *Organic* Life, on the other hand, serves in the first instance to construct or *build-up* the Apparatus of Animal Life, and then to *maintain* it in “working order.” For all expenditure of Force involves not only a certain “wear and tear” of the apparatus which furnishes its instrumentality ; but also a certain equivalent amount of Chemical change, either in the substance of the apparatus itself, or in the blood which circulates through it, or in both. Thus when a Muscle is called into contraction, there is a certain disintegration or “waste” of its tissue, which needs repair by Nutrition ; but there is also an oxidation of Organic Compounds, by which Carbon and Hydrogen originally derived from the food are converted into Carbonic acid and Water ; and what would elsewhere produce *Heat*, here takes the form of the mechanical equivalent of heat, namely *Motion*. How much of these Organic Compounds is supplied by the *muscle*, and how much by the *blood*, has not yet been satisfactorily determined : it may be regarded, however, as certain that the whole of the *motor* force generated in the contraction of a muscle is *not* derived (as Liebig maintained it to be) from the “waste” of the muscle itself, and the oxidation of its components ; but that a large part of it is supplied by the oxidation of non-nitrogenous constituents of the blood. — The generation of Nerve-force involves a still more active change in that part of the Nervous system which is the instrument of its production (§ 41) ; and though we are not yet able to state precisely in what this change consists, yet we may affirm with certainty that it involves a reaction between Nerve-substance and oxygenated Blood, which requires a constant

supply of that fluid, and a no less constant removal of the products of the reaction to which it ministers.

32. Thus, then, the Apparatus of Organic Life may be said to consist of the organs by which Blood is *made*, those by which it is *kept in circulation*, and those by which it is *maintained in purity*; but the action of these has to be supplemented by that of the Apparatus of Animal Life. For, in the first place, the Animal must obtain its food by the exercise of its senses, of its psychical powers, and of its locomotive organs; and even in the Ingestion and Digestion of the food, when procured, the assistance of Muscles is required. So the Circulation of Blood is maintained by a muscular organ, the Heart, and is regulated locally by the muscularity of the walls of the Arteries; and both the rhythmical contraction of the Heart, and the calibre of the Arteries, are greatly influenced by the Nervous system. Again, the ordinary movements of Respiration, which constitute the most important of all the provisions by which the Blood is kept in the condition required for the development of the Nervous and Muscular forces, are dependent in the higher animals upon the Nervo-muscular apparatus; and although they are so completely *automatic* in their character, as to be performed not only *without* effort, but *in opposition* to effort, they are so far under the control of the higher Nervous centres, as to be subservient to the Vocal expression of Psychical states. So, again, although the action of the Excretory organs, by which the products of the "waste" are removed from the Blood, is essentially independent of the Nervo-muscular apparatus, this has a certain control over their outlets, which enables the excretions to be retained and discharged at suitable times.

33. We shall find, then, that in the higher Animals the Nervous system is the instrument, not only of those Psychical powers by which they are pre-eminently distinguished, but also of many operations which minister solely to the maintenance of the Organic Functions. But the portions of it which are directly concerned in

this latter duty, constitute an *automatic* apparatus, which is essentially independent of those higher centres that minister to the former. Thus not only does the Heart continue to beat, but the Respiratory movements are performed, as well in the sleeping as in the waking state ; during the profoundest insensibility, as in the condition of fullest mental activity. It cannot be certainly affirmed how far the rhythmical contractions of the Heart are *dependent* upon Nervous agency ; but there can be no doubt of this dependence in the case of the ordinary movements of Respiration ; and they afford a typical example of what is known as “reflex” action (§ 47).

As neither the Physiological nor the Psychical action of the Nervous Mechanism can be properly understood, without some knowledge of its structure,—both as regards the Elementary parts of which it is composed, and the different modes in which these elements are combined and arranged in different Classes of Animals,—an account will now be given of what seems most essential to be known under each of these heads.

SECTION 2. *Elementary Structure of the Nervous System.*

34. Wherever a distinct Nervous system can be made out (which has not yet been found possible in the lowest Animals), it consists of two very different forms of structure, the presence of both of which, therefore, is essential to our idea of it as a whole. We observe, in the first place, that it is formed of *trunks*, which distribute branches to the different parts of the body, especially to the Muscles and to the Sensory surfaces ; and of *ganglia*, which sometimes appear merely as knots or enlargements on these trunks, but which in other cases have rather the character of central masses from which the trunks proceed. Thus in Man, the “nervous system of animal life” consists of the Brain and Spinal Cord, which are aggregations of ganglia, and of the trunks and branches

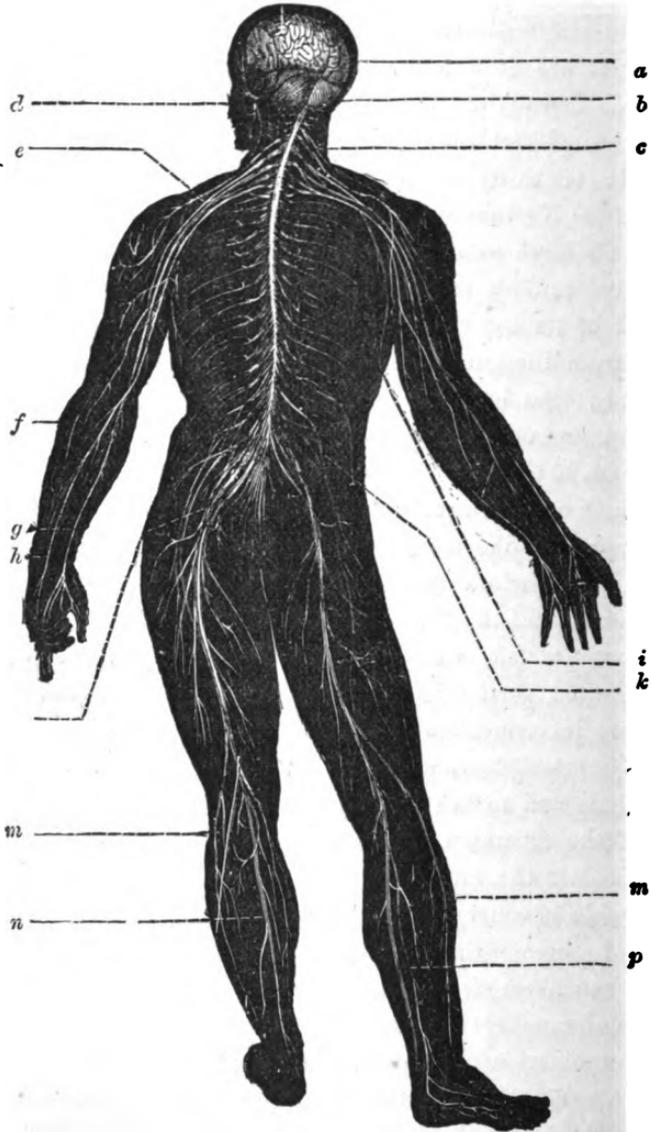
that proceed from them (Fig. 1). In addition to this, he has also a "Nervous system of Organic life," the ganglionic centres of which are scattered through the body (§ 112). In both systems, the trunks are essentially composed of *nerve-fibres*; whilst the ganglionic centres are characterized by the presence of peculiar *cells* connected with these fibres.

35. It is easily established by experiment that the *active powers* of the Nervous system are concentrated in the *ganglia*, while the *trunks* serve as *conductors* of the influence which is to be propagated towards or from them. For, if a trunk be divided in any part of its course, all the parts to which the portion thus cut off from the ganglionic centre is distributed, are completely paralysed; that is, no impression made upon them is felt as a Sensation, and no Motion can be excited in them by any act of the mind. Or, if the substance of the ganglion be destroyed, all the parts which are exclusively supplied by nervous trunks proceeding from it, are in like manner paralysed. But if, when a trunk is divided, the portion still connected with the ganglionic centre which constitutes the Sensorium be pinched, or otherwise irritated, Sensations are felt, which are referred to the points supplied by the separated portion of the trunk; thus showing that the part remaining in connection with the centre is still capable of conveying impressions, and that the ganglion itself receives these impressions and makes them felt as sensations. On the other hand, if the separated portion of the trunk be irritated, Motions are excited in the muscles which it supplies; showing that it is still capable of conveying the motor influence, though cut off from the usual source of that influence.

36. Each *Nerve-fibre* in its most complete form (Fig. 2) consists of a membranous tube¹, lined by a peculiar material composed of a combination of fat and albumen, which is known as the "white substance of Schwann²;" and this encloses an "axis cylinder³," composed of a protoplasmic substance, which seems

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Fig. 1.



NERVOUS SYSTEM OF MAN.

to be the *essential* constituent of the Nerve-fibre. Each fibre appears to maintain its continuity uninterruptedly from its origin to its termination, without any union with other fibres, though bound up closely with them in the same nerve-trunk; and there is strong reason to believe that the "white substance of Schwann" serves as an *insulator*, whereby the axis-cylinders of the contiguous nerve-fibres are kept apart from one another, just as are the numerous wires, each having its own origin and termination, which are bound up together in the aerial cable of the District Telegraph. — The

Fig. 2.



STRUCTURE OF NERVE-FIBRE.

typical form of the *Nerve-cells* or "ganglion-globules" (Fig. 3) may be regarded as globular; but they generally, if not always, have two or more long extenisons, which become continuous either with the axis-cylinders of nerve-fibres or with other cells.

Fig. 3.



GANGLION-CELLS AND NERVE-FIBRES.

The nerve-cells, which do not seem to possess a definite cell-wall, are composed of a finely-granular substance, with which pigment-granules are mingled, especially in the warm-blooded Vertebrata; thus giving to their *ganglionic* nerve-substance that reddish-brown hue which causes it to be often designated *grey* or *cineritious* matter; the *tubular* nerve-substance, which contains no pigment-granules, being known as *white* matter. This difference of colour marks the distribution of the two substances in the Nervous centres of Man and the higher Animals

Fig. 1. Nervous System of Man :—*a*, Cerebrum; *b*, Cerebellum; *c*, Spinal Cord; *d*, facial nerve; *e*, brachial plexus, for supply of arm; *f*, radial nerve; *g*, median nerve; *h*, ulnar nerve; *i*, intercostal nerves; *k*, lumbar plexus, and *l*, sacral plexus, for supply of leg; *m m*, fibular nerve; *n*, tibial nerve; *p*, external saphenous nerve.

(Figs. 11—13); but as the pigment-cells are wanting in the lower Classes, the distinction between the two substances is not there recognizable by the eye, and is only to be discerned by the microscope.

37. Every Nerve-fibre, there is reason to believe, is connected at its ganglionic centre with a Nerve-cell, an extension of which forms its axis-cylinder; and through other extensions of the same nerve-cell, it may be brought into connection with other nerve-cells in the same ganglion. The axis-cylinder soon receives its insulating investments, and retains these through almost its whole length. But near its termination, where the fibre separates itself from others, and is proceeding to its ultimate destination, the axis-cylinder escapes (as it were) from its envelopes, and comes into immediate relation with the tissue to which it is distributed. Thus, when supplying a Muscle, the axis-cylinder breaks up into very minute fibrillæ, which seem to inosculate with each other, so as to form a network closely resembling that formed by the *pseudopodia* of *Rhizopods* (Fig. 5); and the like subdivision appears to take place in the axis-cylinders of the fibres which are distributed to the general substance of tissues that are to be endowed only with *ordinary* sensibility. But each of the *papillæ* which constitute the special organs of Touch has a nerve-fibre proceeding to it alone, of which the ultimate subdivisions are distributed upon a little cushion-like pad which it contains; and the ultimate distribution of the nerves in the *papillæ* of the tongue, which minister to the sense of Taste, seems to be of like character.

38. In the organs of Sight, Hearing, and Smell, however, there is a more special provision for the reception of the peculiar impressions to which they minister. For the Retina of the Eye may be said to be an expanded ganglion, consisting of layers of nerve-cells that seem to be the immediate recipients of the luminous impressions; and the first effect of those impressions appears to be to generate Nerve-force in the nerve-fibres constituting the

Optic nerve, which transmits them to its ganglionic centre forming part of the Sensorium. The like seems to be the case with regard to the sensitive surface which receives the vibrations that excite the sense of Sound ; and also with respect to that which is affected by those odorous emanations which excite the sense of Smell. And it is common to these three organs, that neither the ganglionic expansions which receive these special impressions, nor the nerves proceeding from them, minister to *common* sensation ; so that either the Optic, the Olfactive, or the Auditory nerve may be pricked or pinched, without any sign of suffering being called forth. On the other hand, the Eye, the internal Ear, and the interior of the Nose, are endowed with *common* sensibility by other nerves distributed to those parts ; so that if these nerves be paralysed, the surface to which they proceed may be touched without the contact being perceived, although neither Sight, Smell, nor Hearing may be impaired, save indirectly.

39. The Nerve-fibres which convey *from* the various parts of the body to the ganglionic centres those impressions which there excite Sensations, are called *afferent* or *excitor*.* On the other hand, the Nerve-fibres which convey *from* the Ganglionic centres to the Muscles the impressions which call forth contractions in the latter, are called *efferent* or *motor*. It is probable that the nature of the Nerve-force excited in each is the same ; so that the same fibre might serve either purpose, if its terminals enabled it to do so,—just as the same wire in an Electric Telegraph can convey an electric current in either direction, and can thus serve alike for the transmission of a message and for its reply. But as the terminals of the two sets of Nerve-fibres are essentially distinct, one set serves for the reception of impressions at the circum-

* They were formerly called *sensory* ; but this term is inappropriate, since the impressions they convey only affect our Consciousness—*i. e.* excite sensations—when they reach the *Sensorium* ; and often excite respondent motions without doing so.

ference, and for their transmission to the ganglionic centres; whilst the other serves for the transmission of the impressions that call forth Muscular contraction, from the ganglionic centres to the various parts of the circumference.—In most Nerve-trunks, *afferent* and *motor* fibres are bound up together; although, in the ordinary Spinal nerves of Vertebrata, these are connected by separate “roots” with the Spinal Cord which serves as their ganglionic centre (§ 62). But the nerves of special sense (the Olfactive, Optic, and Auditory), which proceed to those special ganglionic centres of which the aggregate constitutes the Sensorium, contain no motor fibres; and there are other nerves of the head in Vertebrata, which are either solely *afferent* or solely *motor* (Fig. 11).

40. The analogy just indicated between the two components of every Nervous System, and the two parts of an Electric Telegraph,—that in which change *originates*, and that which serves as the *conductor*,—holds good to this further extent; that as, for the origination of the Electric current, a certain Chemical reaction must take place between the exciting liquid and the galvanic combination of metals, so is it necessary, for the production of Nerve-force, that a reaction should take place between the Blood, on the one hand, and either the *central* nerve-cells, or the *peripheral* expansions of the nerve-fibres. We do not know, it is true, what is the precise nature of that reaction: but we have the evidence of it in the large supply of Blood which goes to all Organs of Sense,—*i.e.*, to organs which are adapted for receiving sensory impressions and transmitting them to the central Sensorium; and, yet more, in the extraordinary proportion that is transmitted to those central organs which receive those impressions, render the Mind cognizant of them as Sensations, and furnish the instrumental conditions of all Psychical operations, as well as of their action upon the Body. Thus, in the case of Man, although the Brain has not ordinarily more than about *one-jth* of the

weight of the body, yet it is estimated to receive from *one-sixth* to *one-fifth* of the whole circulating Blood.

41. The immediate dependence of the production of Nerve-force upon a reaction between the Nerve-substance and the Blood, is proved by the effects of suspension of the circulation, whether *local* or *general*. Thus, if the supply of blood to a limb be temporarily interrupted (as by pressure on its main artery), numbness, or diminution of Sensibility, is perceived in it, as well as loss of Muscular power (the hand or foot being "asleep"), until the circulation is re-established. The effect of complete interruption to the blood-supply of the Brain is extremely remarkable. That supply is conveyed into the cavity of the skull of Man and of the higher Vertebrata by *four* arterial trunks, which enter it at no great distance from one another, and then unite into the "circle of Willis;" from which are given off the various branches that distribute arterial blood to every part of the brain-substance. After traversing this, the blood returns by the veins, greatly altered in its chemical composition; especially as regards the loss of free Oxygen, and its replacement by various oxy-compounds of Carbon, Hydrogen, Phosphorus, &c., that have been formed by a process analogous to combustion. Now if *one, two, or three* of the arterial trunks be tied, the total quantity of blood supplied to the brain is diminished; but in virtue of the "circle of Willis," no part is entirely deprived of blood; and the functional activity of the brain, though enfeebled, is still maintained. If, however, the *fourth* artery be compressed so as entirely to prevent the passage of blood, there is an *immediate* and *complete* suspension of activity, the animal becoming as unconscious as if it had been stunned by a severe blow; whilst it recovers as soon as the blood is again allowed to flow through the artery. In fact, the "stunned" state produced by a blow on the head, is only secondarily dependent upon the effect of that blow on the Brain, which may have sustained no *perceptible* injury whatever; the state of insensibility being due to the paralysis

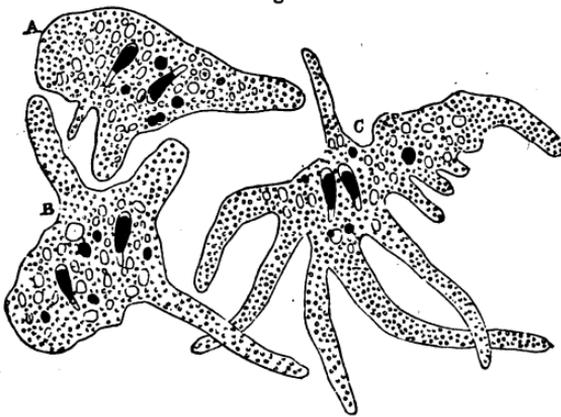
of the Heart and suspension of the Circulation, induced by the "shock." For the like insensibility may be the result of a blow on the "pit of the stomach" (acting on the great Solar plexus of nerves, § 112), or of the shock of some overpowering mental Emotion, either of which produces the like paralysis of the heart. Further, if the blood transmitted to the brain, though not deficient in quantity, be depraved in *quality* by the want of Oxygen and the accumulation of Carbonic acid (as happens in Asphyxia), there is a gradually increasing torpor of the mental faculties, ending in complete insensibility. (See also § 472, and Appendix.)

42. Thus, then, the dependence of Nervous power and of Mental activity upon the Physical changes kept up by the Circulation of oxygenated Blood through the brain, can be shown experimentally to be just as direct and immediate, as is the dependence of the Electric activity of a Galvanic battery upon the analogous changes taking place between its Metals and its exciting Liquid. And if we say that Electricity is the *expression* of Chemical change in the one case, how can we refuse to regard Thought as the *expression* of Chemical change in the other?—This view is not here advanced as *explaining* any Mental phenomenon. No Physicist would say that he can "explain" how it is that Electricity is generated by Chemical change: but he knows that such a relation of cause and effect exists between the two orders of phenomena, that every Chemical change is accompanied by a disturbance of Electricity; and thus, whenever he witnesses Electric disturbance, he is led to look for some Chemical change as its Physical cause. And in precisely the same sense, and no other, the Physiologist *must* regard some change in the substance of the Brain as the immediate Physical antecedent of all *automatic* Mental action.—It is the attribute of the Will to utilize this automatic power of the Brain, as it utilizes that of the Muscles; and thus to make the *Ego*, in proportion as he has acquired the mastery over it, a "free agent" (§§ 25—28).

SECTION 3. *Different Forms and Modes of Action of the Nervous Apparatus.*

43. The simplest type of an Animal consists of a minute mass of "protoplasm" or living jelly, which is not yet *differentiated* into "organs ;" every part having the same endowments, and taking an equal share in every action which the creature performs. One of these "jelly-specks," the *Amœba* (Fig. 4), moves itself about by changing the form of its body, extemporising a foot (or *pseudopodium*) first in one direction and then in another ; and then, when it has met with a nutritive particle, extemporises a stomach for its reception, by wrapping its soft body around it. Another, instead of

Fig. 4.

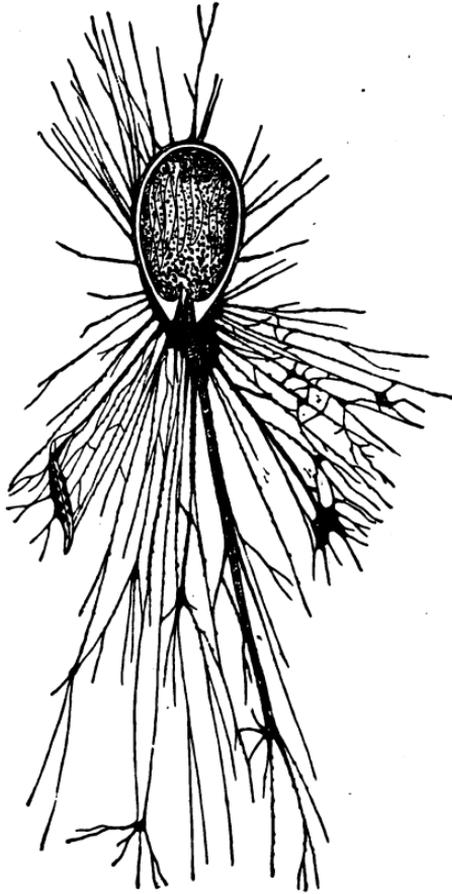


AMŒBA IN DIFFERENT FORMS, A, B, C,

going about in search of food, remains in one place, but projects its protoplasmic substance into long *pseudopodia* (Fig. 5), which entrap and draw-in very minute particles, or absorb nutrient material from the liquid through which they extend themselves, and are continually becoming fused (as it were) into the central body, which is itself continually giving off new pseudopodia.—Now we can scarcely conceive that a creature of such simplicity should possess any distinct *consciousness* of its needs, or that its actions should

be directed by any *intention* of its own; and yet the Writer has lately found results of the most singular elaborateness to be wrought-out by the instrumentality of these minute "jelly-specks,"

Fig. 5.



GROMIA, WITH EXTENDED PSEUDOPODIA.

which build-up "tests" or casings of the most regular geometrical symmetry of form, and of the most artificial construction.

a. Suppose a Human mason to be put down by the side of a pile of stones of various shapes and sizes, and to be told to build a

dome of these, smooth on both surfaces, without using more than the least possible quantity of a very tenacious but very costly cement in holding the stones together. If he accomplished this well, he would receive credit for great intelligence and skill.—Yet this is exactly what these little “jelly-specks” do on a most minute scale; the “tests” they construct, when highly magnified, bearing comparison with the most skilful masonry of Man. From the same sandy bottom, one species picks up the coarser quartz-grains, cements them together with phosphate of iron secreted from its own substance, and thus constructs a flask-shaped “test” having a short neck and a single large orifice. Another picks up the finest grains, and puts them together with the same cement into perfectly spherical “tests” of the most extraordinary finish, perforated with numerous small pores, disposed at pretty regular intervals. Another selects the minutest sand-grains and the terminal portions of sponge-spicules, and works these up together,—apparently with no cement at all, by the mere “laying” of the spicules,—into perfect white spheres, like homœopathic globules, each having a single fissured orifice. And another, which makes a straight many-chambered “test,” that resembles in form the chambered shell of an Orthoceratite—the conical mouth of each chamber projecting into the cavity of the next,—while forming the walls of its chambers of ordinary sand-grains rather loosely held together, shapes the conical mouths of the successive chambers by firmly cementing together grains of ferruginous quartz, which it must have picked out from the general mass.

To give these actions the vague designation “instinctive,” does not in the least help us to account for them; since what we want, is to discover the mechanism by which they are worked out; and it is most difficult to conceive how so artificial a selection can be made by a creature so simple.

b. The Writer has often amused himself and others, when by the sea-side, with getting a *Terebella* (a marine Worm that cases its body in a sandy tube) out of its house, and then, putting it into a saucer of water with a supply of sand and comminuted shell, watching its appropriation of these materials in constructing a new

tube. The extended tentacles soon spread themselves over the bottom of the saucer, and lay hold of whatever comes in their way, "all being fish that comes to their net;" and in half an hour or thereabouts the new house is finished, though on a very rude and inartificial type.—Now here the organization is far higher; the instrumentality obviously serves the needs of the animal, and suffices for them; and we characterize the action, on account of its uniformity and its apparent *un-intelligence*, as Instinctive.

44. We can only surmise that, in these humble *Rhizopods*, as the whole of each "jelly-speck" possesses the attribute of contractility elsewhere limited to Muscles, so may the attributes which are restricted in the higher types of Animal life to the Nervous apparatus, be there diffused through every particle,—the whole protoplasmic substance being endowed in a low degree with that power of receiving, conducting, and reacting upon external impressions, which is raised to a much more exalted degree when limited or *specialized* in the Nervous system. As we ascend the Animal series, and meet with a progressive differentiation of special structures, the general substance of the body loses the endowments which characterize it in the *Rhizopod*; and wherever we find a definite Muscular apparatus with Sensory organs, there is a strong presumption that there must also be a definite Nervous system, whose action may be purely *internuncial*,—that of calling forth Muscular movements in response to the impressions made by external agencies. The apparent absence of a Nervous system is doubtless to be attributed in many instances to the general softness of the tissues of the body, which prevents it from being clearly made-out among them. And we might justly expect to find it bearing a much smaller proportion to the entire structure, in these lowest Animals whose functions are chiefly Vegetative, than in the higher classes, in which the vegetative functions merely serve for the develop-

ment and subsequent maintenance of the Apparatus of Animal life (§ 30).

45. Perhaps the simplest form of a definite Nervous system is that presented by the *Ascidian Mollusks*: for, their bodies not possessing any repetition of similar parts,—either around a common centre as in the *Star-fish*, or longitudinally as in the *Centipede*,—their Nervous system is destitute of that multiplication of ganglia which we see in those animals; whilst the limited nature of their Animal powers involves a corresponding simplicity in their instrument. An Ascidian (Fig. 6) consists essentially of an external membranous bag or “mantle,” within which is a Muscular envelope, and again within this a Respiratory sac, which may be considered as the dilated

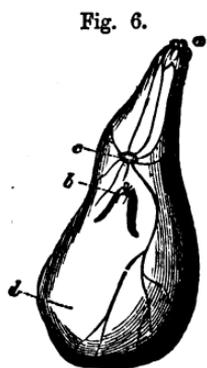


Fig. 6.
NERVOUS SYSTEM OF ASCIDIAN :—*a*, mouth; *b*, vent; *c*, ganglion; *d*, muscular sac.

pharynx of the animal. At the bottom of this last is the entrance to the stomach, which, with the other viscera, lies at the lower end of the muscular sac. The external envelopes have two orifices; a mouth (*a*) to admit water into the pharyngeal sac; and a vent (*b*) for the expulsion of the water which has served for respiration, and of that which has passed through the alimentary canal, together with the fæcal matter, the ova, &c. A current of water is continually being drawn into the pharyngeal sac, by the vibration of the cilia that line it; and part of this is driven into the stomach, conveying to it the necessary supply of aliment in a very finely divided state; whilst a part is destined merely for the aëration of the circulating fluid, and is transmitted more directly to the vent after having served that purpose. These animals are for the most part fixed to one spot, during all save the earliest period of their existence; and they give but little external manifestation of life, beyond the continual entrance and

exit of the currents just mentioned, which, being driven by ciliary action, are altogether independent of the Nervous system. When any substance, however, the entrance of which would be injurious, is drawn-in by the current, its presence excites a general contraction of the muscular envelope ; and this causes a jet of water to issue from one or both orifices, which carries the offending body to a distance. And in the same manner, if the exterior of the body be touched, the muscular envelope suddenly and violently contracts, and expels the contents of the sac.

46. These are the only actions, so far as we know, to which the Nervous system of these animals is subservient. They scarcely exhibit a trace of eyes, or of other organs of special sense ; and the only parts that appear peculiarly sensitive, are the small "tentacula" or feelers that guard the oral orifice. Between the two apertures in the mantle we find a solitary ganglion (*c*), which receives branches from both orifices, and sends others over the muscular sac (*d*). This simple apparatus seems to constitute the whole Nervous system of the animal ; and it is fully sufficient to account for the movements which have been described. For the impression produced by the contact of any hard substance with the tentacula, or with the general surface of the mantle, being conveyed by the *afferent* fibres to this ganglion, will excite in it a motor impulse ; which, being transmitted to the muscular fibres of the contractile sac, as well as to those circular bands that surround the orifices and act as *sphincters*, will call forth the movements in question.

47. We have here a characteristic example of what is designated as the *reflex* action of a Nerve-centre ; being the response which it makes, through the *motor* fibres, to the impression that has been conveyed to it by the *afferent* or *excitor* fibres,—the whole constituting what has been termed the *nervous circle*. This response is purely *automatic* or involuntary ; depending, like the contraction of a Muscle stimulated by electricity, upon the

inherent endowments of the Nervous apparatus. Whether such "reflex action" is or is not attended with Consciousness, depends on the other endowments of the ganglion which performs it; but it is certain that actions which *seem* to indicate a definite *purpose* and *will*, may be called forth by mere stimulation, under circumstances which forbid us to attribute them to anything else than the automatic and unconscious action of the Nerve-centre (§ 66).—Now the contraction of the muscular sac of the Ascidian, when called forth by the entrance of some irritating particle through the oral orifice, has its precise parallel in the act of *coughing* in ourselves. This is a combined succession of Respiratory movements, consisting of (1) a full inspiration; (2) a closure of the glottis (or aperture of the windpipe); and (3) the bursting open of the glottis by a violent expiratory blast, so that the offending body (such as a particle of food, or a drop of liquid, that has "gone the wrong way,"—or an irritating vapour that has been drawn in with the breath,—or a morbid secretion from the membrane of the air-passages) may be forcibly ejected. Now we are constantly made aware by our own experience, how completely *automatic* this action is; for not only is it performed *without* any will of our own, but even *against* the strongest volitional effort we may make to restrain it; and when we cough voluntarily, as to give a signal, or to put down a tedious speaker, we simply make use of the automatic apparatus. We could not ourselves devise or imagine anything better *adapted* than the above combination, to produce the required result. Yet that combination is assuredly made *for* us, not *by* us. An Infant coughs prior to all experience; and even in a state of entire insensibility, provided the patient can still swallow, coughing will be excited by the passage of any of the food or drink "the wrong way."

48. The act of *swallowing* affords another example of the same reflex action; for though we are accustomed to regard it as

altogether *voluntary*, inasmuch as we only swallow when we choose, yet it is not so in reality. For what the Will does, is to carry back the particle to be swallowed, by a movement of the tongue, so as to bring it into contact with the membrane lining the pharynx ; and this contact serves to call the muscles of the pharynx into *automatic* action, whereby the particle is grasped and carried downwards into the gullet. It has several times happened that a feather, with which the back of the mouth was being tickled in order to excite vomiting (another form of reflex action), having been carried down a little too far, has been thus grasped by the pharyngeal muscles, and drawn out of the fingers of the operator.—In *sucking*, again, there is a combination of respiratory movements, producing the vacuum which draws forth the milk, with the movements by which it is swallowed ; and the whole combination is a purely reflex action, performed by the instrumentality of a ganglionic centre which forms no part of the Brain proper, and called-forth by the contact, either of the nipple of the mother, or of something which produces the like impression, with the lips of the offspring (§ 69).—This last act is sometimes spoken of as *instinctive*, and has been even taken as a type of that class of operations ; and in the broad sense of the term Instinct, it may doubtless be so regarded. But, in common with the ordinary and extraordinary movements of respiration, with swallowing, and, with many other actions that are *immediately* concerned in the maintenance of the Organic functions, it may be executed *unconsciously* ; requiring nothing for its performance but an automatic Mechanism of nerves and muscles, which, in its normal state, responds as precisely to the stimulus made upon it, as the Locomotive steam-engine does to the directing actions of its driver.—The actions to which it seems preferable to limit the term *instinctive*, are those to which the prompting is given by *sensations*. These are not less “reflex” than the preceding in their essential nature, being the automatic responses given by the

Nervous mechanism to the impressions made upon it, in virtue of its original or acquired endowments; but the Nerve-centres concerned in them being of a higher order, their reflex activity cannot be called forth without affecting the *consciousness* of the Animal that executes them (§§ 57, 77, 78).

49. In ascending through the *Molluscous* series, we find the Nervous system increasing in complexity, in accordance with the increasing complexity of the general organization; the addition of new organs of special Sensation, and of new parts to be moved by Muscles, involving the addition of new ganglionic centres, whose functions are respectively adapted to these purposes. The possession of a distinct *head*, in which are located the organs of Vision, the rudimentary organs of Hearing, and the organs (if any such exist) of Smell and Taste, constitutes the distinction between the two primary divisions of the series,—the *cephalous* and the *acephalous*; the Snail and Whelk being typical examples of the former, the Oyster and Cockle of the latter. In the Cephalous Mollusks, we always find a pair of ganglia situated in the head; which pair, termed the *cephalic* ganglia, is really made up of several distinct ganglionic centres, and is connected by cords that pass round the œsophagus, with other ganglia disposed in various parts of the trunk. Still, generally speaking, the Nervous system bears but a small proportion to the whole mass of the body; and the ganglia which minister to its *general* movements, are often small in proportion to those which serve some *special* purpose, such as the actions of Respiration. This is what we should expect from the general inertness of the character of these animals (typified by the term *sluggish*), and from the small amount of Muscular structure which they possess.

50. Again, we find no other multiplication of *similar* centres, than a doubling on the two sides of the body; excepting in a few cases in which the organs they supply are correspondingly multiplied,—as in the arms of the *Cuttle-fish*, which are furnished with great

numbers of contractile suckers, every one possessing a ganglion of its own. Here we can trace very clearly the distinction between the *reflex* actions of each individual sucker, depending upon the powers of its own ganglion; and the actions prompted by Sensation, which are called forth through its connection with the Cephalic ganglia. For the Nerve-trunk which proceeds to each arm may be distinctly divided into two tracts; one containing the ganglia which appertain to the suckers and are connected with them by distinct filaments; whilst the other consists of fibres that form a direct communication between these and the Cephalic ganglia. Thus each sucker has a separate relation with a ganglion of its own, whilst all are alike connected with the Cephalic ganglia, and are placed under their control; and we see the results of this arrangement, in the mode in which the contractile power of the suckers may be called into operation. When the animal embraces any substance with its arm (being directed to this action by its Sight or some other sensation), it can bring all the suckers simultaneously to bear upon it; evidently by a determinate impulse transmitted along the connecting cords that proceed from the Cephalic ganglia to the ganglia of the suckers. On the other hand, any individual sucker may be made to contract and attach itself, by placing a substance in contact with it alone; and this action will take place equally well when the arm is separated from the body, or even in a small piece of the arm when recently severed from the rest,—thus proving that when it is directly excited by an impression made upon itself, it is a *reflex* act, quite independent of the Cephalic ganglia, not involving Sensation, and taking place through the medium of its own ganglion alone.*

51. In the *Articulated* series, on the other hand, in which the

* A very curious example of the *independent* activity of the gangliated cord in the arm of the Cuttle-fish, and of its similarity, both in structure and action, to the ventral cord of *Articulata*, is presented in the detached *Hectocotylus*-arm of the male of the *Argonaut* (Paper-Nautilus), which, when first discovered, was mistaken for a Worm.

Locomotive apparatus is highly developed, and its actions are of the most energetic kind, we find the Nervous system almost entirely subservient to this function. In its usual form, it consists of a chain of ganglia connected by a double cord; commencing in the head, and passing backwards through the body (Fig. 7). The ganglia, though they usually appear single, are really double; being composed of two equal halves closely united on the median line. In general we find a ganglion in each segment, giving-off nerves to the muscles of the legs, as in Insects, Centipedes, &c.; or to the muscles that move the rings of the body when no extremities are developed, as in the Leech, Worm, &c. In the lower Vermiform (or worm-like) tribes, especially in the marine species, the number of segments is frequently very great, amounting even to several hundreds; and the number of ganglia increases in the same proportion. But whatever be their degree of multiplication, they seem but repetitions of one another; the functions of each segment being the same with those of the rest. The *cephalic* ganglia, however, are always larger and more important; they are connected with the organs of special Sense; and they evidently possess a power of directing and controlling the movements of the entire body, whilst the power of each ganglion of the trunk is for the most part confined to its own segment.

52. The Cephalic ganglia lie *above* the mouth, in the immediate neighbourhood of the eyes, with which they are connected by nerve-trunks. And from the constancy of the relation between the size of these ganglia and the development of the Visual organs, it cannot be doubted that they are to be regarded as essentially *optic* ganglia, though also containing the

Fig. 7.



GANGLIATED-
NERVOUS CORD
OF CENTIPEDE.

ganglionic centres of the nerves of other Senses, altogether constituting the *Sensorium*.—These Cephalic ganglia are connected with the ganglion of the first segment of the trunk, by a band on either side ; and the pair of bands, with the ganglia above and below, form a ring through which the œsophagus passes, so that the chain of ganglia comes to lie nearer the lower or *ventral* surface, *beneath* the alimentary canal, instead of just beneath the *dorsal* surface, *above* the alimentary canal, which is the position of the Spinal cord of Vertebrata. Hence the longitudinal gangliated chain of Articulated animals is often distinguished as the *ventral cord*.

53. A marked difference is observable in the arrangement of the ganglia of the Ventral cord, according as the act of Locomotion is performed by muscles uniformly repeated through the successive segments of the body, as in the crawling of the Maggot or Caterpillar ; or by the muscles of special appendages, attached to particular segments, as in the perfect Insect. In the former case, the ganglionic chain is uniform throughout ; whilst in the latter, the ganglia of the thorax, with which are connected the nerves that supply the legs and wings, are greatly increased in size, whilst those of the abdomen, the segments of which no longer take any share in the act of locomotion, are proportionally reduced. The change from one condition to the other takes place during the metamorphosis.—When the structure of the Ventral cord is more particularly inquired into, it is found to consist of two distinct tracts ; one of which, composed of *nerve-fibres* only, passes backwards from the Cephalic ganglia over the surface of all the ganglia of the trunk : whilst the other includes the collections of nerve-cells which constitute *ganglia*. Hence every part of the body has two sets of nervous connections ; one with the ganglion of its own segment, and another with the Cephalic ganglia. Each of the ganglia of the Ventral cord ministers to the reflex actions of its own segment, and, to a certain extent also, to those of other segments : for by

the peculiar arrangement of the fibres of the Cord, an impression conveyed by an *afferent* fibre to any one of these ganglia may excite contraction in the muscles of the *same* side of its own segment, or in those of the *opposite* side, or in those of segments at a greater or less distance, according to the point at which the *motor* fibres leave the cord. On the other hand, impressions made upon the afferent fibres which proceed from any part of the body to the Cephalic ganglia, give rise to *sensations* when conveyed to the latter; whilst, in response to these, the influence of the Sensations received through the Cephalic ganglia, being reflected through the motor fibres proceeding from them, harmonizes and directs the general movements of the body.

54. The general conformation of Articulated animals, and the arrangement of the parts of their Nervous system, render them peculiarly favourable subjects for the study of the *reflex* actions; some of the principal phenomena of which will now be described.— If the head of a Centipede be cut off whilst it is in motion, the body will continue to move onwards by the action of its legs; and the same will take place in the separate parts, if the body be divided into several distinct portions. After these actions have come to an end, they may be excited again by irritating any part of the Nerve-centres, or the cut extremity of the nervous cord. The body is moved forwards by the regular and successive action of the legs, as in the natural state; but its movements are always forwards, never backwards, and are only directed to one side when the forward movement is checked by an interposed obstacle. Hence, although they might *seem* to indicate Consciousness and a guiding Will, they do not do so in reality; for they are performed as it were “mechanically;” and show no direction of object, no avoidance of danger. If the body be opposed in its progress by an obstacle of not more than half of its own height, it mounts over it and moves directly onwards, as in its natural state; but if the obstacle be equal to its own height, its progress is arrested,

and the cut extremity of the body remains forced-up against the opposing substance, *the legs still continuing to move.*—If, again, the Ventral cord of a Centipede be divided in the middle of the trunk, so that the hinder legs are cut off from connection with the Cephalic ganglia, they will continue to move, but not in harmony with those of the fore-part of the body; being completely paralysed, as far as the animal's controlling power is concerned, though still capable of performing reflex movements by the influence of their own ganglia, which may thus continue to propel the body in opposition to the determinations of the animal itself. —The case is still more remarkable when the Ventral cord is not merely divided, but a portion of it is entirely removed from the middle of the trunk: for the anterior legs still remain obedient to the animal's control; the legs of the segments from which the nervous cord has been removed are altogether motionless; whilst those of the posterior segments continue to act through the reflex powers of their own ganglia, in a manner which shows that the animal has no power of checking or directing them.

55. Another curious phenomenon of this kind is presented by the *Mantis*, a large Insect allied to the Grasshoppers and Crickets, but of less active habits; its conformation fitting it to lie in wait for its prey, rather than to go in search of it. The first segment of its thorax is greatly prolonged, and is furnished with a pair of large and strong legs, ending in sharp claws; whilst the two posterior segments, and the legs attached to them, are of the ordinary type. From its resting on these last, and lifting up the first segment, with its legs stretched out as arms, in the attitude of prayer, though really in readiness for the capture of prey, the *Mantis* is regarded by the peasantry of Italy and the South of France, where it is common, with superstitious veneration, under the name of *Prie-Dieu*, and has hence acquired the specific name of *religiosa*. Now, if the head be cut off, the body still

retains its position, and resists attempts to overthrow it ; while the arms close round anything that is introduced between them, and impress their claws upon it. But further, if the first segment of the thorax with its attached members be cut off, the posterior part of the body will still remain balanced upon the four legs that support it, not only resisting any attempts to overthrow it, but recovering its position when disturbed, and performing the same agitated movements of the wings and wing-covers as when the entire Insect is irritated ; while the arms attached to the separated segment of the thorax will still act in the manner just described. Hence it is obvious that the ordinary movements of this Insect *immediately* depend on the reflex powers of the ganglia of the Ventral cord ; and that while the prey is actually *captured* by their instrumentality, the control exercised over these movements by the Cephalic ganglia serves to *direct* them towards the prey,—just as our own movements in walking, which are themselves *acquired* reflex actions of the Spinal cord (§ 71), are still *directed* by the Sight, while maintained without either Volitional or even *conscious* effort.

56. The stimulus to the Reflex movements of the legs, in the foregoing cases, appears to be given by the contact of the extremities with the solid surface on which they rest. In other cases, the appropriate impression can only be made by the contact of liquid : thus a *Dytiscus* (a kind of water-beetle) from which the Cephalic ganglia had been removed, remained motionless so long as it rested upon a dry surface ; but when cast into water, it executed the usual swimming motions with great energy and rapidity, striking all its comrades to one side by its violence, and persisting in these for more than half an hour.—Other movements, again, may be excited through the Respiratory surface. Thus, if the head of a *Centipede* be cut off, and, while the trunk remains at rest, some irritating vapour (such as that of ammonia or muriatic acid) be caused to enter the air-tubes on one side of it through the spiracles

or breathing-pores of that side, the body will be immediately bent in the opposite direction, so as to withdraw itself as much as possible from the influence of the vapour; if the same irritation be then applied on the other side, the reverse movement will take place; and the body may be caused to bend in two or three different curves, by bringing the irritating vapour into the neighbourhood of different parts of either side. This movement is evidently (like the acts of Coughing and Sneezing in the higher animals, §. 47) a reflex one, and serves to withdraw the entrances of the air-tubes from the source of irritation.

57. From these and similar facts it appears that the *ordinary movements* of the legs and wings of Articulated animals are of a simply-reflex nature, being effected solely through the ganglia with which these organs are severally connected; whilst in the perfect creature they are harmonized, controlled, and directed by the guidance they receive from the Cephalic ganglia, which combines them into those *composite* movements which are distinguished as *instinctive*. This designation is now properly restricted to actions which, being performed without any guidance from experience, and executed in precisely the same manner (when the circumstances are similar) by all the individuals of a species, must be regarded as proceeding from an innate or constitutional tendency, corresponding with that which prompts our own primarily-automatic movements (§ 15). Instinctive actions, then, are as truly "reflex" in their character as are those we have been already considering, but differ from them only in their greater complexity; a combination of many separate impressions being needed to call them forth, and a combination of many distinct movements being concerned in their execution. The special *directing* power exerted by the Cephalic ganglia obviously depends upon their Sensorial attributes; for the directness of their connection with the organs of special Sense, and the constancy of the proportion which their size bears to the develop-

ment of the Eyes, places it beyond doubt that they furnish the instrumentality whereby (1) the Animal is rendered *conscious* of Sense-impressions, and (2) that Consciousness prompts and directs its actions. Thus the truly Instinctive actions of the lower Animals correspond in character with the *Sensori-motor* or *consensual* actions in Man (§§ 78, 79), but constitute a far larger proportion of their entire life-work. In fact, it would appear that *Instinct* culminates in the ARTICULATED series, and especially in the class of *Insects*; just as *Intelligence* does in the VERTEBRATED series, of which *Man* is the highest representative. In proportion as *Instinct* predominates, may we predict with certainty the actions of the individual, when we know the life-history of the species; its whole aim being to work out a design which is formed *for* it, not *by* it, and the tendency to which is embodied (as it were) in its organization. In proportion, on the other hand, as the lower animals possess any share of the Rational nature of Man, which enables them to profit by experience, the mental processes which determine their actions become more complex and seem more variable in their results, so that our power of accurate prediction proportionally diminishes. Of this we have a curious illustration in the contrast between the Architectural operations of Insects and those of Birds (§ 82).

58. The most remarkable examples of *instinctive* action that the entire Animal Kingdom can furnish, are presented in the operations of Bees, Wasps, Ants, and other Social Insects; which construct habitations for themselves upon a plan which the most enlightened Human intelligence, working according to the most refined geometrical principles, could not surpass; but which yet do so without education communicated by their parents, or progressive attempts of their own, and with no trace of hesitation, confusion, or interruption; the several individuals of a community all labouring effectively to one common end, because their Instinctive or Consensual impulses are the same.

—It *might*, indeed, be argued in the case of *Hive-Bees* (on whose life-history our notions of the range of Instinct are chiefly founded), that the extraordinary perfection of their workmanship, and the uniformity of the course they take under each of a great variety of contingencies, are to be accounted for by the experiential acquirement of *knowledge*, progressively improved, and transmitted from one generation to another ; but this cannot possibly be admitted in the case of certain of the *solitary Bees*. For with regard to these it may be positively affirmed that the offspring *can* know nothing of the construction of its nest, either from its own experience, or from instruction communicated by its parent ; so that when it makes a nest of the very same pattern, we cannot regard it as anything else than a *machine* acting in accordance with its Nervous organization,—unless we suppose its actions to be *directly* prompted by “an overruling mind or purpose” *outside* itself, which takes them out of the category of Scientific investigation.—Still, that even Insects *can* learn by experience, must be obvious to those who study the actions of Bees when they have been newly hived ; for if the hive be placed among several others having similar entrances, the bees are obviously undecided, for the first few days, which entrance to make for ; but soon come to recognize their own, as is shown by the straightness of their flight towards it. And Sir John Lubbock has succeeded in taming a Wasp to perform various actions that indicated a *purposive* direction guided by its individual experience.

59. In the change from the *larva* to the perfect or *imago* state of the Insect, besides the modifications already noted (§ 53), the Cephalic ganglia undergo a great increase in size. This evidently has reference to the increased development of the organs of special Sense in the latter ; the Eyes being much more perfectly formed, Antennæ and other appendages used for feeling being evolved, and organs of Hearing and Smell being added. In response to the new sensations which the animal must thus acquire, a great

number of new instinctive actions are manifested ; indeed it may be said that the instincts of the perfect Insect have frequently nothing in common with those of the Larva. The former chiefly relate to the acts of reproduction, and to the provisions requisite for the deposit and protection of the eggs and for the early nutrition of the young ; the latter have reference solely to the acquirement of food. The *larva*, indeed, may be regarded as a mere active embryo, which comes forth from the egg in an extremely immature condition, and then, having taken into itself an enormous amount of additional nutriment, goes back (as it were) into the quiescent state, in which this store of nutriment is applied to the development of the organs that characterize the perfect Insect. And there is evidence of an extremely curious kind, that the course of that development, and the nature of the instinctive tendencies which show themselves in the mature individual, are capable of being determined in certain cases by conditions purely Physical :—

a. The “workers” among Hive-Bees are not really “neuters,” but are undeveloped females ; every one of them being originally a *potential* Queen. They differ from the queen, or fertile female, however, not merely in the non-development of the reproductive organs (which shows itself in the inferior length of the abdomen), but also in the possession of the “pollen-baskets” on the thighs, which are used in the collection of pollen and propolis, and in the conformation of the jaws and antennæ. But they differ yet more in their instincts ; for whilst the life-work of the Queen is to lay eggs, that of the Workers is to build cells for their reception, to collect and store up food, and to nurture the larvæ,—this nurturing process being continued as a sort of incubation during the pupa-state. The Worker-larvæ which come forth from the eggs that are laid in *ordinary* cells, are fed for three days upon a peculiar substance of jelly-like appearance, prepared in the stomachs of the workers ; but afterwards upon “bee-bread” composed of a mixture of honey and pollen. The Queen-larvæ, on the other hand, are reared in larger *royal* cells of peculiar construction ; and they are fed during the whole of the larva-period upon the substance

prepared by the workers, which is hence known as "royal jelly." The length of time occupied in their development is different; the preliminary stages of the Queen being passed through in sixteen days, whilst those of the Worker require twenty-one.

b. Now it sometimes happens that, from some causes not understood, there is a failure in the production of young Queens, so that there are none forthcoming when wanted. The workers then select either worker-eggs or worker-larvæ not yet three days old; and around these they construct "royal cells," by throwing together several adjacent worker-cells, and destroying the larvæ they contain. The selected larvæ are fed with the "royal jelly," and are treated in every respect as Queen-larvæ; and in due time they come forth as *perfect Queens—thus having had not only their bodily organization, but their psychical nature, essentially altered by the nurture they have received.*

This last action is one which it is scarcely possible that either theory or experience could lead the Bees to perform: for not the most ingenious reasoning could have anticipated the fact, that by supplying a worker-larva with food of a different quality, and enlarging the cell around it, a change so remarkable should be produced in its structure, capacities, and instincts; and the circumstances of the case seem no less to forbid the notion that the Bees owe a knowledge of the process to experimental researches carried on either by themselves or by their ancestors, for the purpose of procuring an artificial supply of queens when the natural supply fails. That recourse is uniformly had to it whenever the case requires, has been repeatedly shown by experiment; the removal of the parent-queen and of the royal larvæ from the hive, being always followed by the manufacture (so to speak) of worker-larvæ into new queens.—The *irrationality* of the impulse which prompts the Bees to this action, is evidenced by its occasional performance under circumstances which, if they could reason, would have shown them that it *must* be ineffective. A case has been recorded, in which a Queen, having only laid *drone* or male eggs, was stung to death by the workers, who cast her body out of the hive; but being

thus left without a queen, and no royal larvæ being in process of development to replace her, the workers actually tried to obtain a queen by treating *drone-larvæ* in the usual manner,—of course without effect.

60. Thus, then, while the Human organism may be likened to a keyed instrument, from which any music it is capable of producing can be called-forth at the will of the performer, we may compare a Bee or any other Insect to a barrel-organ, which plays with the greatest exactness a certain number of tunes that are set upon it, but can do nothing else.—The following fact, mentioned by Pierre Huber, affords a curious example of the purely *automatic* nature of instinctive action :—

There is a Caterpillar that makes a very complicated hammock, the construction of which may be divided into six stages. One of these caterpillars which had completed its own hammock, having been transferred to another carried only to its third stage, completed this also by reperforming the fourth, fifth, and sixth stages. But another caterpillar taken out of a hammock which had been only carried to its third stage, and put into one already completed, appeared much embarrassed, and seemed forced to go back to the point at which it had itself left off, executing anew the fourth, fifth, and sixth stages which had been already wrought out.

61. While perfection in the Articulated series consists in the high development of that portion of the Nervous system which is immediately connected with the organs of Sense and of Motion, and which ministers to Instinct, perfection in the VERTEBRATED series shows itself in the high development of a superadded organ, the *Cerebrum* (Fig. 9), which is the instrument of Intelligence ; of this scarcely any trace is found in the Invertebrated classes, whilst but a mere rudiment presents itself in the lowest class of Vertebrata.—Notwithstanding the marked difference in general plan of structure between an Insect and a FISH, the Physiologist recognizes a close correspondence in the essential characters of their Nervous systems. For the *Spinal cord* of the

latter is but a continuous series of ganglionic centres, directly connected with the Muscular apparatus of locomotion ; whilst its *Brain* consists of several pairs of ganglia, which are for the most part, like the Cephalic ganglia of Insects, the immediate centres of the Sensory nerves. The *Spinal cord* (commonly termed the spinal marrow) is not, as was formerly supposed, a mere bundle of Nerves proceeding from the Brain ; for, whilst serving to connect the Brain with the Nerve-trunks that supply the body generally, it is also an independent centre of reflex action. Although externally composed of longitudinal strands of *fibrous* substance, which, like that of the Nerve-trunks, acts mainly as a *conductor* of Nerve-force (§ 35),

contains a sort of core of *ganglionic* substance, which enlarges in the parts of the Cord that give off the nerve-trunks supplying the locomotive members (§ 64). Although there is no actual division of this ganglionic matter into separate segments, as in the gangliated Ventral cord of Articulata (§ 51), yet their segmental division is marked in the regular succession of pairs of nerve-trunks (Fig. 1), which issue from it between the successive Vertebræ that make up the Spinal column. And these Nerve-trunks, like those of the gangliated cord of Articulata (§ 53), have two sets of connections with it : some of their fibres being traceable into its ganglionic substance, which is the centre of the reflex actions of each particular segment ; whilst others are connected with its fibrous strands, and either pass into the ganglionic substance of the Cord at some distance above or below, or proceed continuously upwards towards the Brain. Thus, of their *afferent* fibres, some call forth reflex actions, either through their own segment of the Spinal cord, or through other segments above or below ; whilst others convey those impressions to the Sensorium, which there call forth Sensations. And of their *motor* fibres, some are excited to action by the reflex power of the segment of the Cord from which they seem to issue, and

others by that of segments above or below; whilst some execute the mandates of the Sensorial centres whose seat is in the head.

62. It is only in Vertebrate animals that a distinctness can be shown to exist between the *afferent* and the *motor* nerves: the proof of this distinctness being experimentally obtainable (1) through the separate origination of the two sets of fibres which are bound up in the *trunk* of each Spinal Nerve, by two bundles of *roots* (Fig. 11, 13, 14), of which the *posterior* are afferent, whilst the *anterior* are *motor*; and (2) through the distinct functions of some of the Nerves of the Head,—of which the Third, Fourth, and Sixth pairs, which supply the muscles of the Eye, the Seventh pair, which supplies the muscles of the Face generally, and the Ninth pair, which supplies the muscles of the Tongue, are *motor* only, whilst the Fifth pair is the general *sensory* nerve of the Face, having motor fibres only in its third division, which supplies the muscles of Mastication (Fig. 11). These nerves arise from that upward prolongation of the Spinal cord into the cavity of the skull, which is known as the *Medulla oblongata*, and which corresponds with the two lateral cords that diverge in *Articulata* to let the œsophagus go through (§ 52). As the whole Cerebro-spinal tract of *Vertebrata* lies between the Alimentary canal and the *dorsal* aspect of the body, there is no such divergence between the two lateral halves of their *Medulla oblongata*; but there is a *fissure* between them, which, obvious enough in *Fishes* (Fig. 8), is almost entirely closed in the higher *Vertebrata*, and is completely covered in by the *Cerebellum*. It is in the *Medulla oblongata* that the special ganglionic centre of the reflex movements of *Respiration* is lodged: the afferent or excitor nerves from the lungs (the *Par vagum*, Fig. 11), as well as from the face, proceeding to it; whilst other excitor fibres from the general surface, and the respondent motor fibres which call the respiratory muscles into action, are included in the ordinary nerve-trunks.

63. We should form a very erroneous notion of what essentially

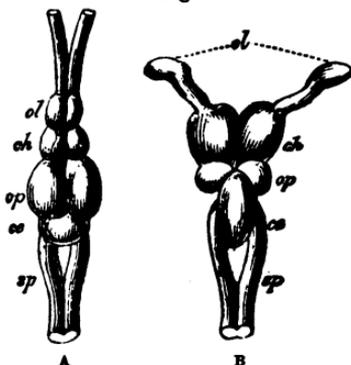
constitutes the *brain* of a Vertebrated animal, and of the mutual relations of the aggregate of ganglionic centres of which it is composed, if we were only to study it in *Man*. For the great relative size and complexity of his *Cerebrum* tends to conceal the fundamental importance of those ganglionic centres on which it is superposed, and which constitute a no less essential part of *his* brain than they do of that of Fishes, although their proportional size is so much less, as to lead to their being commonly regarded as merely subordinate appendages to the *Cerebrum*. The Brain of a FISH is almost entirely composed of an aggregate of Ganglia of Sense, which may be regarded as collectively constituting its *Sensorium*,—that is, according to ordinary phraseology, the “seat of consciousness,” but, more correctly, the Nerve-centre through the instrumentality of which the *Ego* becomes conscious of Sense-impressions. Putting aside the rudimentary *Cerebrum*, therefore, we may regard the *Axial cord* of the Fish (consisting of its Spinal cord with the Sensory ganglia) as the instrument, like the gangliated cord of the Insect, of its *automatic* movements; of which such as are executed through the Spinal centres do not involve Sensation, whilst in those of which the Sensory ganglia are the instruments, Sensation necessarily participates. When, on the other hand, in ascending the Vertebrate series from Fishes toward Man, we compare the different grades of development of the *Cerebrum* (Fig. 9) with the successively augmenting manifestations of *intelligence* (as exhibited in what we must regard as an *intentional* adaptation of means to ends under the direction of *experience*), we find so remarkable a correspondence, as scarcely to leave room for doubt that the *Cerebrum* is the instrument of those *Psychical* operations which we rank under the general designation *rational*. In proportion as the actions of an animal are directed by this endowment, the number of them that can be said to be *primarily* automatic, becomes not only *relatively* but *absolutely* limited; although many

actions (especially in Man) which were in the first instance initiated by the Will, come after long habit to be as truly Automatic as if they had been so originally (§ 71).

64. In the curious little *Amphioxus* or *Lancelet*, which is the lowest known type of a Vertebrate animal, there is nothing that can be properly called a Brain; and we have here one of those "experiments prepared for us by Nature" (as Cuvier termed them), which show that the Axial cord is the fundamental portion of the Nervous apparatus of the Vertebrate animal, as it is the first in order of development. The *Amphioxus*, having no eyes, has no Optic ganglia; and the Spinal cord has no ganglionic enlargement, indicative of any speciality of function, where it enters the head. But the mouth is furnished with a fringe of filaments, which are probably organs of Sense; and the ganglionic centre of their nerves may be considered as the Sensorium.—In others of the lowest Fishes having a Cartilaginous skeleton and a uniform worm-like body, such as the *Lamprey*, the Spinal cord has a like uniformity throughout; and the Brain consists merely of a cluster of ganglia within the skull, which scarcely bear a larger proportion to it, than do the Cephalic ganglia of Insects to the ganglia of their Ventral cord. But with the development of the Eyes and other organs of special Sense, we find the ganglionic centres of their nerves presenting a greatly increased size. The Brain of the *Cod*, viewed from above (Fig. 8, A), shows a series of three pairs of ganglia, lying in the same line with the Spinal cord: of which the first, *ol*, are the *olfactive* ganglia, or centres of the sense of Smell; while the third, *op*, which are the largest of all the ganglionic masses, are the *optic* ganglia, or centres of the sense of Sight. Between these is a pair of ganglionic masses, *ch*, which are usually designated as the rudiments of the *Cerebral Hemispheres*; but they may, perhaps, be more properly regarded as representing the bodies termed *corpora striata*, which, in the Brains of the higher Vertebrata, form part of that series of ganglionic masses

lying along the floor of the skull, on which the Cerebrum is superposed (Figs. 12, 13). Behind the Optic ganglia is a single ganglionic mass, *ce*, the *Cerebellum*; an organ which seems related rather to the regulation of the Movements of the Animal, than to its Psychological faculties, but of which the precise function has not

Fig. 8.



BRAINS OF FISH:—A, Cod; B, Shark;
ol, Olfactory ganglia; *ch*, Cerebral
 ganglia; *op*, Optic ganglia; *ce*,
 Cerebellum; *sp*, Spinal Cord.

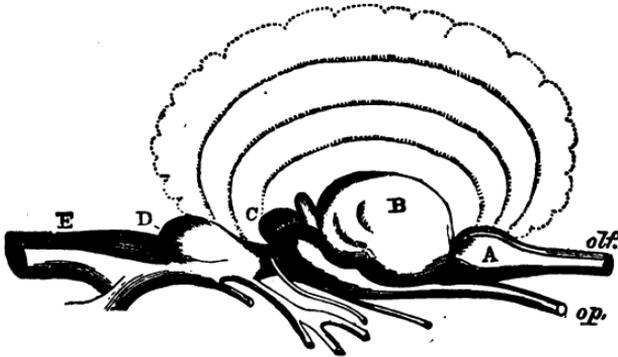
been determined. The Spinal cord, *sp*, is seen to be divided at the top by a fissure, which is most wide and deep beneath the Cerebellum, where there is a complete separation between its two halves.—In the *Shark*, of which, though the skeleton is only cartilaginous, the general organization is very high, we find the *olfactive* ganglia, *ol*, lying at some distance in front of the

olfactive ganglia, *ol*, lying at some distance in front of the cerebral ganglia, *ch*, and connected with them by peduncles or footstalks; the *cerebral* Ganglia are not only relatively much larger, but contain a more distinct rudiment of true Hemispheres separated from the Corpora Striata by a “ventricle” or cavity; the Cerebellum, too, is relatively larger.—In some Fish, separate ganglionic centres of the nerves of Hearing and Taste are found on the under side of the Brain; whilst in others they are imbedded in the Medulla Oblongata, as is the case in Man. In the Vermiform Fishes, the Spinal cord is nearly uniform in size from one end to the other; but in those which have powerful pectoral and ventral fins (the representatives of the fore and hind limbs of land-animals) there is an enlargement of the Spinal cord in the segments which are connected with the nerves of each of these pairs of members.

65. In REPTILES we do not find any considerable advance in the

development of the Brain, save that the Cerebral Hemispheres are somewhat larger, extending forwards so as to cover-in the Olfactive ganglia, and backwards so as partly to overlie the Optic ganglia (Fig. 9). The Cerebellum is almost invariably small, in conformity with the general inertness of these animals, and the want of variety in their movements. The Spinal cord is still very large in proportion to the Brain ; and experiment proves (as will be presently shown) that the greater part of the ordinary movements of these animals are simply reflex, being excited through the afferent nerves proceeding to their ganglionic centre in the Spinal cord, which then reacts on the Muscles through the motor nerves. Where there is a uniformity of motor action through the whole series of Vertebral segments, as in the Serpent, we find a uniformity in the size of the Spinal cord, and in the amount of ganglionic matter it contains, throughout its whole length,—just as in the Ventral cord of the

Fig. 9



BRAIN OF TURTLE, with diagrammatic representation of the increased development of the Cerebrum in higher Vertebrata:—A, Olfactory ganglia ; B, Cerebral ganglia ; C, Optic ganglia ; D, Cerebellum ; E, Spinal Cord ; *olf.*, Olfactory nerve ; *op.*, Optic nerve ; 3, Third pair ; 4, Fourth pair ; 5, Fifth pair.

Centipede (§ 51). But where the locomotive power is delegated to limbs which are appendages of particular segments, we find special ganglionic enlargements of the Spinal cord in those segments,—

just as in the Ventral cord of the perfect Insect (§ 53). Thus in the Lizards and Turtles, whose two pairs of members are nearly similar in locomotive power, we find an anterior and a posterior enlargement of the Spinal cord at the origins of their nerves; whilst in the Frog, whose movements are chiefly effected by its hind legs, the posterior enlargement is the principal.

66. As it has been chiefly by experiments on Frogs and other Reptiles (in which the excitability of the Nervo-muscular apparatus is much longer retained after death than in warm-blooded animals) that the independent endowments of the *Spinal cord* as a centre of Reflex action, have been ascertained, it may be advantageous here to describe the results of these inquiries; and to compare them with what has been learned from observation of the results of disease or accident in Man.—When the Brain has been removed, or its functions have been suspended by a severe blow upon the head, a variety of motions may still be excited by appropriate stimuli. Thus, if the foot be pinched, or burned with a lighted taper, it is withdrawn; and (if the subject of the experiment be a Frog) the animal will leap away, as if to escape from the source of irritation. If the vent of a Frog be irritated with a probe, the hind-legs will endeavour to push it away. And if acetic acid be applied over the upper and inner part of the thigh, the foot of the same side will wipe it away; but if that foot be cut off, after some ineffectual efforts and a short period of inaction, the same movement will be made by the foot of the opposite side.

67. Now the performance of these as well as of many other movements that show a most remarkable adaptation to a purpose, might be supposed to indicate that *sensations* are called-up by the impressions; and that the animal can not only *feel*, but can *voluntarily direct* its movements, so as to get rid of the irritation which annoys it. But such an inference would be inconsistent with other facts.—In the first place, the motions performed by an animal under such circumstances are never spontaneous, but are

always excited by a *stimulus* of some kind. Thus, a decapitated Frog, after the first violent convulsive movements occasioned by the operation have passed away, remains at rest until it is touched ; and then the leg or its whole body may be thrown into sudden action, which immediately subsides again. Again, we find that such movements may be performed, not only when the Brain has been removed, the Spinal cord remaining entire, but also when the Spinal cord has been itself cut across, so as to be divided into two or more portions, each of them completely isolated from each other, and from other parts of the nervous centres. Thus, if the head of a Frog be cut-off, and its Spinal cord be divided in the middle of the back, so that its fore-legs remain connected with the upper part, and its hind-legs with the lower, each pair of members may be excited to movement by a stimulus applied to itself ; but the two pairs will not exhibit any simultaneous motions, as they will do when the Spinal cord is undivided. Or, if the Spinal cord be cut across, without the removal of the Brain, the lower limbs may be *excited* to movement by an appropriate stimulus, though the animal has clearly no power over them ; whilst the upper remain under its control as completely as before. Now it is scarcely conceivable that, in this last case, Sensations should be felt and Volition exercised through the instrumentality of that portion of the Spinal cord which remains connected with the nerves of the posterior extremities, but which is cut-off from the Brain. For, if it were so, there must be two distinct centres of Sensation and Will in the same animal, the attributes of the Brain not being affected ; and, by dividing the Spinal cord into two or more segments, we might thus create in the body of one animal two or more such independent centres, in addition to that which still holds its proper place within the head. To say that two or more distinct centres of Sensation and Will are present in such a case, would really be the same as saying that we have the power of constituting

two or more distinct *Egos* in one body,—which is manifestly absurd.

68. But the best proofs of this limitation of the endowments of the Spinal Cord, are derived from the phenomena presented by the Human subject, in cases where that organ has suffered injury by disease or accident in the middle of the back. We find that when this injury has been severe enough to produce the effect of a complete division of the Cord, there is not only a total want of Volitional control over the lower extremities, but a complete absence of Sensibility also,—the individual not being in the least conscious of any impression made upon them. But when the lower segment of the Cord remains sound, and its nervous connexions with the limbs are unimpaired, distinct *reflex* movements may be excited in the limbs by stimuli directly applied to them; and this without the least Sensation on the part of the patient, either of the cause of the movement, or of the movement itself :—

a. Among the notes left by John Hunter, there was the record of a case of Paralysis of the lower extremities, in which it appeared that Hunter had witnessed reflex movements of the legs of the patient, occasioned by excitation which did not produce Sensation. When the patient was asked whether he *felt* the irritation by which the motions were excited, he significantly replied—glancing at his limbs,—“No, Sir, but you see *my legs* do.” (Of this interesting fact, the Writer was informed by his friend Sir James Paget, to whom Hunter’s notes furnished materials for the admirable Catalogue which he drew up of the Pathological portion of the Hunterian Museum.)

b. In a case of Paralysis, recorded by Dr. William Budd, in which injurious pressure on the Spinal cord in the back was produced by angular distortion of the spine, the sensibility of the legs was extremely feeble, and the power of voluntary motion was almost entirely lost. When, however, any part of the skin of the legs was pinched or pricked, the limb thus acted-on jumped with great vivacity; the toes were retracted towards the instep, the foot raised on

the heel, and the knee so bent as to raise it off the bed; the limb was maintained in this state of tension for several seconds after the withdrawal of the stimulus, and then became suddenly relaxed. In general, while one leg was convulsed, its fellow remained quiet, unless stimulus was applied to both at once. In these instances, the pricking and pinching were perceived by the patient; but *much more violent* contractions were excited by a stimulus of whose presence he was unconscious. When a feather was passed lightly over the skin, in the hollow of the instep, as if to tickle, convulsions occurred in the corresponding limb, much more vigorous than those induced by pinching or pricking; they succeeded one another in a rapid series of jerks, and these were repeated as long as the stimulus was maintained. But when any other part of the limb was irritated in the same way, the convulsions which ensued were very feeble, and much less powerful than those induced by pricking or pinching.—This patient gradually regained both the sensibility of the lower extremities, and voluntary power over them; and as voluntary power increased, the susceptibility to involuntary movements diminished, as did also their extent and power.—This case, then, exhibits an increased tendency to perform reflex actions, when the control of the Brain was suspended; and it also shows that a *slight* impression upon the *surface*, of which the patient was *not conscious*, was more efficacious in exciting the Automatic movements, than were others of a more powerful nature which affected the Sensorium.

c. In another case recorded by Dr. W. Budd, the Paralysis was more extensive and complete, having been produced by an injury (resulting from a fall into the hold of a vessel) at the lower part of the neck. There was at first a *total loss* of Voluntary power over the lower extremities, trunk, and hands; slight voluntary power remained in the wrists, rather more in the elbows, and still more in the shoulders. The Sensibility of the hands and feet was greatly impaired. Recovery took place very gradually; and during its progress, several remarkable phenomena of reflex action were observed. At first, tickling one sole excited to movement that limb only which was acted upon; afterwards, tickling either sole excited both legs, and, on the 26th day, not only the lower extremities, but the trunk and upper extremities also. Irritating the soles, by tickling or otherwise, was

at first the only method, and always the most efficient one, by which convulsions could be excited. On the 41st day, a hot plate of metal was applied to the soles, and was found to be a more powerful excitor of movement than any before tried. The movements continued as long as the hot plate was kept applied; but the same plate, at the common temperature, excited no movements after the first contact. Though the *contact* was distinctly felt by the patient, *no sensation of heat* was perceived by him, even when the plate was applied hot enough to cause blistering.—On the first return of Voluntary power, the patient was enabled to restrain in some measure the excited movements; but *this required a distinct effort of his Will*; and his first attempts to walk were curiously affected by the persistence of the susceptibility to reflex excitement. When he first attempted to stand, the knees immediately became forcibly bent under him; this action of the legs being excited by contact of the soles with the ground. On the 95th day this effect did not take place, until the patient had made a few steps; the legs then had a tendency to bend up, a movement which he counteracted by rubbing the surface of the abdomen; this rubbing excited the extensors to action, and the legs became extended with a jerk. A few more steps were then made, the manœuvre was repeated, and so on. This susceptibility to involuntary movements from impressions on the soles, gradually diminished; and on the 141st day, the patient was able to walk about, supporting himself on the back of a chair which he pushed before him; but his gait was unsteady. Sensation improved very slowly: it was on the 53rd day that he first slightly perceived the heat of the metal plate.—Now in this case, the abolition of Common Sensation was not so complete as in the former instance; but of the peculiar kind of impression which was found most efficacious in exciting reflex movements, *no consciousness whatever was experienced*. It is further interesting to remark, that the reflex actions were very feeble during the first seven days, in comparison with their subsequent energy; being limited to slight movements of the feet, which could not always be excited by tickling the soles. It is evident, then, that the Spinal Cord must have been in a state of concussion, which prevented the manifestation of its peculiar functions so long as this effect lasted; and it is easy, therefore, to perceive, that a still more severe shock might permanently destroy its power, so as to prevent

the exhibition of any of the phenomena of reflex action.—(*Medico-Chirurgical Transactions*, vol. xxii., 1839.)

69. The dependence of the movements of Respiration and Deglutition (swallowing) upon the independent endowments of the ganglionic centres contained in the upper part of the Spinal cord, (§ 62) is equally well established.—It has occasionally happened that even Human infants have been born alive without any Brain ; and have lived and breathed for some hours—crying and even sucking,—though they had no Nerve-centres above the Medulla Oblongata. And new-born puppies, reduced to the same condition by the removal of the whole contents of the skull except the Medulla Oblongata, have continued to perform the same actions. The *independence* of the Ganglionic centres, not only of the ordinary Spinal nerves, but of those which supply the muscles concerned in the acts of Breathing and Sucking, has been thus fully demonstrated. And the purely *reflex* character of the movement of Sucking in the new-born Mammal, is proved by the fact that it is immediately excited in a brainless puppy by introducing the finger moistened with milk between its lips. Now this act requires a combined contraction of a number of muscles,—those of grasping by the lips, those by which a vacuum is produced in the mouth, those of respiration, and those of swallowing,—all of which manifest the most perfect adaptation of means to ends ; but it is clear that this adaptation is not made by any *intention* on the part of the Ego, but is the result of the working of its Nervous mechanism. If an Animal from which everything above the Medulla Oblongata has been removed has any Consciousness at all, it can be of no higher kind than that *sense of need*, which we ourselves experience when we hold our breath for a short time, and which directly prompts the movements that tend to its relief, without the least Idea, on our own parts, of the *purpose* which those movements will answer.

70. These facts, taken in connexion with the preceding experi-

ments both upon Vertebrated and Articulated animals, distinctly prove that Sensation is *not* a necessary link in the chain of reflex actions; but that all which is required is the "nervous circle" already described (§ 47). Thus these movements are all *necessarily* linked with the stimulus that excites them; that is, the same stimulus will always produce the same movement, when the condition of the body is the same. Hence it is evident that the Judgment and Will are *not* concerned in producing them, and that the *adaptiveness* of the movements is no proof of the existence of consciousness and discrimination in the being that executes them; such adaptation being made *for* the being—by the peculiar structure of its Nervous apparatus, which causes a certain movement to be executed in response to a given impression,—not *by* it. An animal thus circumstanced may be not unaptly compared to an Automaton, in which particular movements, each adapted to produce a given effect, are produced by touching certain springs.

71. It seems not improbable, however, that some of these reflex movements,—such as are performed by the legs of a Frog as if with the purpose of removing a source of irritation (§ 66),—were not *originally* automatic, but have *become* so by habit; these *secondarily* automatic actions (as Hartley well designated them) coming to be performed with the same absence of Will or Intention, as the *originally* or *primarily* automatic. Such is pretty certainly the character we are to assign to the ordinary Locomotive actions of Man. For though we are accustomed to regard these as Voluntary, and although they are so in the sense that we can commence and stop them at will, yet they continue *of themselves*, when—having been once set going—our Will has been entirely withdrawn from them; our whole attention being engrossed by some train of thought of our own, or by conversation with a companion. And it seems clear that in this case the succession of movements is purely reflex; being

sustained by the successive contacts of our feet with the ground, each exciting the next action (§ 16). For numerous instances are on record, in which Soldiers have continued to *march* in a sound sleep; *riding on horseback* (which requires a constant exercise of the balancing power) during sleep is a not unfrequent occurrence; and the Writer has been assured by an intelligent witness, that he has seen a very accomplished Pianist complete the performance of a piece of music in the same state.* A case has been mentioned to him by Dr. William Budd, of a patient subject to sudden attacks of temporary suspension of consciousness without convulsion, who, whenever the paroxysm came-on, persisted in the kind of movement in which he was engaged at the moment; and thus on one occasion fell into the water through continuing to walk onwards, and frequently (being a shoemaker by trade) wounded his fingers with the awl in his hand, by a repetition of the movement by which he was endeavouring to pierce the leather.

72. Now in all these forms of *secondarily-automatic* activity, it seems reasonable to infer that the same kind of connection between the excitor and the motor nerves comes to be formed by a process of *gradual development*, as *originally* exists in the Nervous systems of those animals whose movements are *primarily* automatic; this portion of the Nervous mechanism of Man being so constituted, as to *grow-to* the mode in which it is habitually called into play.—Such an idea is supported by all that we know of the formation and persistence of *habits* of Neruo-muscular action. For it is a matter of universal experience, that such habits are far more readily acquired during the periods of Infancy, Childhood, and Youth, than they are after the attainment of

* In playing by memory on a musical instrument, the *muscular* sense (§ 80) often suggests the sequence of movements with more certainty than the *auditory*; and since it is certain that impressions derived from the Muscles may prompt and regulate successional Movements without affecting the Consciousness, there is no such improbability in the above statement as might at first sight appear.

adult age ; and that, the earlier they are acquired, the more tenaciously are they retained. Now it is whilst the Organism is growing most rapidly, and the greatest amount of new tissue is consequently being formed, that we should expect such new connections to be most readily established : and, it is then, too, that the nutritive processes most readily take-on that new mode of action (§ 276), which often becomes so completely a “second nature” as to keep-up a certain acquired mode of Nutrition through the whole subsequent life.—It is an additional and most important confirmation of this view, that (as was shown by Dr. Waller) when a Nerve-trunk has been cut-across, the re-establishment of its conductive power which takes-place after a certain interval, is not effected by the re-union of the divided fibres, but by the *development* of a new set of fibres *beyond* the point of section, in the place of the old ones (which undergo a gradual degeneration), the fibres on the *central* side remaining unaltered. And the same may be pretty certainly affirmed of that complete recovery of Nervous power in the hinder part of the body and limbs, which has been shown to take place by M. Brown-Séguard, after they had been entirely paralysed by complete division of the Spinal cord in the back. For if this recovery had been the result of simple *re-union* of the divided surfaces (as in an ordinary cut finger), the restoration of power,—of which no indication can be perceived for some weeks, and which altogether requires several months—would be much more speedy. The length of time required, which corresponds with that needed in Man after severe injuries to the Spine (§ 68), affords clear evidence that the process in these cases is really one of *regeneration* ; and this fact, in connection with many others, shows that the Nervous substance is not only more capable of such complete regeneration than any other tissue in the body, but is in a state of more constant and rapid *change*. It will be shown hereafter (§§ 277-282) how intimate is the relation between Mental and Bodily habits ; and

how the formation and maintenance of both are dependent on this Nutritive reconstruction of the Nervous apparatus.

73. There are many irregular or abnormal Reflex actions, known as *convulsive*, performed through the instrumentality of the Spinal cord, the study of which is peculiarly instructive. These movements are not produced by injuries of the Cerebral hemispheres ; but, in the production of them, the *Sensory ganglia* are often associated with the Spinal cord. They may either be (1) simply *reflex*, being the natural result of some extraordinary irritation ; or (2) simply *centric*, depending upon an excited condition of the ganglionic centres of the Spinal cord, which occasions muscular movements without any stimulation ; or (3) they may depend upon combined action on both principles ; the Nerve-centres being in a highly irritable state, which causes very slight irritations (such as would otherwise be inoperative) to excite violent reflex or convulsive movements. The undue excitability of the Spinal cord may have its origin in an abnormal state of the Blood : thus we know that it may be produced by the introduction of certain poisons (as Strychnia) into the circulation ; and it is probable that morbid matters generated within the body may have the same effect, and that the convulsive actions which occur in various diseased conditions of the system are generally due in part to that condition. In the case of the convulsions which are not unfrequent during the period of teething, being immediately excited by the irritation which results from the pressure of the tooth as it rises against the unyielding gum, the stimulus would be insufficient to produce the violent result, were it not for a peculiarly excitable state of the Spinal cord, brought about by various causes, amongst which impure air and unwholesome food are the most potent. In like manner, when such an excitable state exists, to which children are peculiarly liable, convulsions may be occasioned by the presence of intestinal worms, of irritating substances, or even simply of undigested matters, in the alimentary canal ; and will cease as soon

as they are cleared-out, in the same manner as the convulsions of teething may often be at once checked by the free lancing of the gums. A change to a purer atmosphere is commonly found the most efficacious means of reducing the morbid excitability of the Spinal cord, and thus of diminishing the liability to the recurrence of the Convulsion.

74. The influence of the condition of the Spinal cord itself is manifested in the convulsive diseases known as Tetanus, Epilepsy, and Hysteria.—In *Tetanus* (commonly known as “lock-jaw”) there is a peculiarly excitable state of the Spinal cord and Medulla oblongata, not extending to the higher centres. This may be the result of causes altogether internal; the condition exactly resembling that which may be artificially induced by the administration of Strychnia, or by its application to the Cord. Or it may be first occasioned by some local irritation, as that of a lacerated wound; the irritation of the injured nerve being propagated to the Nerve-centres, and establishing the excitable state in them.—In like manner, *Epilepsy*, which consists in a combination of Convulsive actions with temporary suspension of Consciousness, may result from the irritation of local causes, like the convulsions of teething; and may cease, like them, when the sources of irritation are removed. It appears probable from recent researches, that the sudden but temporary suspension of the functions of the Brain, may be due to the spasmodic contraction of the vessels of the Sensorium, induced by the extension of the reflex motor impulse to the “vaso-motor” Nerves (§ 113). Certain forms of Epilepsy, on the other hand, are distinctly traceable to diseased states of the highest Nerve-centres. (See Appendix.)

75. These and other forms of Convulsive disorder, when productive of a fatal result, usually act by suspending the Respiratory movements; the muscles that effect these being fixed by the spasm, which thus prevents the air from passing either in or out; so that suffocation takes place as completely as if the entrance to the air-

passages were closed.—It is remarkable that nearly every one of them may be imitated by *Hysteria*; a state of the Nervous system which is characterized by its peculiar excitability, but in which there is no such fixed tendency to irregular action as would indicate any positive disease; one form of convulsion often taking the place of another, at short intervals, with the most wonderful variety. This state is generally connected with an undue excitability of the *Emotions*; and, from their known influence on the “vaso-motor” Nerves (§§ 113, 565), it seems likely that many of its manifestations are produced through the instrumentality of that system.

76. Proceeding now to the Class of BIRDS, we find a considerable advance in the character of the Brain as compared with that of Reptiles. The Cerebral hemispheres are greatly increased in size; so as to cover in not merely the Olfactory ganglia, but in great part also the Optic ganglia. The former are of comparatively small size, the organ of Smell in Birds not being much developed: the latter are very large, in conformity with the acuteness of Sight which is their special characteristic. The Cerebellum is of large size, in conformity with the active and varied muscular movements performed by animals of this class; but it consists chiefly of the central lobe, with little appearance of lateral hemispheres. The Spinal cord is still of considerable size in comparison with the Brain; and it is much enlarged at the points whence the legs and wings originate. In the species which have the most energetic flight, such as the Swallow, the enlargement is the greatest where the nerves of the wings come off; but in those which, like the Ostrich, move principally by running on the ground, the posterior enlargement, from which the legs are supplied with nerves, is much the more considerable.

77. It is not a little curious that Birds,—which present so many points of analogy to Insects in structure as well as in mode

of life, as to have been called the "Insects of the Vertebrated series,"—should strongly resemble Insects also in the high development of their *instincts*; i.e., the marked tendencies they show to particular kinds of movement, at the stimulus and under the guidance of particular sensations, without any experience to direct them. Thus, even the Chick within the egg sets itself free by tapping with its bill (furnished at that time with a sharp horny scale, which soon afterwards falls off) against the shell that encloses it; and, having once penetrated this, carries its chipping in a regular circle round the large end of the shell, which then drops off. In no long time after its escape, it raises itself upon its legs, and soon begins to run about, and to peck at insects, grains, &c., with a very sure aim. Mr. Spalding, who has recently made a series of very interesting observations on this point, found that if he "hooded" Chicks, or put them into a bag immediately on coming forth from the egg, and kept them so for two or three days until they could run about, the first effect of uncovering their eyes was to produce a sort of stunned condition; but recovering from this in a minute or two, they would *immediately* follow the movements of crawling insects, and peck at them with unerring aim. So, he tells us, chickens hatched and kept in the bag for a day or two, when taken out and kept nine or ten feet from a box in which a hen with chicks was concealed, after standing for a minute or two, uniformly set off straight for the box in answer to the call of the hen, though they had never seen her, and had never before heard her voice. This they did, struggling through grass, and over rough ground, when not yet able to stand steadily upon their legs. Even hooded chicks tried to make their way towards the hen, obviously guided by sound alone. So, on the other hand, a turkey only ten days old, which had never in its life seen a hawk, was so alarmed by the note of a hawk secreted in a cupboard, that it fled in the direction opposite to the cupboard with every sign of terror.*

* *Macmillan's Magazine*, Feb., 1873.

78. Now these actions clearly belong to the class which the Physiologist terms *Sensori-motor* or *Consensual* ; being the reflex actions of that higher division of the Nerve-centres, which consists of the *Sensory ganglia* as distinguished from the Cerebrum. The sense of Sight obviously affords the chief direction of the movements of Birds : and that the Sensory ganglia, in these higher Vertebrata, continue to furnish the instrumentality through which Sensations are excited by impressions made on the organs of Sense, and respondent motions are called forth, appears from the effect of experimental removal of the Cerebral hemispheres of Birds, the Sensory ganglia being left intact. For a Bird thus mutilated maintains its equilibrium, and recovers it when it has been disturbed ; if pushed, it walks ; if thrown into the air, it flies. A Pigeon deprived of its Cerebrum has been observed to seek out the light parts of a partially-illuminated room in which it was confined, and to avoid objects that lay in its way ; and at night, when sleeping with closed eyes and its head under its wing, it raised its head and opened its eyes upon the slightest noise.—So, again, the removal or destruction of either pair of these Sensory centres appears to involve the loss of the particular Sense to which it ministers ; and frequently, also, to occasion such a disturbance in the ordinary movements of the animal, as shows the importance of these centres in regulating them. Such experiments have been chiefly made upon the *Optic* ganglia ; the partial loss of which on one side produces temporary blindness in the eye of the opposite side, and partial loss of muscular power on the opposite side of the body ; whilst the removal of a larger portion, or the complete extirpation of it, occasions permanent blindness and immobility of the pupil, and temporary muscular weakness, on the opposite side. This temporary disorder of the Muscular system sometimes manifests itself in a tendency to move on the axis, as if the animal were giddy ; and sometimes in irregular convulsive movements.—Here, then, we have proof of the

necessity of the integrity of this ganglionic centre, for the possession of the sense of Vision ; and we have further proof that the ganglion is connected with the Muscular apparatus by motor fibres issuing from it. The reason why the Eye of the *opposite* side is affected, is to be found in the *crossing* of the optic nerves in their course towards the optic ganglia ; whilst the influence of the operation on the Muscles of the *opposite* side of the body, results from the like crossing of the motor fibres in their downward course through the Medulla oblongata.— Similar disturbances of movement have been produced by injuries to the organs of Sense themselves, or to the nerves connecting them with the Sensorial centres. Thus the division of one of the “semicircular canals” of the Ear in pigeons and rabbits has been found to occasion constant efforts to move in the plane of that canal. (See Appendix.)

79. Notwithstanding that, in Man, the high development of *Intelligence*, and the exercise of the *Will*, supersede in great degree the operations of *Instinct*, we still find that there are in ourselves certain movements which can be distinguished as neither Volitional nor Excito-motor ; being as truly Automatic as the latter, but requiring that the impressions which originate them should be *felt* as Sensations.—As examples of this group, we may advert to the start upon a loud and unexpected sound ; the sudden closure of the eyes to a dazzling light, or on the approach of bodies that might injure them, which has been observed to take place even in cases of paralysis, in which the eyelids could not be voluntarily closed ; the act of sneezing excited by an irritation within the nostril, and sometimes also by a dazzling light ; the semi-convulsive movements and the laughter called forth by tickling ; and the vomiting occasioned by the sight or the smell of a loathsome object. So, again, the act of yawning, ordinarily called-forth by certain uneasy sensations within ourselves, is also excited by the sight or hearing of the act as performed by another.—Various

phenomena of Disease exhibit the powerful influence of Sensations in producing automatic motions. In *Hydrophobia*, for example the stimuli most effectual in exciting the convulsive movements, are those which act through the nerves of special Sense ; thus the *sight* or the *sound* of water will bring on the paroxysm, and any attempt to *taste* it increases the severity of the convulsions ; and it is further not a little significant, that the suggestion of the *idea* of water will produce the same result (§ 105).—In many *Hysterical* subjects, again, the sight of a paroxysm in another individual is the most certain means of its induction in themselves.—The most remarkable examples, however, of automatic movements depending upon Sensations, are those which we come to perform *habitually*, and as we commonly say *mechanically*, when the attention and the voluntary effort are directed in quite a different channel (§§ 191-194). The man who is walking through the streets in a complete reverie, unravelling some knotty subject, or working-out a mathematical problem, not only performs the movements of progression (which are themselves excito-motor, § 71) with great regularity, but also directs these in a manner which plainly indicates the guidance of Sight. For he will avoid obstacles in the line of his path, and he will follow the course which he has been accustomed to take, although he may have intended to pass along some very different route ; and it is not until his attention is recalled to his situation, that his train of thought suffers the least intermission, so that his Will is brought to bear upon his motions (§ 117).

80. We may recognize the agency of the Sensory ganglia, however, in Man, not merely in their direct and independent operation upon his muscular system, but also in the manner in which they participate in all his Voluntary actions. The existence of a sensation of some kind, in connection with muscular exertion, seems essential to the continuance of the latter. Our ordinary movements are guided by what is termed the *muscular sense* ; that is, by a feeling

of the condition of the muscles, that comes to us through their own afferent nerves. How necessary this is to the exercise of Muscular power, may be best judged-of from cases in which it has been deficient. Thus a woman who had suffered complete loss of sensation in one arm, but who retained its motor power, found that she could not support her infant upon it without constantly *looking* at the child ; and that if she were to remove her eyes for a moment, the child would fall, in spite of her knowledge that her infant was resting upon her arm, and of her desire to sustain it. Here, the Muscular sense being entirely deficient, the sense of Vision supplied what was required, so long as it was exercised upon the object ; but as soon as this guiding influence was withdrawn, the strongest Will could not sustain the muscular contraction.—Again, in the production of Vocal sounds, the nice adjustment of the muscles of the larynx, which is requisite to produce determinate tones, can only be effected in obedience to a Mental conception of the tone to be uttered ; and this conception cannot be formed, unless the sense of Hearing has previously brought similar tones to the mind. Hence it is that persons who are born *deaf* are also *dumb*. They may have no malformation of the organs of Speech ; but they are unable to utter distinct vocal sounds or musical tones, because they have not the guiding conception or recalled sensation of the nature of these. By long training, and by efforts directed by the Muscular sense of the larynx itself, some persons thus circumstanced have acquired the power of speech ; but the want of sufficiently definite control over the vocal muscles, is always very evident in their use of the organ.—So, again, all the combinations of diverse Muscular actions which take place in the conjoint movements of the eyes, can be shown to be executed by this automatic Mechanism under the guidance of the Visual sense ; the mandate to direct the eyes to a given point, being all that is issued by the Will (§ 21).

81. There seems no adequate reason for the belief that the

addition of the Cerebrum in the Vertebrated series *alters* the endowments of the Sensory ganglia on which it is superposed ; on the contrary, we everywhere see that the addition of new ganglionic centres, as instruments of new functions, leaves those which were previously existing in the discharge of their original duties. Hence we should be led to regard them as the instruments of Consciousness, even in Man,—each pair of ganglionic centres ministering to that peculiar kind of sensation for which its nerves and the organs they supply are set apart ; thus we should consider the Optic ganglia to be the seat of Visual sensations, the Auditory to be the seat of the sense of Hearing, and so on. And we should also consider them as the instruments whereby Sensations, of whatever kind, either originate or direct *instinctive* movements. The mechanism of all such movements, in fact, may be regarded as consisting of that part of the Nervous system which answers to the entire gangliated Cord of Articulated Animals, whose active life may be characterised as almost purely instinctive. And we shall presently see that this automatic Apparatus is as readily distinguishable from the *Cerebrum* (which is the instrument of Intelligence) even in *Man*, as it is in the lower Vertebrata ; provided that we study the structure of his Brain under the guidance of Comparative Anatomy.

82. It would be impossible to find a better illustration of the contrast between Instinct and Intelligence as springs of action, than is afforded by the comparison of the habits of Birds in a state of Nature, with those which they acquire when brought into relation with Man. There can be no reasonable doubt that their Architectural constructions, like those of Insects, proceed from an internal impulse, which prompts each individual of a species to build after one particular pattern, to choose a situation suitable to its requirements, and to go in search of materials of a certain kind, though others might be much more easily obtained. But, on the other hand, in the working-out of this design, it is clear that Birds

often profit by experience, and *learn* to use special means when special ends have to be provided for.—The following case, narrated by Mr. Jesse, supplies a very good example of this intelligential modification of the instinctive tendency :—

a. A pair of Jackdaws endeavoured to construct their nest in one of the small windows that lighted the spiral staircase of an old church tower. As is usual, however, in such windows, the sill sloped inwards, with a considerable inclination; and, consequently, there being no level base for the nest, as soon as a few sticks had been laid, and it was beginning to acquire weight, it slid down. This seems to have happened two or three times; nevertheless the birds clung with great pertinacity to the site they had selected, and at last devised a most ingenious method of overcoming the difficulty. Collecting a great number of sticks, they built up a sort of cone upon the staircase, the summit of which rose to the level of the window-sill, and afforded the requisite support to the nest; this cone was not less than six feet high, and so large at its base as quite to obstruct the passage up the staircase; yet, notwithstanding the large amount of material which it contained, it was known to have been constructed within four or five days.—Now as this was a device quite foreign to the natural habit of the bird, and only hit-upon after the repeated failure of its ordinary method of nest-building, the curious adaptation of means to ends which it displayed can scarcely be regarded in any other light, than as proceeding from a *design* in the minds of the individuals who executed it.

The following circumstance, again, which was related to the Writer by a friend who witnessed it, shows how readily some Birds will spontaneously learn to profit by experience in matters which arise out of their relation to Man :—

b. A Wren having built her nest in a rather dangerous situation in the slate-quarries at Penrhyn, was liable to great disturbance from the occasional explosions. She soon learned, however, to take warning by the sound of the bell, which was rung to give notice to the workmen when a blast was about to be made; and would then quit her nest and fly to a little distance, remaining there until the shock of the ex-

plosion had passed off. This was noticed by the workmen; and the sagacity of the Wren was made a subject of exhibition to the visitors at the quarries, the bell being frequently rung for the mere purpose of causing her to quit her nest. After a time, however, it was observed that the bird no longer flew away upon the ringing of the bell, but that she remained until she saw whether or no the workmen began to move; if *they* drew off, *she* would go too; but if they remained in their places, she would not stir.—Now this conduct, sagacious as it may appear, is evidently explicable on a very simple hypothesis of the Mental operations of the bird. Observant, from its elevated post, of all that took place in its neighbourhood, the wren in the first instance learnt by experience to *associate* the ringing of the bell with the coming explosion, so as to anticipate the latter on the occurrence of the former. Being frequently disturbed, however, by the demonstration of her sagacity, and driven without occasion from her nest, the bird would perceive that this first association no longer held good; and nothing but a further period of observation was required for the bird to derive a more positive warning from the departure of the workmen, from which she learned by experience that a certain indication of the approaching explosion might be derived. None of those higher processes which enter into our more complex trains of Reasoning, were here required; the mere formation of an *association*, which gives the data for all these, which is the foundation of all knowledge derived from experience, and which appears to be the faculty first called into action in the mind of the Human infant, being quite sufficient to account for it (§ 217).

Another instance in which a Bird, without any direct teaching, learned to perform a particular action altogether foreign to its nature, was related to the Writer by a Swiss friend who had often witnessed the occurrence :—

c. In the town in which he was brought up, was a domesticated Stork, which was accustomed to receive its food every evening about six o'clock, along with the ordinary poultry; and the latter, being usually allowed to roam at large in the streets, were collected together, at the proper time, by a man who went through the town in search of them. The Stork, after having thus learned not to expect

its food until the poultry had been all collected, spontaneously accompanied the collector, and assisted him in bringing the fowls together: and after doing this for a considerable time, becoming gradually more and more independent and self-relying, it became quite competent to perform this duty for itself, and was at last intrusted with it, so that it might be seen on any evening, gravely perambulating the town, collecting its flock of poultry, and driving it home, just as a Shepherd's Dog collects the sheep.

So, again, Rooks and other birds which live in the neighbourhood of Man, and are liable to be shot-at, often show in their actions that they distinguish whether a man who approaches them carries a gun, or not; and are said to be able to distinguish a gun from a walking-stick put to the shoulder after the manner of a gun. And it is further noticeable that they distinguish Sunday from other days; flying lower than usual, and sometimes visiting gardens where they would not venture on the days on which they would be liable to be molested. Whether they distinguish the day by some of its outward signs, or are guided by that remarkable power of measuring Time which many animals certainly possess, cannot be stated with certainty.—The following circumstance, of which the Writer is personally cognizant, indicates the acquirement of the same kind of knowledge:—

d. In a Ladies' school formerly kept near Bristol, it was customary for the young people to go into the play-ground for a few minutes every week-day, soon after twelve o'clock, and there to eat their luncheon. The crumbs of bread which they dropped on the ground proved very attractive to the sparrows in the neighbourhood, which would congregate on the walls of the garden a little *before* twelve every day, waiting for the appearance of their young friends, and patiently anticipating the time when the return of the ladies into the school-room would allow them to profit by their leavings. But on Sundays, the habits of the family were altogether different; the visit to the play-ground gave place to attendance on public worship, and the mid-day luncheon to an early dinner; on that day, therefore, the sparrows went without their accustomed meal. But it was obvious that they

did not expect it; for it might be observed by any one who happened to remain at home on Sunday morning, that the usual mid-day gathering did not present itself,—the sparrows having evidently learned, not merely to judge very accurately of the approach of noon on the week-days on which they might expect their feed, but also to distinguish the day on which they must dispense with it.

83. The Birds of the *Parrot* tribe are pre-eminent for their educability and apparent intelligence: but this educability chiefly depends upon their great *imitative* power; and their intelligence is really of a very low order, consisting in an exercise of the simple faculty of Association, the manifestations of which are chiefly remarkable as taking the form of vocal utterances. The associations which the Parrot forms between certain vocal sounds and certain visual objects, lead it often to give forth the former under circumstances of singular appropriateness; but it would be quite a mistake to attribute such utterances to any higher intelligence than that of a young child just learning to talk, which repeats the phrases it has learned by imitation, without any distinct idea of their meaning, but sometimes brings them in remarkably *à propos*. A very good illustration of both faculties is afforded by a couple of anecdotes which the Writer remembers to have heard in his youth from his aged friend Mr. Palmer of Bristol:—

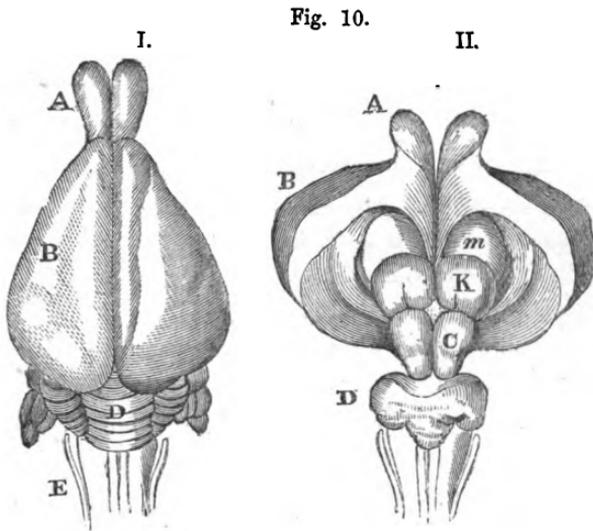
In Mr. Palmer's younger days, when Bristol was largely engaged in the African slave-trade, the large grey Parrots (which are far more intelligent than the green) were very numerous in that city, and often created great amusement. There was one which hung outside a shop in the neighbourhood of the quay, and had a remarkable tact in distinguishing sailors; and if a sailor happened to stop before his cage when he was in the middle of singing Handel's 104th psalm (which he performed most correctly), he would break off from "My soul praise the Lord," into "D——n your eyes, you fool, what are you looking at?" The sight of a sailor obviously called forth the phraseology which the bird had been accustomed to associate with that class.—Another Parrot caused no small degree of personal

annoyance to Mr. Palmer himself. In his younger days, when an attorney's clerk, he was somewhat given to dandyism, and particularly rejoiced in a very long *queue*. A parrot, which was accustomed to hang outside the window of a house that he passed in his way between his residence and his office, was taught by some waggish boys to salute him with—"There goes the man with the long pig-tail;" and this the parrot learned to sing-out, without any prompting, whenever Mr. Palmer made his appearance; the continual repetition of which remark was so disagreeable to him, that he changed his route, and went through another street, to avoid it.—Now we have no reason to suppose that the bird knew the meaning of what it uttered, or was itself cognizant of the remarkable length of Mr. Palmer's pigtail; it simply learned to distinguish the individual, and to utter the phrase which it had been taught to associate with the sight of him.—On the same simple principles we may explain most, if not all, of what appears most marvellous in the accounts of wonderful Parrots, given to the world from time to time. (See, for example, *Jesse's Gleanings in Natural History*, 5th Edit., p. 220.)

84. It is a fact of no little interest, that Birds which inhabit localities not frequented by Man, know no fear of him, but allow him to approach them closely. Thus, when Mr. Darwin visited the Galapagos islands, he found that mocking-birds and finches, doves, and hawks, would allow him to come near enough to kill them with a stick, and sometimes even to catch them with the hand. The early visitors to the Falkland islands, a century previously, made the same report of the tameness of the birds they found there; and the descendants of these birds still exhibit very little of that apprehension which is shown by the birds of the same species in Tierra del Fuego, where they have been persecuted by man for ages past. The experience of many generations seems to be needed for the acquirement of this fear of man; which, as Mr. Darwin remarked, appears to have the character of an hereditary *instinct*, rather than to proceed from *knowledge* traditionally communicated from one generation to another,—the experience being gradually *embodied*, as it were, in the constitu-

tions of the Birds, and showing itself, like other congenital tendencies, in the actions they perform without any process of education. Here, then, we have a simple case of that *hereditary transmission of acquired Psychological peculiarities*, which seems to have a large share in the progressive development of the Human Mind (§§ 93, 97).

85. We arrive, lastly, at the Class of MAMMALIA ; in which the development of the *Cerebrum* comes to be so predominant, as to



BRAINS OF RODENTS :—I, *Rabbit* ; II, *Beaver*, with the Hemispheres drawn apart :—A, Olfactory Ganglia ; B, Cerebral Hemispheres ; c, Optic Ganglia ; D, Cerebellum ; E, Spinal Cord ; K, Thalami Optici ; m, Corpora Striata.

mask what has been shown to constitute the fundamental part of the organization of the Brain,—namely the Sensorial tract at its base. Still, among those lower Mammals in which the Brain does not present any great advance upon that of Birds, the Sensorial tract can be at once recognized as something altogether distinct from the Cerebrum, if we simply draw apart the Hemispheres,

which, in their natural position, cover it in. Thus, in the Order *Rodentia*, the Cerebrum (B, Fig. 10) is smooth externally, as it is in Birds and Reptiles ; it is pointed in front, and is not prolonged sufficiently far forwards to cover the *olfactive* ganglia (A, A) ; but it is wider behind, and is prolonged so far backwards as completely to cover-in the optic ganglia, and even partly to overlap the Cerebellum (D). But, on drawing its hemispheres apart, we find the *optic* ganglia (c) lying immediately in front of the Cerebellum ; whilst in front of these, again, are two pairs of ganglionic masses, known as the *Thalami optici* (κ) and the *Corpora striata* (m), which may be probably regarded as the terminations of the *sensory* and *motor* columns of the Spinal cord, and as ministering to the sense of Touch, and to the movements immediately related to it. The Thalami have also a connection with the *optic* nerves ; and it does not seem improbable that this connection is instrumental in the establishment of that co-ordination between the senses of Sight and of Touch, which is so essential to the formation of trustworthy Perceptions of external objects (§ 167).

86. The large proportion which the Sensory ganglia still bear to the Cerebral hemispheres, and the low development of the latter—as marked by the smoothness of their surface, not less than by their relative size—are in accordance with the predominance of Instinct over Intelligence, which still marks the psychical character of these lower Mammalia, and of which we have a conspicuous example in the *Beaver*. There could scarcely be a better example of the *irrationality* of Instinct, than is afforded by the following account, given by Mr. Broderip, of a Beaver which he kept in his house :—

“The building instinct showed itself immediately it was let out of its cage, and materials were placed in its way ; and this before it had been a week in its new quarters. Its strength, even before it was half-grown, was great. It would drag along a large sweeping-brush, or a warming-pan, grasping the handle with its teeth so that the load

came over its shoulder, and advancing in an oblique direction till it arrived at the point where it wished to place it. The long and large materials were always taken first, and two of the longest were generally laid crosswise, with one of the ends of each touching the wall, and the other end projecting out into the room. The area formed by the cross-brushes and the wall he would fill up with hand-brushes, rush-baskets, boots, books, sticks, cloths, dried turf, or anything portable. As the work grew high, he supported himself on his tail, which propped him up admirably; and he would often, after laying on one of his building materials, sit up over against it, appearing to consider his work, or, as the country people say, 'judge it.' This pause was sometimes followed by changing the position of the material 'judged,' and sometimes it was left in its place. After he had piled up his materials in one part of the room (for he generally chose the same place), he proceeded to wall up the space between the feet of a chest of drawers which stood at a little distance from it, high enough on its legs to make the bottom a roof for him, using for this purpose dried turf and sticks, which he laid very even, and filling up the interstices with bits of coal, hay, cloth, or anything he could pick up. This last place he seemed to appropriate for his dwelling; the former work seemed to be intended for a dam."

Nothing could be more absurd, from the *reasoning* point of view, than the attempt of the animal to construct a dam where there was no water, or to build up a house where he was already comfortably lodged; but the innate architectural impulse was obviously uncontrolled by any perception of the entire unsuitableness of the work to the conditions under which it was being carried out, under the guidance of a "judgment" which had reference to conditions that did not exist.

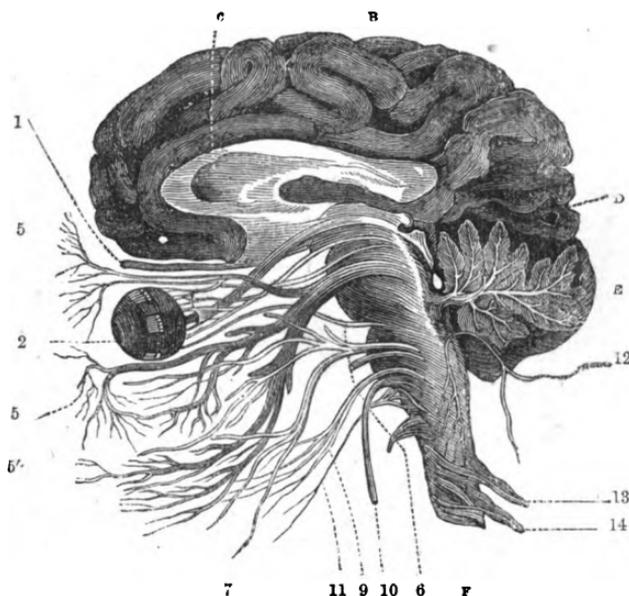
87. As we rise through the Mammalian series towards Man, we find not only a marked increase in the *absolute* bulk of the *Cerebral hemispheres*, and a yet greater *relative* excess in their size as compared with the aggregate of that of the Sensory ganglia, but an augmentation of their functional powers beyond all proportion to their size, which is derived from the peculiar manner in which

their ganglionic matter is disposed. In all ordinary ganglia, the Nerve-cells on whose presence their special attributes depend (§ 36), form a sort of *internal nucleus*; but in the Cerebrum they are spread-out on the surface, forming an *external* or *cortical* layer. This layer is covered by a membrane termed the *pia mater*, which is entirely composed of Blood-vessels held together by connective tissue; and thus a copious supply of blood is brought to this important part. But the extent of the cortical layer, and of its contact with the *pia mater*, is enormously increased by its being thrown into *fold*s, so as to produce what is known as the *convoluted surface* of the Hemispheres (Figs. 11-13); for the *pia mater* everywhere dips-down into the furrows between the convolutions, so as to supply the deepest parts of this plicated ganglionic layer, equally with the most superficial. And thus it comes to pass that the supply of Blood to the Cortical layer is far larger in proportion to the amount of its substance, than it is to any other part of the body. Of the enormous amount distributed to the Brain as a whole (§ 40), by far the greater part goes to the cortical layer of "grey" or "ganglionic" substance; the "white" or "fibrous" structure of the interior, often termed the Medullary substance, which constitutes by far the larger portion of the bulk of the Brain (Figs. 12, 13), receiving comparatively little. It is clear, therefore, that the functional activity of the Cerebrum is immensely augmented by the folding of its Cortical layer; and that its capacity for the production of Nerve-force is marked by the number and depth of its plications, no less than by its absolute size. In the higher orders of Mammalia, the convolutions are well marked; but we do not find them either numerous or complex in their arrangement until we approach Man; and even in the highest Apes they are considerably shallower and less numerous than in the lowest examples of the Human brain. (See Appendix.)

88. The Brain of Man (Fig. 11) differs from that of the animals that most nearly approach him, rather in its large size—as com-

pared alike with the Body generally, and with the Spinal cord,—than in any other character. For in the higher Apes, as in Man, we find that backward development of the Cerebrum into a *posterior lobe*, which makes it cover-in the Cerebellum; whilst in them, as in him, the anterior lobes have a much greater breadth, as well as greater forward extension, than in the lower Mammalia. There is, however, a marked diversity in respect

Fig. 11.



BRAIN AND CEPHALIC NERVES OF MAN, AS SHOWN IN VERTICAL SECTION THROUGH THE MEDIAN PLANE:—A, B, C, anterior, middle, and posterior lobes of the Cerebrum; showing its convoluted surface; D, Optic ganglia; E, Cerebellum; F, Spinal Cord; c, corpus callosum;—1, Olfactory bulb; 2, Eye, with Optic nerve; 5, 5', 5", Fifth pair of Nerves; 6, Sixth pair; 7, Seventh pair; 9, Glosso-pharyngeal nerve; 10, Par Vagus; 11, Hypoglossal; 12, Spinal Accessory; 13, 14, ordinary double-rooted Spinal Nerves.

of size between the Brains of different Races of men; those of the most civilized stocks, whose powers have been culti-

vated and improved by Education through a long series of generations, being for the most part considerably larger than those of Savage tribes, or of the least advanced among our own peasantry. So far as can be judged from the few cases which have furnished adequate materials for the determination, the brains of those earliest Races of men, which (like the old "flint-folk") had made but a very slight advance in the arts of life,

Fig. 12.

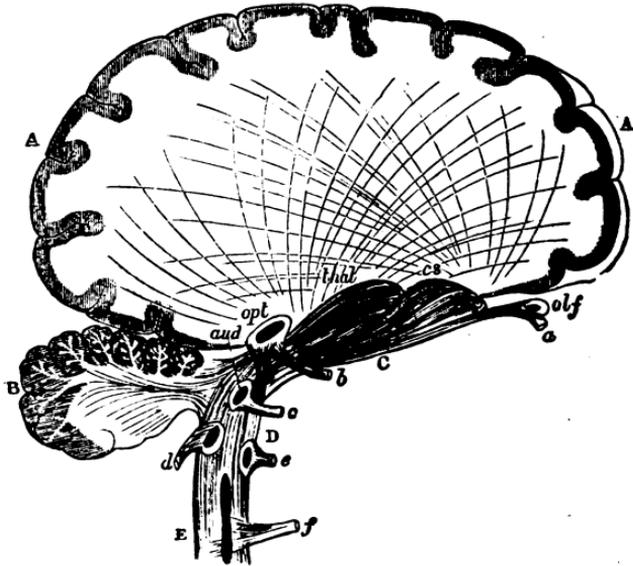


DIAGRAM OF THE MUTUAL RELATIONS OF THE PRINCIPAL ENCEPHALIC CENTRES, AS SHOWN IN *vertical* SECTION:—A, Cerebrum; B, Cerebellum; c, Sensori-motor tract, including the Olfactive ganglion *olf*, the Optic *opt*, and the Auditory *aud*, with the Thalami optici *thal*, and the Corpora striata *cs*; D, Medulla oblongata; E, Spinal cord;—*a*, olfactive nerve; *b*, optic; *c*, auditory; *d*, pneumogastric; *e*, hypoglossal; *f*, spinal:—radiating fibres of the Medullary substance of the Cerebrum are shown, connecting its cortical layer with the Thalami optici and Corpora striata.

were extremely small. Thus the inference, based on Comparative Anatomy, as to the relation between the development of the

Cerebrum and the predominance of Intelligence over Instinct, seems to hold good when applied to the diversities we encounter in the Human type ; and of this we have a further confirmation in the fact, that where the Cerebrum is so imperfectly developed as to be greatly under the average size, there is a marked deficiency in Intelligence, amounting to absolute Idiocy. The unfortunate

Fig. 13.

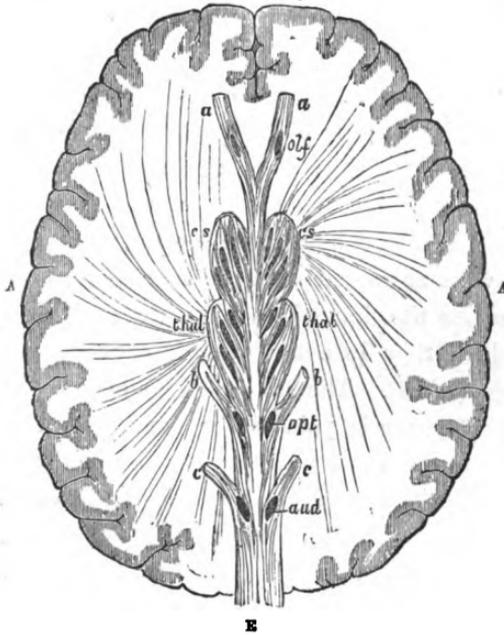


DIAGRAM OF THE MUTUAL RELATIONS OF THE CEREBRUM AND THE SENSORI-MOTOR TRACT, AS SHOWN IN *horizontal section* :—A, A, Cortical layer of Cerebral Hemispheres, connected with Sensori-motor tract by *ascending* fibres (shown on the left side) radiating from *thal*, the Thalami optici, and by *descending* fibres (shown on the right side) converging to *cs*, the Corpora striata ; *olf*, Olfactive ganglia ; *opt*, Optic ganglia ; *aud*, Auditory ganglia ; *a, a*, Olfactive nerves ; *b, b*, Optic nerves ; *c, c*, Auditory nerves ; *E*, Spinal Cord.

beings thus characterized, are guided almost solely by their Instinctive tendencies, which frequently manifest themselves with a degree of strength that would not have been supposed to exist ;

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and Instincts occasionally present themselves, of which the Human being is ordinarily regarded as destitute, and which may be presumed to be *survivals* of those which characterized some lower grade of his development. On the other hand, those who have obtained most influence over the *understandings* of others, have generally been *large-brained* persons, of strong Intellectual and Volitional powers, whose Emotional tendencies have been subordinated to their Reason and Will, and who have devoted their whole energy to the particular objects of their pursuit.—It is very different, however, with those who are chiefly actuated by what is ordinarily termed *genius*; and whose influence is rather upon the *feelings* and *intuitions*, than upon the understandings, of others. Such persons are often very deficient in the power of even comprehending the ordinary affairs of life; and still more commonly, they show a want of judgment in the management of them, being too much under the immediate influence of their Passions and Emotions, which they do not sufficiently endeavour to control by their Intelligent Will. The life of a “genius,” whether his bent be towards poetry, music, painting, or pursuits of a more material character, is too often one which cannot be held-up for imitation. In such persons, when the *general* power of the mind is low, the Cerebrum is not usually found of any great size.—The mere comparative size of the Cerebrum, however, affords no accurate measure of the amount of Mental power; for we not unfrequently meet with men possessing large and well-formed heads, whose Psychical capability is not greater than that of others, the dimensions of whose crania have the same general proportion, but are of much less absolute size. Large brains, with deficient activity, are commonly found in persons of what is termed the *phlegmatic* temperament, in whom the general processes of life seem in a torpid and indolent state; whilst small brains and great activity, betoken what are known as the *sanguine* and *nervous* temperaments.

89. It is not only, however, by their size, and by the special development of their Cortical layer, that the Cerebral hemispheres of Man are distinguished from those of the lower Mammalia ; for they are further remarkable for the elaborateness of their internal structure, which shows itself especially in the complexity of the arrangement of the nerve-fibres of which the Medullary substance is composed. These may be grouped under three principal divisions. The *first*, which may be distinguished as the *radiating* fibres, connect the different parts of the Cortical layer with the Sensori-motor tract on which the Cerebrum is superposed (Figs. 12, 13) ; and it is probable that there are two sets of these,—one *ascending* from the *Thalami optici* (which seem to form the terminals of the *sensory* tract of the Axial cord) to the Cortical layer, and conveying to it the result of the Physical changes produced in them by the Sense-impressions which they receive ;—the other *descending* from the Cortical layer to the *Corpora striata* (which seem to form the terminals of the *motor* tract of the Axial cord), and conveying to them the Physical results of the changes which take place in itself. These fibres, which bring the instrument of Intelligence and Will into relation with that portion of the Nervous apparatus which furnishes the Mechanism of sensation and of the automatic or instinctive motions, were called by a sagacious old Anatomist, Reil, the *nerves of the internal senses* ; and under that name they will be frequently referred-to in this Treatise.—The *second* set of fibres brings the several parts of the Cortical layer of each Hemisphere into mutual communication. The arrangement of these *commissural* fibres is peculiarly complex in Man : one particular group of them is known as the *Fornix*, or great *longitudinal* commissure.—The *third* set of fibres, termed *inter-cerebral*, connects the two Hemispheres together, through the medium of a broad band which is known as the *Corpus callosum*, or great *transverse* commissure (Fig. 11, c). This also is much more developed in Man, relatively to the size of his

Cerebrum, than it is in any of the lower Mammalia. It is altogether wanting in Fishes, Reptiles, and Birds; and there is little more than a rudiment of it in Marsupials and Rodents. Cases have occurred in which it has been nearly, or even entirely, deficient in Man; and it is significant that the chief defect in the characters of such individuals has been observed to be a want of forethought, *i. e.*, of power to apply the experience of the past to the anticipation of the future.

90. Thus, then, we see that the Cerebrum is a special organ *superadded* to that automatic Mechanism which constitutes the fundamental and essential part of the Nervous system, even in Man; and which not only supplies the conditions requisite for the maintenance of his Organic functions (§ 32), but ministers to the operations of the Cerebrum itself. For it is through the fibres ascending from the Sensorium to the Cortical layer of the Cerebrum, that the latter derives all that stimulus to its activity, which is furnished by the Ego's consciousness of the changes taking place in the external world;* while it is through the descending fibres that the results of Cerebral change are enabled to produce, through the motor portion of the apparatus, those Muscular movements by which the Mind expresses itself in action. We have now to enquire more closely into the mode in which the Cerebrum is subservient to those higher Mental operations, the capacity for which constitutes the distinguishing characteristic of Man, but to which we may trace very distinct approximations among the lower Mammalia.

91. We have seen that, so far as any Animal is dominated by *instinct*, it is a creature of necessity; performing its instrumental part in the economy of Nature from no design or will of its own, but as an *automaton* executing that limited series of actions for

* Here and elsewhere, the term "external world" is meant to include all that is *external to the Mind itself*,—thus taking-in the changes which occur in the Ego's own Bodily organism.

which its Mechanism fits it: and further, that the highest development of the Instinctive tendencies, with the lowest proportional manifestation of Intelligence, is to be found in *Insects*. On the other hand, that type of Psychological perfection which consists in the highest development of the *reason*, and in the supreme domination of the *will*, to which all the automatic actions—save those which are absolutely essential to the maintenance of the Organic functions—are brought under subjection, is presented in *Man*; who, *in his most elevated phase*, is not only a thinking and reflecting, but a self-determining and self-controlling agent, all whose actions are performed with a definite purpose which is distinctly within his own view, and are adapted to the attainment of that purpose by his own Intelligence. But as, in ascending the Vertebrated series, we observe that the Cerebrum is at first a mere rudimentary organ, and approximates but very gradually to the high development it attains in Man, so do we observe that the Psychological manifestations of its successive types exhibit a greater and yet greater approximation *in kind* to those of which he is capable. And this approximation becomes more obvious, when we compare them, not with those of the Adult, but with those of the Infant and young Child. For whilst the actions of the new-born Infant are entirely automatic, being directly prompted by *present* sensations, it soon becomes obvious that simple *ideas* are being formed as to the objects which excite those sensations, and that the actions begin to be guided by the experience with which these ideas are associated; and this is just what we recognize in studying the actions of such of the lower Vertebrata as we can bring under our observation. In the acts of the higher Mammals, as in those of the Child, we cannot fail to perceive the manifestations of true *reasoning* processes, analogous to those which we ourselves perform; together with the expressions of *emotional* states corresponding more or less closely to our own. Such are especially noticeable in the Dog, the Horse, and the

Elephant ; which, having been trained into subservience to Man's requirements, and having come to possess a peculiar sympathetic attachment to him of which other species seem incapable, acquire a peculiar insight into what is passing in *his* mind, which helps to shape their course of action. In so far as that action is based upon the distinct conception of a *purpose*, and is carried-out by the means suggested by their experience as most suitable to its attainment, these animals participate in the rational nature of Man. But there seems no adequate ground for crediting them with that power of *reflecting upon their own Mental states*, which is required for the Intellectual processes of Abstraction and Generalization (§ 227); their most sagacious performances being readily accounted for by the automatic action of *Association* (§ 218).

92. Of all breeds of Dogs, there is none more distinguished for sagacity than the one which has probably been longest associated with Man,—namely the Shepherd's Dog. "The shepherd," says Mr. T. Bell (*British Quadrupeds*, p. 234) "who tends his hundreds or thousands of sheep on the moors and mountain-sides of Scotland and of Wales, or on the extensive and trackless downs of Wiltshire, commits his almost countless charge to the care of his Dogs, with the certainty that their safety and welfare will be surely provided-for by the activity, watchfulness, and courage of these intelligent and faithful guardians. Some of the recorded instances of the almost human sagacity evinced by this valuable race would exceed belief, were they not authenticated by the most credible witnesses. In Scotland, particularly, where the flocks are so liable to be lost in snow-wreaths, these qualities are beyond all price ; and are often exhibited in a manner equally affecting and wonderful."—The following is a very remarkable case of this kind, which occurred in the experience of James Hogg, the Ettrick Shepherd, the associate of Walter Scott and Christopher North :—

"He was," quoth the Shepherd, "beyond all comparison, the best dog I ever saw. He was of a surly, unsociable temper, dis-

dainig all flattery, and refused to be caressed; but his attention to his Master's commands and interests will never again be equalled by any of the canine race. When he first came into my possession, he was scarcely a year old, and knew so little of herding, that he had never turned a sheep in his life; but as soon as he discovered that it was his duty to do so, and that it obliged me, I can never forget with what anxiety and eagerness he learned his different evolutions. He would try every way deliberately, till he found out what I wanted him to do; and when once I made him to understand a direction, he never forgot or mistook it again. Well as I knew him, he often astonished me; for when hard pressed in accomplishing the task he was put to, he had expedients of the moment that bespoke a great share of the reasoning faculty."

Mr. Hogg goes on to narrate the following, among other remarkable exploits, in illustration of Sirrah's sagacity. About seven hundred lambs, which were at once under his care at weaning-time, broke up at midnight, and scampered off in three divisions across the hills, in spite of all that the Shepherd and an assistant lad could do to keep them together. "Sirrah," cried the Shepherd in great affliction, "my man, they're a' awa." The night was so dark that he did not see Sirrah; but the faithful animal had heard his master's words—words such as of all others were sure to set him most on the alert; and without any delay, he silently set off in quest of the recreant flock. Meanwhile the Shepherd and his companion did not fail to do all that was in their power to recover their lost charge; they spent the whole night in scouring the hills for miles around, but of neither the lambs nor Sirrah could they obtain the slightest trace. "It was the most extraordinary circumstance," says the Shepherd, "that had ever occurred in the annals of the pastoral life. We had nothing for it (day having dawned), but to return to our master, and inform him that we had lost his whole flock of lambs, and knew not what was become of one of them. On our way home, however, we discovered a body of lambs at the bottom of a deep ravine, called the Flesh Clench, and the indefatigable Sirrah standing in front of them, looking all around for some relief, but still standing true to his charge. The sun was then up; and when we first came in view of them, we concluded that it was one of the divisions of the lambs, which Sirrah had been unable to manage until he came to that commanding situation. But

what was our astonishment, when we discovered by degrees that not one lamb of the whole flock was wanting! How he had got all the divisions collected in the dark is beyond my comprehension. The charge was left entirely to himself, from midnight until the rising of the sun; and if all the shepherds in the forest had been there to have assisted him, they could not have effected it with greater propriety. All that I can further say is, that I never felt so grateful to any creature below the sun, as I did to my honest Sirrah that morning."

93. In this and other exercises of Intelligence, we may trace the manifestations of an hereditary transmission of aptitudes for particular kinds of Mental action, which have been originally *acquired* by habit. Dogs of other breeds cannot be taught to herd sheep in the manner which "comes naturally" to the young of the Shepherd's Dog. And it is well known that young Pointers and Retrievers, when first taken into the field, will often "work" as well as if they had been long trained to the requirements of the sportsman. The curious fact was observed by Mr. Knight, that the young of a breed of Springing Spaniels which had been trained for several successive generations to find Woodcocks, seemed to know as well as the old dogs what degree of frost would drive the birds to seek their food in unfrozen springs and rills.—Among the descendants of the Dogs originally introduced into South America by the Spaniards, there are breeds which have learned by their own experience, without any Human training, the best modes of attacking the wild animals they pursue; and since young dogs have been observed to practise these methods the very first time they engage in the chase, with as much address as old dogs, it can scarcely be questioned that the tendency to the performance of them has been embodied in the Organization of the Race, and is thus transmitted hereditarily.—There seems reason to believe that such hereditary transmission is limited to acquired peculiarities which are simply *modifications* of the natural constitution of the Race, and would not extend to such as may be altogether foreign to it.

But the foregoing facts would seem to justify the belief that the like hereditary transmission of acquired aptitudes may take place in Man ; and that, in accordance with the far wider range of his faculties, it may become the means of a far higher exaltation of them (§ 97).

94. Whilst, however, we fully recognize the possession, by many of the lower Animals, of an Intelligence comparable (up to a certain point) with that of Man, we find no evidence that any of them have a Volitional power of *directing* their Mental operations, at all similar to his. These operations, indeed, seem to be of very much the same character as those which *we* perform in Reverie or connected Dreams ; different "trains of thought" commencing as they are suggested, and proceeding according to the laws of Association until some other disturb them. So long, in fact, as the current of thought and feeling flows on under the sole guidance of Suggestion, and without any interference from the Will, it may be considered as the expression of the *reflex action of the Cerebrum*, called forth, like that of other Nerve-centres, by the stimulus conveyed to it from without ; the seat of that activity being its expanded layer of Cortical substance.* This reflex action manifests itself not only in Psychical change, but also in Muscular movements : and these may either proceed from simple Ideas, without any excitement of Feeling, in which case they may be designated *ideo-motor* ; whilst, if they are prompted by a Passion or Emotion, they are known as *emotional*. The nature of the response made by the reflex action of the Cerebrum will depend upon the condition of that organ at the time when it receives the impression ; and that condition, among the lower Animals, may be regarded as the *resultant*, in each individual, of

* The extension of the doctrine of Reflex action to the Brain was first advocated by Dr. Laycock in a very important Essay read before the British Association in 1844 ; and published in the "British and Foreign Medical Review" for January, 1845.

the modifications which its inherited Constitution has undergone from the influence of external circumstances.

95. But whilst the Cerebrum of Man, in common with that of the lower Animals, has a reflex activity of its own—which, in the first instance, may be regarded as the direct resultant of his congenital Constitution, modified by early training,—an additional and most important influence subsequently comes into play; namely, the directing and controlling power of the Ego's own *Will*, in virtue of which he can to a great degree *direct* his thoughts and *control* his feelings, and can thus rise superior to circumstances, make the most advantageous use of the intellectual faculties with which he may be endowed, and keep his appetites and passions under subordination to his higher nature. And in proportion as he does this, will he so *shape* his Cerebral mechanism (which, like all other parts of the organism, *grows-to* the manner in which it is habitually exercised), that its automatic responses will be the expressions of the modes of activity in which he has brought it habitually to work,—just as the “trained” Horse automatically does that *of itself*, which it did originally under the will of its master. Thus each Human *Ego*, at any one moment, may be said to be the *general resultant* of his whole Conscious Life; the direction of which has been determined in the first instance by his congenital Constitution, secondly by the education he has received from the Will of others or from the discipline of circumstances, and thirdly by the Volitional power he has himself exercised.

96. It is not only, however, in the possession of this self-determining power, that the Psychical nature of Man is distinguished from that of the animals whose organization most nearly approaches his own; for if his Intellectual and Moral capacity were limited, as narrowly as theirs seems to be, by the Mechanism of his Brain, he could never pass that limit. So far as the lower animals are guided by *Instinct*, the actions of each species are prompted by its own sense of need, and have a direct (though not a self-

designed) adaptation to the supply of them. And these actions we see repeated from generation to generation, with no other variation than may arise from a change of circumstances, which necessitates some modification of the habit. Even where *Intelligence* comes into play, and a *designed* adaptation of means to ends, of actions to circumstances, is made by an individual, the Race does not seem to profit by that experience. And where the influence of Man has been exerted in the domestication of wild animals, it does not appear to produce any permanent improvement in their Psychological characters, but merely develops it in the manner suitable to his own requirements (§ 91); so that when such domesticated Races are left to themselves, they cease in a few generations to show any indication of the training they have received, and relapse into their original wildness. In the Human species, on the other hand, we observe not merely an unlimited *capacity* for Psychological elevation, but an unlimited *desire* to attain it; and this desire serves to stimulate Man not merely to the acquirement of knowledge, and to the application of it in the amelioration of his physical condition, but to the improvement of his Moral nature, by determinately repressing its lower propensities, and by fostering those which he feels to constitute the true nobility of his character.

97. But there is an element in Human nature ranging even beyond this desire and capacity for progress; which, though difficult to define, manifestly interpenetrates and blends with his whole Psychological character. "The Soul," says Francis Newman, "is that side of our nature which is in relation with the Infinite;" and it is the existence of this relation, in whatever way we may describe it, which seems to constitute Man's most distinctive peculiarity. For it is in the aspiration after a nobler and purer *ideal*, that the highest spring of Human progress may be said to consist; and it is this which is the source of those notions of Truth, Goodness, and Beauty *in the abstract*, which seem peculiar to the higher types of Humanity. Whatever *capacity* for progress may exist among the

lower Races (and this is a question which still remains open to determination by experience), the *desire* for it—as among the lowest part of our own “practical heathen” population—seems altogether dormant. When once thoroughly awakened, however, it “grows by what it feeds on ;” and the advance once commenced, little external stimulus is needed, for the desire increases at least as fast as the capacity. In the higher grades of Mental development, there is a continual looking-upwards, not (as in the lower) towards a more elevated Human standard, but at once to something *beyond* and *above* Man and material nature (§ 213). And in proportion as the love of *truth* for its own sake constitutes the incentive of our Intellectual efforts, as the love of *goodness* for its own sake animates our endeavours to bring our own Moral nature into conformity with it, and our love of the highest type of *beauty* withdraws us from all that is low and sensual, are we not only elevating *ourselves* towards our Ideal, but contributing to the elevation of our *race*. For we seem justified by the whole tendency of modern Physiological research, in the belief that alike by the discipline we exert over ourselves, and by the influence we exercise over others, will every effort judiciously directed towards the improvement of our Psychical nature impress itself upon our Physical constitution ; and that, by the genetic transmission of such modifications, will the capacity of future generations for yet higher elevation be progressively augmented.

98. It is, in fact, upon the course of our strictly *Mental* operations, that the *Will* exerts its most powerful, and what is commonly regarded as its most direct influence. But it appears to the Writer that this influence is by no means so direct as is commonly supposed ; and that observation of our own Psychical phenomena entirely justifies the belief, which Physiological considerations tend to establish,—that the operations of the *Cerebrum* are in themselves as automatic as are those of other Nerve-centres, and that the Volitional control which we exercise over our

thoughts, feelings, and actions, operates through the *selective attention* we determinately bestow upon *certain* of the impressions made upon the Sensorium, out of the *entire aggregate* brought thither by the "nerves of the internal senses" (§ 89). In this point of view, it is the *Sensorium*, not the Cerebrum, with which the Will is in most direct relation; and in order that this doctrine (which lies at the basis of the whole inquiry as to the relation of the Will to motives, and the mode in which it determines our character and actions) may be rightly apprehended, it is necessary here to consider the following Physiological question:—Whether *Cerebral changes are in themselves attended with consciousness*, or whether *we only become conscious of Cerebral changes as states of ideation, emotion, &c., through the instrumentality of the Sensorium*,—that is, of that aggregate of Sense-ganglia, through the instrumentality of which we become conscious of external Sense-impressions, and thus feel *sensations*.

99. The Brain, *as a whole*, has been commonly regarded, alike by Psychologists and by Physiologists, as "the seat of consciousness;"—or, to speak more precisely, as the instrument through which we become conscious of the impressions made by external objects upon our organs of Sense: whilst the Ego has been supposed by Metaphysicians to be *directly* conscious of all Mental operations; or rather, these operations are regarded as "states of consciousness," not in any way requiring material instrumentality. Those Psychologists, however, who recognize the cogency of those considerations which *force* on the Physiologist the conviction that "Brain-change" is a necessary condition of all Mental action, appear generally to take for granted that *all* "Brain-change" must be attended with Consciousness: entirely ignoring the fact that the Brain is an *aggregate* of ganglionic centres having very distinct functions; and that the *Cerebrum*, which in Man is by far the largest of those centres, is *not* the part of the brain which ministers to what may be called the "outer life" of the

Animal, but is the instrument exclusively of its "inner life,"—that is, of those *psychical* operations, of which the sensations received from the outer world constitute the mental *pabulum*. Now this *inner* life seems to have no existence in that vast section of the Animal Kingdom, which is most distinguished by the activity of its *outer* life, viz. the Class of Insects: and taking the Nervous system of that Class as the type of an automatic Apparatus which furnishes all the conditions required for Sensation and Motion, as well as for the working of those fixed or mechanical modes of action which we term *instincts*, we have found that a precisely analogous Automatic apparatus exists through the entire Vertebrated series, that it constitutes almost the whole Nervous system of the Fish, and that it is distinctly recognizable as the fundamental or essential part of that of Man, in whom the vast relative development of the Cerebrum merely indicates a *superaddition* of new functions, without affording the least ground to believe that there is any *transfer* to it of the proper attributes of the automatic Apparatus. And it has been shown that this indication is confirmed by the results of the experimental removal of the Cerebrum in Birds (§ 78); which prove that (due allowance being made for the disturbance in the action of other parts of the Brain, necessarily produced by the operation) the Sensorimotor apparatus, which ministers to the outer life, retains its functional activity. Further, it has been positively established, alike by experiments on Animals, and by observation of the phenomena of disease and accident in Man, that the substance of the Cerebrum is itself *insensible*; that is, no injury done to it, or physical impression made upon it, is *felt* by the subject of it (See Appendix). As it is clear, therefore, that the presence of the Cerebrum is not essential to Consciousness, we have next to inquire in what way it seems most likely that the Consciousness is affected by Cerebral changes.

100. When we compare the *anatomical* relation of the Sensorium,

on the one hand to the Cortical layer of the Cerebrum, and on the other to that Retinal expansion of ganglionic matter which is the recipient of Visual impressions, we find the two to be so precisely identical (§ 89), as to suggest that its *physiological* relation to those two organs must be the same. And as we only become *conscious* of the luminous impression by which Nerve-force has been excited in the retina, when the transmission of that nerve-force through the nerve of *external* sense has excited a change in the Sensorium, so it would seem probable that we only become *conscious* of the further change excited in our Cerebrum by the Sensorial stimulus transmitted along its *ascending* fibres, when the reflexion of the Cerebral modification along its *descending* fibres—the nerves of the *internal* senses—has brought it to re-act on the Sensorium. In this point of view, the Sensorium is the one centre of consciousness for Visual impressions on the Eye (and, by analogy, on the other Organs of Sense), and for Ideational or Emotional modifications in the Cerebrum:—that is, in the one case, for *sensations*, when we become conscious of Sense-impressions; and, on the other, for *ideas* and *emotions*, when our consciousness has been affected by Cerebral changes. According to this view, we no more *think* or *feel* with our Cerebrum, than we *see* with our eyes; but the Ego becomes conscious through the same instrumentality of the retinal changes which are translated (as it were) by the Sensorium into visual sensations, and of the Cerebral changes which it translates into Ideas or Emotions. The mystery lies in the *act of translation*; and is no greater in the excitement of *ideational* or *emotional* consciousness by Cerebral change, than in the excitement of *sensational* consciousness by Retinal change.

101. Now although there may seem no *à priori* objection to this view, yet it may be thought to introduce needless complication into what was previously a simple account of the relation of the Brain to Mental phenomena. But this notion of “simplicity”

is really based on ignorance ; and when the phenomena of *reproduced* Sensations are carefully considered, they will be found to fit in with it so exactly, as scarcely to admit of being accounted for in any other way. There are many persons who can bring up before the "mind's eye," with extraordinary vividness, the *pictures* of scenes or persons they have been formerly familiar with ; while to many who cannot thus recall them volitionally, these pictures present themselves automatically, as in *dreaming* or *delirium*. Thus Dr. Abercrombie relates of Niebuhr, the celebrated Danish traveller, that :—

a. "When old, blind, and so infirm that he was able only to be carried from his bed to his chair, he used to describe to his friends the scenes which he had visited in his early days, with wonderful minuteness and vivacity. When they expressed their astonishment, he told them that as he lay in bed, all visible objects shut out, the pictures of what he had seen in the East continually floated before his mind's eye, so that it was no wonder he could speak of them as if he had seen them yesterday. With like vividness, the deep intense sky of Asia, with its brilliant and twinkling host of stars, which he had so often gazed at by night, or its lofty blue vault by day, was reflected, in the hours of stillness and darkness, on his inmost soul."—*Intellectual Powers*, 5th Edit., p. 130.

The same Author relates the following very remarkable example of the volitional reproduction of a picture formerly impressed on the mental vision, which would be almost too wonderful for belief, if it had not been vouched for by so trustworthy an authority as the late Dr. Duncan, who had himself seen and compared the original picture and the copy reproduced *memoriter* :—

b. "In the church of St. Peter at Cologne, the altar-piece is a large and valuable picture by Rubens, representing the martyrdom of the Apostle. This picture having been carried away by the French in 1805, to the great regret of the inhabitants, a painter of that city undertook to make a copy of it from recollection ; and succeeded in doing so in such a manner, that the most delicate tints of the

original are preserved with the most minute accuracy. The original painting has now been restored, but the copy is preserved along with it; and even when they are rigidly compared, it is scarcely possible to distinguish the one from the other."—*Op. cit.* p. 131.

102. Now it will not be questioned by any Psychologist, that what were perceived in these two cases were the *ideational representations* or *concepts* of what were formerly presented to the Mind as *objects of sensation*; and it would seem scarcely to admit of question, that *the same Sensorial state* must be excited in the one case as in the other,—that state of the Sensorium which was *originally* excited by impressions conveyed to it by the nerves of the *external senses*, being *reproduced* by impressions brought down to it from the Cerebrum by the nerves of the *internal senses*. In fact, the real complexity lies in supposing that Mental states so closely related as the *perception* of a *present* object, and the *conception* of a *remembered* object, are produced through the instrumentality of two different "seats of consciousness," the *Sensorium* in the one case, and the *Cerebrum* in the other.

103. Still stronger evidence of the same associated action of the Cerebrum and Sensorium, is furnished by the study of the phenomena designated as *Spectral Illusions*. These are clearly *Sensorial states* not excited by external objects; and it is also clear that they frequently originate in Cerebral changes, since they represent *creations* of the Mind, and are not mere reproductions of past sensations. The following very interesting experience, which was several years ago communicated to the Writer by the distinguished subject of it (who subsequently published it in fuller detail), affords a striking confirmation, not only of the doctrine here advocated, but also of that further development of it which will be made hereafter under the title of "Unconscious Cerebration" (Chap. XIII.); and it seems to give the clue to the *rationale* of another large class of obscure phenomena, that may now be fairly regarded as results of Physical changes of which we

are unconscious even when our Attention is directed to them (§ 424).

Sir John Herschel stated that he was subject to the involuntary occurrence of Visual impressions, into which Geometrical regularity of form enters as the leading character. These were not of the nature of those ocular Spectra which may be attributed with probability to retinal changes (§ 140); "for what is to determine the incidence of pressure or the arrival of vibrations from without, upon a geometrically devised pattern on the retinal surface, rather than on its general ground?"

"They are evidently not Dreams. The mind is not dormant, but active and conscious of the direction of its thoughts; while these things obtrude themselves on notice, and, by calling attention to them, *direct* the train of thought into a channel it would not have taken of itself."

Even supposing the phenomenon to be the result of a retinal change excited through the Optic nerve, instead of *ab externo*, the question remains—"Where does the pattern itself, or its *prototype in the intellect*, originate? Certainly not in any action *consciously* exerted by the Mind; for both the particular pattern to be formed, and the time of its appearance, are not merely beyond our will or control, but beyond our knowledge. If it be true that the conception of a regular geometrical pattern implies the exercise of thought and intelligence, it would almost seem that in such cases as those above adduced we have evidence of a *thought*, an intelligence, working within our own organization distinct from that of our own personality, in a manner we have absolutely no part in, except as spectators of the exhibition of its results."—*Familiar Lectures on Scientific Subjects*, pp. 406-412.

We have here *not* a reproduction of Sensorial impressions formerly received; but a *construction* of new forms, by a process which, if it had been carried on *consciously*, we should have called Imagination. And it is difficult to see how it is to be accounted for in any other way, than by an unconscious action of the Cerebrum; the products of which impress themselves on the Sensorial consciousness, just as, in other cases, they express themselves through the Motor apparatus (§ 425).

104. It may not improbably be in this manner, that a number of those so-called "spiritual" phenomena are produced, in which "subjective" Sensations of various kinds are distinctly felt by persons who are not only wide awake, but are entirely trustworthy on all other matters, though self-deceived as to the reality of the objective sources of their sensations. Having resigned the exercise of their Common Sense *quoad* this particular set of beliefs, and having allowed them to gain a mastery over their ordinary course of thought, there is nothing wonderful in the automatic and unconscious evolution of results corresponding to these beliefs; which results, impressing themselves on the Sensorium, are felt as true sensations. And just as Sir John Herschel *truly saw* as geometrical forms the unconscious constructions of his own Cerebrum, so, it seems probable, may the "spiritualist" *truly see* the strange things he describes as actual occurrences, although they have no foundation whatever in *fact* (§ 147).

105. Another consideration which strongly indicates that the action of Cerebral changes on the Muscular apparatus is exerted through the instrumentality of the Sensorial apparatus, is the identity of the effects often produced by *ideas*, with those produced by sights, sounds, or other Sensations which call forth respondent motions. Thus in a person predisposed to yawn, the verbal suggestion of the notion of yawning is almost as provocative of the act, as the sight or sound of a yawn in another. So, again, a "ticklish" person is affected in the same way by the mental state suggested by the *pointing* of a finger, as by the actual contact. And so in a hydrophobic patient, the same paroxysm is excited by the *idea* of water suggested by words or pictures, as by the actual sight or sound of it. So far, then, from being a source of additional complexity, the doctrine of the *singleness* of the Sensorial nerve-centre, through the instrumentality of which we become conscious alike of Sense-impressions and of Cerebral changes, and from which the Motor

impulses to respondent action immediately proceed, will be found (the Writer believes) to lead to a real simplification in the interpretation of a large class of phenomena occupying the border ground between Physical and Psychological action.

106. That the different portions of the *Cerebrum* should have different parts to perform in that wonderful series of operations by which the Brain as a whole becomes the instrument of the Mind, can scarcely be regarded as in itself improbable. But no determination of this kind can have the least scientific value, that is not based on the facts of Comparative Anatomy and Embryonic Development. In ascending the Vertebrate series, we find that this organ not only increases in relative size, and becomes more complex in general structure, but undergoes progressive additions which can be defined with considerable precision. For the Cerebrum of Oviparous Vertebrata is not a miniature representative of the entire Cerebrum of Man, but corresponds only with its "anterior lobe;" and is entirely deficient in that great transverse commissure, the *corpus callosum* (§ 89), the first appearance of which, in the Placental Mammals, constitutes "the greatest and most sudden modification exhibited by the brain in the whole Vertebrated series" (Huxley). It is among the smooth-brained *Rodentia* that we meet with the first distinct indication of a "middle lobe," marked off from the anterior by the "fissure of Sylvius;" this lobe attains a considerably greater development in the *Carnivora*; but even in the *Lemurs* it still forms the hindermost portion of the Cerebrum. The "posterior lobe" makes its first appearance in *Monkeys*; and is distinctly present in the anthropoid *Apes*. The evolution of the Human Cerebrum follows the same course. For in the *first* phase of its development which presents itself during the second and third months, there is no indication of any but the anterior lobes; in the *second*, which lasts from the latter part of the third month to the beginning of the fifth, the middle lobes make their appearance; and it is not until the latter

part of the fifth month that the *third* period commences, characterized by the development of the posterior lobes, which sprout, as it were, from the back of the middle lobes, and remain for some time distinctly marked off from them by a furrow. The exact mutual confirmation afforded by these two sources of knowledge seems fatal to the ordinary Phrenological doctrine, which locates in the posterior part of the Cerebrum those Instincts and Propensities which Man shares with the lower Animals; while it would lead us to regard the *posterior* lobes as the instruments of those higher forms of Ideational activity by which Man is especially distinguished, and the *anterior* and *middle* lobes as the instruments of those simpler Ideational states which are the *most general* forms of Mental activity, being most directly excited by Sensorial suggestions. And it seems probable that evidence to this effect may be derived from a careful comparison of the Cerebral convolutions in different animals; the researches of Leuret, Gratiolet, and others having made it clear that notwithstanding the apparent indefiniteness of their distribution in Man, a distinct plan shows itself in their arrangement in each Family (this being simpler in the smaller members of it, and more complex in the larger), and that certain identities are traceable between the fundamental convolutions in representatives of different Families. The lower Quadrumana, for example, present a sort of sketch of the plan on which the convolutions are arranged in the higher Apes; and whilst the study of the latter gives the key to the complex arrangement of the convolutions in the Human Cerebrum, that of the former enables the Simioid plan to be correlated with that of inferior types. (See Appendix.)—One remarkable localization of function to which recent Pathological enquiry has been thought to point, will be considered hereafter (§ 355).

SECTION 4. *General Summary:—Functional Relations of the Ganglionic Centres of the Cerebro-Spinal System of Man:—Sympathetic System.*

107. It was well remarked by Cuvier, that the different tribes of Animals may be said to be so many “experiments ready prepared for us by Nature; who adds to, or takes from, the aggregate of their organs, just as we might wish to do in our laboratories, showing us at the same time in their actions the results of such addition or subtraction.” And to no part of the organization of Animals is this view more applicable, than it is to the Nervous apparatus; for the different Ganglionic centres which are combined in the *Cerebro-spinal system* of Man and the higher Vertebrates, have such an intimate structural relation to each other, and so much more frequently act consentaneously than separately, that, notwithstanding the abundant evidence of the diversity of their respective endowments, there is considerable difficulty in the determination of their special functions; since the destruction or removal of any one portion of the Nervous system, not only puts a stop to the phenomena to which that portion is directly subservient, but so deranges the general train of nervous activity, that it often becomes impossible to ascertain, by any such method, what is its real share in the entire performance.—Under the guidance of Comparative Anatomy, however, we are enabled to recognize the following Ganglionic centres as essentially distinct in function, however intimately connected in structure:—

1.—The *Spinal Cord*, consisting of a tract of ganglionic matter enclosed within strands of longitudinal fibres, and giving-off successive pairs of nerves which are connected at their roots with both of these components. This obviously corresponds with the gangliated Ventral cord of the *Articulata*; chiefly differing from it in the *continuity* of the ganglionic tract which occupies its

interior. And each segmental division of it, which serves as the centre of Reflex action for its own pair of nerves, may be considered, like each ganglion of the ventral cord of the Articulata, as a repetition of the single "pedal" ganglion of those Mollusca which have but one instrument of locomotion.

II.—The *Medulla Oblongata*, or prolongation of the Spinal Cord within the skull : which consists of a set of strands that essentially correspond with the cords passing round the œsophagus in Invertebrated animals, and connecting the cephalic ganglia with the first ganglion of the trunk; although, as the whole Cerebro-spinal axis of the Vertebrata lies *above* the alimentary canal (the trunk being supposed to be in a horizontal position), there is no divergence of these strands to give it passage. Interposed among them, however, are certain collections of ganglionic matter, which serve as the centres for the reflex movements of Respiration and Deglutition, corresponding with the separate respiratory and stomato-gastric ganglia found in many Invertebrated animals.—This incorporation of so many distinct centres into one system, would seem destined in part to afford to all of them the protection of the Vertebral column; and in part to secure that consentaneousness of action, and that ready means of mutual influence, which are peculiarly requisite in beings in whom the activity of the Nervous system is so predominant. Thus the close connection which is established in the higher Vertebrated animals, between the Respiratory and the general Motor apparatus, is obviously subservient to the use which the former makes of the latter in the performance of its functions; whilst, on the other hand, the control which their Cephalic centres possess over the actions of the Respiratory ganglia, enables the Will to regulate the inspiratory and expiratory movements in the manner required for the acts of Vocalization.

III.—The *Sensory Ganglia*, comprehending that assemblage of ganglionic masses lying along the base of the skull in Man, and partly included in the *Medulla Oblongata*, in which the nerves of

the special Senses,—Taste, Hearing, Sight, and Smell,—have their central terminations. With these may probably be associated the two pairs of ganglionic bodies known as the Corpora Striata and Thalami Optici ; into which may be traced the greater proportion of the fibres that constitute the various strands of the Medulla Oblongata, and which seem to stand in the same kind of relation to the nerves of Touch or common sensation, that the Olfactive, Optic, Auditory, and Gustative ganglia bear to *their* several nerve-trunks.—These Ganglia, the aggregate of which constitutes the *Sensorium*, are the centres of Reflex movements prompted by the impressions brought to them by the several nerves of sense.

The foregoing together constitute the Automatic Apparatus which ministers to our purely *animal* or *outer life*, namely, the functions of Sensation and Locomotion ; and which also sustains the movements that are necessary for the maintenance of our Organic functions. To this apparatus is superadded :—

iv.—The *Cerebrum*,—the instrument of our *Psychical* or *inner life* ; of which organ, although it is so enormously developed in Man as apparently to supersede the Sensorial centres, scarcely a trace exists in the lowest Vertebrates ; and the relative proportion borne by which to the Sensorial centres, in regard alike to size and to complexity of structure, corresponds closely with the degree of predominance which the *Intelligence* possesses over the Animal Instincts. Much of its action, however, may still be purely *automatic* in its nature ; for so long as the current of Thought and Feeling flows on in accordance with the direct promptings of suggestion, and without any interference from Volition, it may be considered as a manifestation of the reflex activity of the Cerebrum, which takes the form of a *mental instinct*. This reflex activity manifests itself not only in the Psychical operations themselves, but also in Muscular movements : and these, when they proceed from simple Ideas, without any excitement of feeling, may be designated as *ideo-motor* ;

whilst, if they spring from a Passion or Emotion, they are termed *emotional*. The *mental* Instincts, however, are by no means as invariable in the different individuals of the same species, as are the *animal* Instincts of that inferior part of the Nervous apparatus which is more closely connected with the maintenance of the Organic life: the particular changes which any given suggestion will excite in each individual, being partly determined by *original constitution*, and partly by *acquired habits*; and the hereditary constitution being itself determined to a large extent by the acquired habits of the ancestral Race.—There seems a strong probability that there is *not* (as was formerly supposed) a direct continuity between even all or any of the Nerve-fibres distributed to the body, and those of the Medullary substance of the Cerebrum. For whilst the nerves of special sense have their own ganglionic centres, it cannot be shown that the nerves of common Sensation have any higher destination than the *thalami optici*. So, the Motor fibres which pass-forth from the Brain, though commonly designated as *cerebral*, cannot be certainly said to have a higher origin than the *corpora striata*. And there is strong reason to believe that the Cerebrum has no communication with the external world, otherwise than by its connection with the Sensori-motor apparatus; and that even the movements which are usually designated *voluntary* (or more correctly *volitional*), are only so as regards their original source, —the stimulus which *immediately* calls the Muscles into contraction being still supplied from the automatic centres.

v.—Wherever a Cerebrum is superimposed upon the Sensory ganglia, we find another ganglionic mass, the *Cerebellum*, superimposed upon the Medulla oblongata. The development of this organ bears a general, but by no means a constant, relation to that of the Cerebrum; for in the lowest Fishes it is a thin lamina of nervous matter on the median line, only partially covering-in the fissure between the two lateral halves of the upper part of the

Spinal cord (§ 64); whilst in the higher Mammalia, as in Man, it is a mass of considerable size, having two lateral lobes or hemispheres, in addition to its central portion (Fig. 11). The direct communication which the Cerebellum has with both columns of the Spinal cord, and the comparatively slight connection which it possesses with the higher portions of the Brain, justify the supposition that it is rather concerned in the regulation and co-ordination of the Muscular movements, than in any proper Psychological operations; and though its precise function is still unknown, that general conclusion seems in harmony with our best knowledge on the subject. (See Appendix.)

108. Now although every segment of the Spinal cord and every pair of the Sensory ganglia, may be considered, in common with the Cerebrum, as an independent centre of Nervous power, yet this independence is only manifested when these organs are separated from each other; either structurally—by actual division, or functionally—by partial suspension of activity. In their state of perfect integrity and complete functional activity, they are for the most part (at least in Man) in such subordination to the Cerebrum, that they only minister to *its* actions; except in so far as they are subservient to the maintenance of the Organic functions, as in the automatic acts of breathing and swallowing. The impressions which call forth these and similar movements, ordinarily excite them by the direct reflex action of the lower centres, without passing-on to the Cerebrum; so that we only perceive them when we specially direct our attention to them, or when they exist in unusual potency. Thus we are ordinarily unconscious of that internal need for air, by which our movements of Respiration are prompted; and it is only when we have refrained from breathing for a few seconds, that we experience a sensation of uneasiness which impels us to make forcible efforts for its relief. Notwithstanding, however, that the Cerebrum is unconcerned in the

ordinary performance of those automatic movements, yet it can exert a certain degree of control over many of them, so as even to suspend them for a time ; but in no instance can it carry this suspension to such an extent, as seriously to disarrange the Organic functions. Thus, when we have voluntarily refrained from breathing for a few seconds, the inspiratory impulse so rapidly increases in strength with the continuance of the suspension, that it at last overcomes the most powerful effort we can make for the repression of the movements to which it prompts. That the Will should have a certain degree of control over such movements, is necessary in order that they may be rendered subservient to various actions which are necessary for the due exercise of Man's Psychical powers ; but that they should not be left dependent upon its exercise, and should even be executed in opposition to it, when the wants of the system imperatively demand their performance, constitutes an essential provision for the security of Life against the chance of inattention or momentary caprice, as well as for maintaining it during the unconsciousness of sleep.

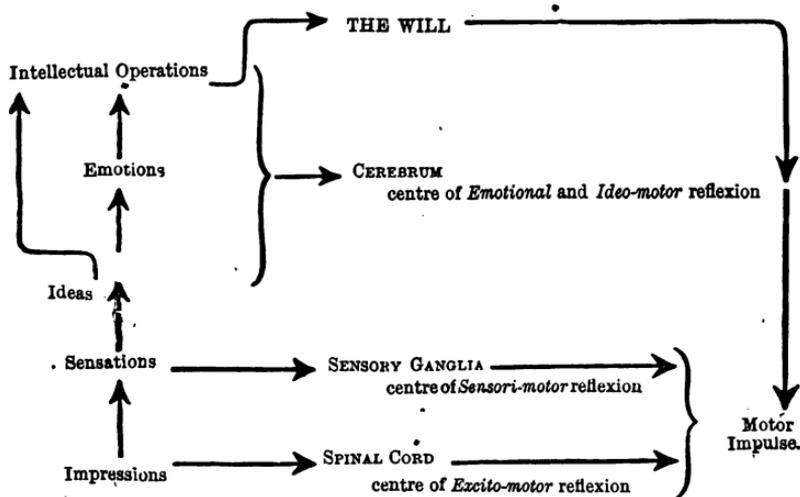
109. In that action and reaction, however, between the Mind and all that is outside it, in which the Conscious Life of every Human *Ego* consists, the whole Cerebro-spinal system participates. For in virtue of the peculiar arrangement of the Nervous apparatus, every excitor *impression* travels in the *upward* direction, if it meet with no interruption, until it reaches the Cerebrum, without exciting any reflex movements in its course. When it arrives at the Sensorium, it makes an impression on the consciousness of the individual, and thus gives rise to a *sensation* ; and the change there induced, being propagated onwards to the Cerebrum, becomes the occasion of further changes in its cortical substance, the downward reflexion of whose results to the Sensorium gives rise to the formation of an *idea*. If with this idea any pleasurable or painful *feeling* should be associated, it assumes the character of an *emotion* ; and either as a simple or as an emotional

idea, it becomes the stimulus to further Cerebral changes, which, when we become conscious of them, we call *Intellectual operations*. These may express themselves either *directly* in respondent Movements; or *indirectly*, by supplying motives to the Will; which may exert itself either in producing or in checking Muscular movement, or in controlling or directing the current of Thought and Feeling.

110. But if this ordinary *upward* course be anywhere interrupted, the impression will then exert its power in a *transverse* direction, and a reflex action will be the result; the nature of this being dependent upon the part of the Cerebro-spinal axis at which the ascent had been checked. Thus if the interruption be produced by division or injury of the Spinal cord, so that its lower part is cut-off from communication with the Cephalic centres, this portion then acts as an independent centre; and impressions made upon it, through the afferent nerves proceeding to it from the lower extremities, excite violent reflex movements, which, being thus produced without sensation, are designated as *excito-motor*.—So, again, if the impression should be conveyed to the Sensorium, but should be prevented by the removal of the Cerebrum, or by its state of functional inactivity, or by the direction of its activity into some other channel, from calling-forth Ideas through the instrumentality of that organ, it may re-act upon the Motor apparatus by the reflex power of the Sensory ganglia themselves. Such actions, being dependent upon the prompting of Sensations, are *sensori-motor* or *consensual*.—But further, even the Cerebrum responds automatically to impressions fitted to excite it to reflex action, when from any cause the Will is in abeyance, so that its power cannot be exerted either over the muscular system or over the direction of the thoughts and feelings. Thus in the states of Reverie, Dreaming, Somnambulism, &c., whether spontaneous or artificially induced (Chaps. XIV.—XVI.), *ideas* which take full possession of the mind, and from which it cannot free itself, may

excite respondent *ideo-motor* actions ; as happens also when the force of the Idea is morbidly exaggerated, and the Will is not suspended, but merely weakened, as in many forms of Insanity (Chap. XIX)

111. The general views here put-forth in regard to the independent and connected actions of the several primary divisions of the *Cerebro-spinal* apparatus, may perhaps be rendered more intelligible by the following Table; which is intended to represent (1) the



ordinary course of operation, when the whole is in a state of complete functional activity, and (2) the character of the Reflex actions to which each part is subservient, when it is the highest centre that the impression can reach.

112. The Cerebro-spinal system is intimately blended with another set of Ganglionic centres and Nerve-trunks, scattered through different parts of the body, but mutually connected with each other, which is termed the *Sympathetic* system.* The principal ganglionic

* This System has been sometimes termed the *ganglionic* system, on account of the connection of its nerve-trunks with isolated and scattered centres, in striking contrast with the continuity and apparent fusion of the ganglionic

centres of this system are the two great *Semilunar Ganglia*, which lie in the abdominal cavity near the spine, and from which there issues a radiating series of trunks and branches, constituting the great *Solar plexus*, to be distributed to the muscular walls of the Intestinal canal along its whole length, and also to the various Glandular organs in connection with it. There are two other principal though smaller systems of ganglia and nerves; one in connection with the Heart and great bloodvessels, constituting the *Cardiac plexus*; and the other in connection with the organs of reproduction and other viscera contained in the cavity of the pelvis, constituting the *Hypogastric plexus*. These plexuses communicate by connecting cords with a chain of *Prevertebral ganglia*, which lies along the front of the Spine on each side; and this, in its turn, communicates with the *Spinal ganglia*, which are ganglionic enlargements on the posterior roots of the Spinal nerves (§ 62). There are also several small ganglionic centres in the Head; which have the same kind of connection with its ordinary sensory and motor nerves, that the prevertebral ganglia have with those of the trunk. In virtue of these communications, the trunks and branches of the *Sympathetic* system contain, in addition to their own fibres (which are distinguished from the Cerebro-spinal by not possessing the double border that is given by the "white substance of Schwann," § 36), a great number of fibres derived from the Cerebro-spinal system. On the other hand, the Cerebro-spinal nerves contain Sympathetic fibres, sometimes in considerable quantity.

113. The Sympathetic system is sometimes designated the

centres of the Cerebro-spinal system. And an analogy has even been drawn between the chain of *prevertebral ganglia* of the Sympathetic, and the Ventral cord of Articulated animals. But this analogy entirely fails when we look at the distribution of the two sets of nerves, and the functions to which they respectively minister; since it is perfectly clear from such comparison, that it is the Spinal cord of Vertebrata which really represents the Ventral cord of Articulata, as a series of locomotive or Pedal ganglia.

nervous system of Organic Life, to distinguish it from the Cerebro-spinal system, which is the *nervous system of Animal Life*. Its motor action is exerted upon the Muscular walls of the Alimentary canal, of the Heart and Arteries, of the Gland-ducts, Uterus, and other organs; as has been experimentally proved by irritating these trunks immediately after the death of an animal. But as the very same contractions may be excited by irritating the roots of those Spinal nerves from which the several Sympathetic plexuses receive fibres, there is reason to believe that the motor endowments of the Sympathetic system are chiefly dependent on its connection with the Cerebro-spinal. And this seems to be especially the case with that very important division of the Sympathetic which is distributed on the walls of the Arteries, now known as the *Vaso-motor system*. For the real centre of this system, which has for its function to regulate the supply of blood to different parts, by its action on the calibre of the Arteries, appears to lie in the *Medulla oblongata*; from which also proceed certain nerve-fibres (included in the trunks of the *Pneumogastric* or *Par vagum*), which have a special influence on the movements of the Heart, and which probably regulate their rate in accordance with that of Respiratory action.—No motor power can be exerted through the Sympathetic system by any act of *Will*; but the muscular actions of many of the parts just enumerated are greatly affected by *Emotional* states; and this is particularly the case in regard to those of the Heart and Arteries. Thus we continually see the action of the heart quickened by Emotional excitement; whilst a violent “shock” to the feelings may seriously reduce it (as in fainting), or may even completely paralyse it. Of the action of the Emotions, through the same channel, on the Blood-vessels, we have a familiar example in the phenomenon of blushing; and this is only one of (probably) a vast number of changes thus induced, some of which have a very important influence on our Mental operations (§§ 356, 472). The blood-vessels that supply some of the Glands

most directly affected by Mental states—such as the Lachrymal, the Salivary, and the Mammary,—seem to receive their supply of vaso-motor nerves direct from the Cerebro-spinal System ; and it is by the influence of those nerves in determining the calibre of their arteries, that the quantity of the Secretion is regulated ; as in the sudden flow of Tears, of Saliva, or of Milk. Those portions of the Glandular apparatus, on the other hand, the amount of whose secretions is affected, not so much by mental conditions, as by states of other parts of the Visceral apparatus, are supplied by the Sympathetic exclusively, or nearly so.

114. Whatever *Sensory* endowments are possessed by the parts supplied by the Sympathetic system, must be referred to the same connection with the Cerebro-spinal system. In the ordinary condition of the body, there is no evidence of the possession of any such endowments ; for the organs exclusively supplied by the Sympathetic system perform their functions without our consciousness, and no sign of pain is given when the Sympathetic nerve-trunks are irritated. But in diseased conditions of those organs, violent pains are often felt in them ; and experiment shows that whilst slight irritations of the healthy organs call forth no indications of suffering, such indications are manifested when the impression is made stronger. It is clear, therefore, that the effect of such impressions, when unusually strong, must be transmitted to the Sensorium ; and the reason why they do not ordinarily proceed thither, is probably because the *excitor* impulse is usually expended in calling forth reflex *movement* through the Sympathetic ganglia themselves. There is a remarkable tendency to *radiation* in such impulses, in virtue of the extraordinary intercommunication between different parts of the Sympathetic system ; and it is in this manner that those “morbid sympathies” between remote organs are established, which have a very important share in the phenomena of disease.

115. There is considerable evidence, moreover, that the

Sympathetic system has a modifying influence on the *Nutrition* of the body, and on the *quality* (as well as on the quantity) of the *Secretions*. And it seems probable that this is exerted through the proper fibres of the Sympathetic, rather than through those of the Cerebro-spinal system. This influence has been especially studied in the case of the Fifth Pair (Fig. 11), which is the nerve of common Sensation for the head and face, and which contains a great number of Sympathetic fibres that have their centre in a large ganglion on its sensory root. For it has been found that if its *trunk* be divided after having passed through the ganglion, a disorganizing inflammation of the Eye always follows; whilst if the *roots* be divided, so as to cut off all the Cerebro-spinal fibres from *their* centre, whilst the fibres proceeding from the Sympathetic ganglion can still go on to the eye, the derangement of its nutrition is either wanting altogether, or is greatly diminished in intensity. — There can be no doubt whatever, that though the *Will* can exert no modifying influence on the Nutritive operations, yet that these are very much affected by *mental states*; and especially by the persistence of that which may be termed *expectant attention*, whose remarkable action will form the subject of special consideration hereafter (Chap. XIX.).

NOTE.

Since the foregoing Chapter was in type, Dr. Ferrier has obtained a very remarkable series of Experimental results, by the application of Faradic Electricity to the Cortical substance of the Cerebrum, and to other Ganglionic centres of the Brain, in different animals. As these results—so far as they have been yet made public—do not appear to the Writer in any way inconsistent with the views set forth in the preceding pages, but, on the contrary, serve to confirm and extend them, he has thought it preferable to leave in its original shape the expression of the opinions at which he had arrived long previously, and had recorded in nearly the same words; deferring to the Appendix an account of Dr. Ferrier's experiments, with the inferences which they seem in the Writer's judgment to warrant.

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CHAPTER III.

OF ATTENTION.

116. It has been the Writer's object in the preceding Chapter, not only to explain the general structure and working of the Nervous mechanism, but also to indoctrinate the Reader with that idea of its *reflex* activity, which we derive from experiment on the lower Animals, and from observation of the phenomena of disease or injury in Man. For the information we obtain from the study of the *lower* centres, in regard to that form of reaction which manifests itself directly in Muscular motion, furnishes the key to the study of that reflex activity of the *higher* centres, which expresses itself in states of Consciousness, — namely, in the production of Sensations, the formation of Ideas, and the excitement of Emotions; these states of activity being either the *excitors* of other Cerebral changes of the like kind, or discharging themselves (so to speak) by operating downwards on the Muscular apparatus.—It seems desirable, at our very entrance upon the enquiry into the action of these *higher* centres (which is, in fact, the Physiology of the *Mind*), to take special note of the *active* as distinguished from the *passive* state of recipiency for impressions which are brought to the Sensorium, whether by the nerves of the *external* or by those of the *internal* senses (§ 89); in virtue of which we *fix our Attention* either on something that is going on *outside* us, or on something that is going on *within* us, instead of being affected by each impression exactly in proportion to its strength. For it is in the power which the Will possesses over the *direction* of this active recipiency, or *Attention*, that the capacity of the Ego, alike for the systematic acquirement of Knowledge, for the

control of the Passions and Emotions, and for the regulation of the Conduct, mainly consists. In studying the working of the "Mechanism of Thought and Feeling," therefore, we must first trace the effect of Attention on each principal form of Mental activity.

117. The augmented recipiency of the *Sensorium* for some particular kind of impression, involves—apparently as its direct consequence—a proportionate reduction, or even an entire suspension, of its recipiency for impressions of other kinds. The Philosopher who is walking in a crowded thoroughfare, may have his attention so completely engrossed by an internal "train of thought," that he takes no heed whatever of what is going on around him, so long as this does not interfere with his onward progress; his vision having been *passively* exercised merely in directing his Muscular movements, and none of its impressions having gone up further than the *Sensorium*, the *activity* of which has been limited for the time to its Cerebral side.

The Writer was informed by Mr. John S. Mill, when his "System of Logic" was first published, that he had thought-out the greater part of it during his daily walks between Kensington and the India House; and himself more than once met Mr. Mill in Cheapside, at its fullest afternoon tide, threading his way among the foot-passengers with which its narrow pavement was crowded, with the air of a man so deeply absorbed in his own contemplations that he would not recognize a friend, and yet not jostling his fellows or coming into collision with lamp-posts.

On the other hand, the Countryman who comes up to London for the first time, may have his attention so attracted by the novelties he sees at every step, as to be led with difficulty to discuss a matter of business with the friend with whom he is walking. But suppose the Philosopher's course to be checked by some unusual obstruction,—such as a procession, or a street-accident,—the activity of his *Sensorium* is diverted from its Cerebral (or Intellectual) to its Sensational side; in other words, his attention is

given to what is passing *outside* himself, rather than to what is passing *within* himself; his train of thought is completely interrupted; and he cannot recover it, until his attention is no longer occupied by the difficulty of making his way onward, which has temporarily diverted it. On the other hand, the nature of the communication which the Countryman receives from his friend, may be of a kind so powerfully to interest him, whether pleasantly or painfully,—as, for example, his inheritance of a fortune, or the success of a commercial speculation; or, on the other hand, a serious loss of property, or the adverse decision of a law-suit,—that from the moment he receives the news, he takes no note of the novelties which previously attracted him so strongly; but gives his whole attention to the particulars which his friend has to communicate.

118. Now this state of *active* as compared with *passive* recipiency,—of *Attention* as compared with mere *Insouciance*—may be either *volitional* or *automatic*; that is, it may be either *intentionally* induced by an act of the Will, or it may be produced *unintentionally* by the powerful *attraction* which the *object* (whether external or internal) has for the Ego. Hence, when we *fix* our Attention on a particular object by a determinate act of our own, the *strength of the effort* required to do so is greater, in proportion to the attractiveness of *some other* object. Thus, the Student who is earnestly endeavouring to comprehend a passage in “Prometheus,” or to solve a Mathematical problem, may have his attention grievously distracted by the sound of a neighbouring piano, which *will* make him think of the fair one who is playing it, or of the beloved object with whom he last waltzed to the same measure. Here the Will may do its very utmost to keep the attention fixed, and may yet be overmastered by an involuntary attraction too potent for it; just as if a powerful electro-magnet were to snatch from our hands a piece of iron which we do our very utmost to retain within our grasp. Or, again, when “the thoughts begin to

wander" through fatigue of Brain, a powerful effort of the Will may be needed to keep them fixed on the completion of a task which the Ego has determined to execute, until the strongest Volition can no longer resist the imperious demand of the Physical mechanism for repose. Yet even then, the attractiveness of some new object (the coming-in, for example, of an anxiously-desired book, or the unexpected arrival of a friend charged with important news) shall produce not only a complete awakening of the attention, but an irresistible diversion of it into a new channel.

119. The power of the *Will* over the state of *attention* is therefore not unlimited; and its degree varies greatly in different individuals. In the young Child, as among the lower Animals, the Attention seems purely *automatic*, being solely determined by the *attractiveness of the object*; and the diversion of it from one object to another simply depends upon the relative force of the two attractions. It is this automatic fixation of the attention on the Sense-impressions received from the external world, that enables the Infant to effect that marvellous combination of visual and tactile perceptions, which guides the whole subsequent interpretation of its phenomena (§ 167). When an attractive object is presented to it, which it grasps in its little hands, carries to its lips, and holds at different distances, earnestly gazing at it all the while, it is learning a most valuable lesson; and the judicious Mother or Nurse will not interrupt this process, but will allow the infant to go on with its examination of the object as long as it is so disposed.—During the earlier stage of Childhood, it is mainly the attractiveness which the *changes* going on in the world around have for the observing faculties, which leads to the employment of them in connection with Ideational activity; the child wanting to know the *meaning* of what it sees, breaking open its toys to find out what makes them move, and asking the "why" of everything that excites its curiosity. In this stage, it is of great importance that the child should be led to limit his enquiries to some one

object, until he has made himself acquainted with all that he can learn of its characters ; and here a judiciously-devised system of "object lessons" answers the double purpose of communicating information and of cultivating the habit of fixity of the attention, which, at first purely *automatic*, gradually comes to be under the control of the Ego.

120. So soon, however, as the work of systematic instruction commences, other influences come into play. It is the aim of the Teacher to fix the attention of the Pupil upon objects which may have in themselves little or no attraction for it ; and in this stage, the direct operation of *motives* becomes very apparent. The "unconscious influence" which the Parent or Nurse has acquired by Habit (§ 290), the desire of approbation or reward, or the fear of punishment, first call forth the *effort* which is required to keep the Attention steadily fixed, even for a short time, upon some unattractive object, and to resist the solicitations of a new toy or a game of play. And in this early stage, all experience shows the advantage of *moderating* this effort, by giving to the object to which the Attention is to be directed, such attractiveness as it may be capable of, and by not requiring the attention to be too long sustained. Thus a picture-alphabet, with jingling rhymes, will often do what a simpler and severer method of "teaching the child its letters" fails to accomplish ; and the "multiplication table" is much sooner acquired by being put into rhyme and sung in the march of an Infant-school, than when presented in the repulsive nakedness of $2 \times 2 = 4$. Those "strong-minded" Teachers who object to these modes of "making things pleasant," as an unworthy and undesirable "weakness," are ignorant that in this stage of the child-mind, the Will—that is, the power of *self-control*—is weak ; and that the primary object of Education is to encourage and strengthen, not to repress, that power. Great mistakes are often made by Parents and Teachers, who, being ignorant of this fundamental fact of child-nature, treat as *wilfulness* what is

in reality just the contrary of Will-fullness; being the direct result of the *want* of Volitional control over the automatic activity of the Brain. To punish a child for the want of obedience which it *has not the power* to render, is to inflict an injury which may almost be said to be irreparable. For nothing tends so much to prevent the healthful development of the Moral Sense, as the infliction of punishment which the child *feels to be unjust*; and nothing retards the acquirement of the power of directing the Intellectual processes, so much as the Emotional disturbance which the feeling of injustice provokes. Hence the determination often expressed to "break the will" of an obstinate child by punishment, is almost certain to strengthen these reactionary influences. Many a child is put into "durance vile" for not learning "the little busy bee," who simply *cannot* give its small mind to the task, whilst disturbed by stern commands and threats of yet severer punishment for a disobedience it cannot help; when a *suggestion* kindly and skilfully adapted to its automatic nature, by directing the turbid current of thought and feeling into a smoother channel, and *guiding* the activity which it does not attempt to *oppose*, shall bring about the desired result, to the surprise alike of the baffled teacher, the passionate pupil, and the perplexed bystanders.

121. The habit of Attention, at first purely automatic, gradually becomes, by judicious training, in great degree amenable to the Will of the Teacher; who encourages it by the suggestion of appropriate motives, whilst taking care not to overstrain the child's mind by too long dwelling upon one object. Even at a very early period, there will be found marked differences among individuals, as to their power of sustained attention: some being distracted by every passing occurrence; whilst others have not much difficulty in keeping their minds fixed upon an object, for a sufficient length of time to enable them to learn all that the exercise of their senses can teach them; while with others, again, the difficulty lies in the *transference* of their attention from one

object to another, so that, when the Teacher thinks that the Pupil's mind is being exercised on B, he is still "ruminating" upon A. And thus many children require special modifications of this disciplinary process; the "bird-witted" being encouraged to *fix* their attention, whilst those in whom the opposite tendency predominates should be exercised in *mobilizing* it. These opposite tendencies are noticeable in after life, and give a marked direction to the Intellectual character. Many a "dull" boy is supposed to be stupid, when he is simply introspective; his attention being given rather to the ideas which are passing through his mind, than to what is going on around him. On the other hand, many a "quick-witted" boy gets a reputation for cleverness which he does not deserve; his mind being keenly alive to all that is passing outside, so that he rapidly takes in new impressions, but loses their traces *as* quickly, one set of impressions superseding another before any have had time to fix themselves.

122. As the power of determinately fixing the Attention gains strength, only requiring adequate motives for its exercise, the influence of a *system* of discipline by which each individual feels himself borne along as if by a Fate, still more that of an Instructor possessing a strong Will guided by sound judgment (especially when united with qualities that attract the affection, as well as command the respect, of the pupil, § 290, III.), greatly aid him in learning to use that power. As Archbishop Manning has truly said (*Contemporary Review*, Feb. 1871), "During the earlier period of our lives, the potentiality of our intellectual and moral nature is elicited and educed by the Will of others. . . . Our 'plagiosus Orbilius' did for our brain in boyhood, what our developed Will, when we could wield the ferule, did for it in after life." With the general progress of Mental development, the direction of the Attention to *ideas* rather than to sense-impressions, which was at first difficult, becomes more and more easy; its *continuous* fixation upon one subject becomes so completely habitual, that it is often

less easy to break the continuity than to sustain it ; and the time at last arrives, when the *direction* of that Attention is given by the individual's *own* Will, instead of by the will of another.

123. It will serve to help us in the study of the manner in which volitional Attention operates in the higher spheres of Thought and Emotion, if we first study its action in the reception of Sense-impressions.— When we *wish* to make ourselves thoroughly acquainted with a Landscape or a Picture, we *intentionally* direct the axes of our eyes to each part of it successively, and study that part in its details until we have formed a composite conception of the whole. Whilst we do this, the determinate fixation of the Attention upon any one part weakens the impression made by all the rest ; so that of what lies within the Visual range at any one moment, nothing is distinctly seen, except the limited spot at which we are fixedly looking. Again, the practised Microscopist, whilst applying one of his eyes to his instrument, and determinately giving his whole Attention to the visual picture he receives through it, can keep his other eye open, without being in the least disturbed by the picture of the objects on the table which must be formed upon its retina, but which he *does not see*, unless their brightness should *make* him perceive them.— So in the act of *listening*, we are not only distinctly conscious of sounds so faint that they would not excite our notice but for the volitional direction of the Attention ; but we can single out these from the midst of others by a determined and sustained effort, which may even make us quite unconscious of the rest, so long as that effort is kept up. Thus, a person with a practised “ musical ear ” (as it is commonly but erroneously termed, it being not the *ear*, but the *brain*, which exerts this power), whilst listening to a piece of music played by a large orchestra, can single out any one part in the harmony, and follow it through all its mazes ; or can distinguish the sound of the weakest instrument in the whole band, and follow its strain through the whole performance.

And an experienced Conductor will not only distinguish when some instrumentalist is playing out of tune, but will at once single out the offender from the midst of a numerous band.

124. The contrast between the *volitional* and the *automatic* states of Attention is particularly well shown in the effects of *painful* impressions on the Nervous system. It is well known that such impressions as would ordinarily produce severe pain, may for a time be *completely unfelt*, through the exclusive direction of the Attention elsewhere; and this direction may either depend (a) upon the *determination of the Ego*, or (b) upon the *attractiveness of the object*, or (c, d, e,) on the combination of both.

a. Thus, before the introduction of Chloroform, patients sometimes went through severe operations without giving any sign of pain, and afterwards declared that *they felt none*; having concentrated their thoughts, by a powerful effort of abstraction, on some subject which held them engaged throughout.

b. On the other hand, many a Martyr has suffered at the stake with a calm serenity that he declared himself to have no difficulty in maintaining; his entranced attention being so *engrossed* by the beatific visions which presented themselves to his enraptured gaze, that the burning of his body *gave him no pain* whatever.

c. Some of Robert Hall's most eloquent discourses were poured forth whilst he was suffering under a bodily disorder which caused him to roll in agony on the floor when he descended from the pulpit; yet he was entirely unconscious of the irritation of his nerves by the calculus which shot forth its jagged points through the whole substance of his kidney, so long as his soul continued to be "possessed" by the great subjects on which a powerful effort of his Will originally fixed it.

d. The Writer has himself frequently begun a lecture, whilst suffering neuralgic pain so severe as to make him apprehend that he would find it impossible to proceed; yet no sooner has he, by a determined effort, fairly launched himself into the stream of thought, than he has found himself continuously borne along without the least distraction, until the end has come, and the attention has been released; when the pain has recurred with a force that has over-mastered all

resistance, making him wonder how he could have ever ceased to feel it.

e. A similar experience in the case of Sir Walter Scott is thus recorded by his biographer:—"John Ballantyne (whom Scott, while suffering under a prolonged and painful illness, employed as his amanuensis) told me that though Scott often turned himself on his pillow with a groan of torment, he usually continued the sentence in the same breath. But when dialogue of peculiar animation was in progress, spirit seemed to triumph altogether over matter,—he arose from his couch, and walked up and down the room, raising and lowering his voice, and as it were acting the parts. It was in this fashion that Scott produced the far greater portion of the *Bride of Lammermoor*,—the whole of the *Legend of Montrose*,—and almost the whole of *Ivanhoe*."—(*Lockhart's Life of Scott*, chap. xlv.) See also § 352 a, for a curious sequel to the foregoing.

125. These facts throw considerable light upon a question which will hereafter come to be considered, whether Cerebral changes by which Intellectual results are evolved may not go on *without our consciousness* (§ 417). For there are Metaphysicians who fully admit the *automatic* nature of the operations referred to, but at the same time assert that, as they are truly *Mental*, we cannot be really *unconscious* of them, but merely do not *remember* them, in consequence either of the occupation of our attention by another train of thought, or of the severance of the connection between our *sleeping* and our *waking* consciousness. But this assertion does not constitute proof. In the case of the Physical impressions that produce the sense of pain, we have ample evidence that they *must* have been *made*; and the only question is as to their having been *felt*. "Did Robert Hall, for example, really *feel* the pain which he declared that he did *not* feel?" If it be replied that he did, but that he did not remember it, it may be further inquired, "What is the evidence of his having felt it?" His consciousness and memory said that *he did not*; and what higher evidence is attainable? No doubt, if his attention had been, for a

moment withdrawn from the subject of his discourse, the pointed calculus in his kidney would have made its presence most distressingly perceptible ; but there is no more evidence that pain was *consciously felt, though not remembered*, whilst he was preaching, than that he felt it when a large dose of opium procured for him the refreshment of sound sleep. When Damiens, worn out by his protracted sufferings, slept on the rack (§ 471), enjoying a remission of suffering until awoke by some new and more exquisite torture, did *he feel* his pain? It would be a mere gratuitous assumption to say that he *must* have felt it, because the organic condition was present that would make him feel it if he were awake ; since the presence of this organic condition goes for nothing, unless there be a receptive condition on the part of the Sensorium. And there seems just as much evidence that this receptivity may be entirely suspended *quoad* any one set of impressions (whether internal or external) by the *complete engrossment of the attention* upon another, as that it may be suspended altogether in Sleep or Coma (see § 488).

126. Now, just as the Organic impressions which make themselves felt in *pain*, when the sensorium is receptive of them, may exist *without consciousness* if the sensorium be otherwise engaged, so (it appears to the Writer) may it be affirmed—and on precisely the same evidence—that the Organic changes which are concerned in the automatic production of Thought, and of which we become conscious as *ideas* when the Sensorium takes cognizance of them, may go on *without consciousness* if the sensorium be otherwise engaged. The affirmation that such automatic changes *cannot* take place without the consciousness of them, is, as Sir William Hamilton has pointed out (§ 418), a mere *petitio principii* ; and may be regarded as a “survival” of those older notions of the essential independence of Mind and Body, which a truly philosophical Psychology can no longer accept as consistent with the fundamental facts of our composite nature.

127. It is to the habitual direction of the Attention to some particular kind of Sense-impressions, that we are to attribute the *increase in discriminative power*, which is specially remarkable in the case of such as suffer under deprivation of other Senses. This is most frequently seen in the case of the Touch, which may be brought by practice to such wonderful acuteness, that some blind persons can read from raised print not much larger than that of an ordinary folio Bible, by merely passing the point of the finger along the lines; whilst by attending to minute differences which ordinarily pass entirely unnoticed, they can not only distinguish persons among whom they are living, but can also recognize such as have not been near them for months or even years previously, by the mere contact of their hands. (Thus Laura Bridgeman unhesitatingly recognized the Writer's brother, after the lapse of a year from his previous interview with her, by the "feel" of his hand.) It is well known that an extraordinary acuteness of Touch is possessed by the weavers of the finest of those textile fabrics for which India is celebrated; and as this manufacture, like others, is handed down in the same families, it does not seem improbable that a special *aptitude* for it, originally acquired by the experience of the individual, may be transmitted hereditarily with progressive improvement.—The like improvement is also occasionally noticed in regard to the Smell, which may acquire an acuteness rivalling that of the lower animals; and this not only in the blind, but among races of Men whose existence depends upon such discriminative power. Thus we are told by Humboldt that the Peruvian Indians in the darkest night can not merely perceive through their scent the approach of a stranger whilst yet far distant, but can say whether he is an Indian, European, or Negro. And it is said that the Arabs of the Sahara can recognise the smell of a fire thirty or forty miles distant.—In the same manner, the sense of Taste may be trained to the recognition of differences which would ordinarily pass unnoticed; of which we have an example in the Wine-taster

who can tell the vineyard by which any particular choice wine was yielded, and the year of the vintage which produced it; a not less striking case being furnished by the Tea-taster, the delicacy of whose sense is said to be seldom preserved for more than a few years.—The familiar case of the Seaman who makes out the distinct “loom of the land,” where a landsman can discern nothing but an indefinite haze above the horizon-line, illustrates the improvement in the Visual sense of individuals, which arises from the habitual direction of the Attention to a particular class of impressions. But the possession of this faculty, also, seems occasionally to be an attribute of Race; the power of descrying objects at vast distances being (it is asserted) hereditarily possessed by the Mongols of Northern Asia and the Hottentots of Southern Africa, both of which races habitually dwell on vast plains, that seem to stretch without limit in every direction. As no dweller among them seems able to acquire the same visual power by any amount of individual experience, and as even half-breeds do not possess the aptitude in a degree by any means equal to that which characterizes the men of pure race, it seems probable that, as in the cases already referred to, the power acquired by habitual Attention in the first instance has become fixedly hereditary, improving with habitual use in successive generations.

128. Whilst, however, we give full credit to the cumulative effect of Hereditary transmission, in cases in which the same habit is kept up by force of circumstances through successive generations, there is adequate evidence that an extraordinary increase in the discriminative power of individuals may be brought about by the *concentration* of the Attention upon the Sensorial impression received through the organ of sense, rather than upon an improvement produced by practice in the organ itself. For the same exaltation often shows itself without any practice at all, in that curious form of Somnambulism (natural or induced), in which the Attention is entirely engrossed by the particular thought or feeling which

may be before the consciousness at the moment (§§ 494, 498). And it is not a little remarkable that this exaltation should show itself especially in the *muscular sense*, to the indications of which we ordinarily give very little heed. Thus, the Writer has repeatedly seen Hypnotized patients write with the most perfect regularity, when an opaque screen* was interposed between their eyes and the paper; the lines being equidistant and parallel, and the words at a regular distance from each other. He has seen, too, an algebraical problem thus worked out, with a neatness which could not have been exceeded in the waking state.—But the most curious proof of the exaltation of this Muscular sense, which conveys to the mind of the Somnambule that exact appreciation of distance and relative position for which we ordinarily trust to our Vision (§ 192), is derived from the manner in which the writer will sometimes carry back his pen or pencil to dot an *i* or cross a *t*, or to make a correction in a letter or word. Mr. Braid had one patient (in whom the sense of Smell also was remarkably exalted, § 498), who could thus go back and correct with accuracy the writing on a whole page of note-paper; but if the paper was moved from the position it had previously occupied on the table, all the corrections were on the *wrong* points of the paper as regarded the *then* place of the writing, though on the *right* points as regarded its *previous* place. Sometimes, however, he took a fresh departure (to use a nautical phrase) from the upper left-hand corner of the paper; and all his corrections were then made in their *right* position, notwithstanding the displacement of the paper. “This,” says Mr. Braid, “I once saw him do, even to the double-dotting a vowel in a German word at the bottom of the

* This is a far more satisfactory test than bandaging the eyes. It is impossible to see through a slate, a music book, or a piece of pasteboard; but those who have carefully experimented on the asserted *clairvoyance* of Mesmerized “subjects,” know well that the best-arranged bandages may be shifted, by the working of the muscles of the face, sufficiently to permit the use of the eyes in certain directions.

page, a feat which greatly astonished his German master, who was present at the time."

129. The effects of Attention in either augmenting or diminishing the intensity of Sensations, are manifested, not only in regard to those which are excited by external Impressions, but also in respect to those which originate within the body. Every one is aware how difficult it is to remain perfectly at rest, especially when there is a particular motive for doing so, and when the attention is strongly directed to the object. This is experienced whilst a Photographic likeness is being taken, even when the position is chosen by the individual, and a support is adapted to assist him in retaining it ; and it is still more strongly felt by the performers in "Tableaux Vivans," who cannot keep up the effort for more than three or four minutes.—On the other hand, when the Attention is strongly directed to an entirely different object (as, for example, in listening to an eloquent sermon or an interesting lecture), the body may remain perfectly motionless for a much longer period, the Sense-impressions which would otherwise have induced the individual to change his position, not being felt ; while no sooner is the discourse ended, than a simultaneous movement of the whole audience takes place, every one then becoming conscious of some discomfort, which he seeks to relieve. This is especially the case in regard to the Respiratory sense : for it may generally be observed that the usual reflex movements do not suffice for the perfect aëration of the blood, and that a more prolonged inspiration, prompted by an uneasy feeling, takes place at intervals ; but under such circumstances as those just alluded to, this feeling is not experienced until the Attention ceases to be engaged by a more powerful stimulus, and then it manifests itself by the deep inspirations which accompany, in almost every individual, the general movement of the body.—Sensations may even be called into existence, as Sir H. Holland has pointed out, by the deter-

minate direction of the Attention to particular parts of the body :

a. "The Attention by an effort of Will concentrated on the sensorium, creates certain vague feelings of tension and uneasiness, caused possibly by some change in the circulation of the part; though it may be an effect, however difficult to conceive, on the nervous system itself. Persistence in this effort, which is seldom indeed possible beyond a short time without confusion, produces results of much more complex nature, and scarcely to be defined by any common terms of language." "Stimulated attention will frequently give a local sense of arterial pulsation where not previously felt, and create or augment those singing and rushing noises in the ears, which probably depend on the circulation through the capillary vessels." "A similar concentration of consciousness on the region of the stomach, creates in this part a sense of weight, oppression, or other less definite uneasiness; and, when the stomach is full, appears greatly to disturb the due digestion of the food." The state and action of the bladder and the bowels are much influenced by the same cause. A peculiar sense of weight and restlessness approaching to cramp, is felt in a limb to which the attention is particularly directed. So, again, if the attention be steadily directed to almost any part of the surface of the body, some feeling of itching, creeping, or tickling will soon be experienced.—(*Chapters on Mental Physiology*, pp. 18—24.)

Evidence will hereafter be adduced, that this direction of the Attention changes the local action of the part; so that, if habitually maintained, it may produce important modifications in its Nutrition. In this way it often happens that a *real* malady supervenes upon the *fancied* ailments of those, in whom the want of healthful occupation for the mind leaves it free to dwell upon its own Sensations; whilst, on the other hand, the strong *expectation* of benefit from a particular mode of treatment, will often *cure* diseases that involve serious organic change (Chap. XIX.). Hence it seems probable that in the cases just cited, as in others to be presently noticed (§ 140), the Sensations really originate

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in an impression on the nerves of the part to which they are referred.

130. The difference between *volitional* and *automatic* Attention, again, is well shown by the difference between an observant and an unobservant person ; still more by the phenomena of that state which is strangely misnamed "absence of mind." One man is designated as observant, whose Will prevents his attention from being so far enchained by the attractiveness of any one object, whether a Sense-perception or an internal train of Thought, as to interfere with the reception of other impressions ; whilst another is spoken of as unobservant, who, by allowing his attention to remain engrossed by one object, whether a Sense-perception or a train of Thought, is kept from bestowing a legitimate share of it upon the other impressions which he receives through either his external or his internal senses. The state of *Abstraction* is only an intensified condition of this last form of exclusive *un-volitional* attention (§ 445).

131. The effect of Attention in the limitation and intensification of our *external* sense-impressions, is exerted also upon those Cerebral operations of which we become conscious as states of Thought and Emotion, and which may be conveniently distinguished as *internal* sense-impressions. For these, like the preceding, may excite no more than a *passive* cognizance of them ; whilst, on the other hand, our attention may be *actively* directed to them. And the result of this direction is similar : for the Mental state, of whatever nature it may be, upon which the attention is fixed, becomes intensified to such a degree, as to exclude for the time the cognizance of other impressions ; whilst it acquires a special power of suggesting other Mental states.—This direction of the attention to states of Cerebral activity, may, like its direction to impressions received through the organs of Sense, be either *automatic* or *volitional*. When it is automatic, the Mind is engrossed for the time by some Idea or Emotion, in virtue of the intensity with which it has been called

up, or of the peculiar hold which it has upon our nature ; and it may remain thus fixed, until this Mental state shall have given-rise to some other, or shall have expended its force in bodily action, or until the attention has been determinately detached from it by an exertion of the Will. But volitional Attention consists in the fixation of the Mental gaze, by a purposive *effort*, upon some single state, or on some class of Ideas or Feelings, which the Ego desires to make the special object of his contemplation ; and it is by means of this *selecting* power, and of the tendency of the Mental state thus intensified to call-forth other states with which it has pre-formed links of association, that the Will acquires that *directing* power over the current of Thought and Feeling, which characterizes the fully developed Man (§§ 25-28).—Thus it is in the degree of Attention which we bestow upon certain classes of Ideas presented to us by suggestion, that our power of determinately *using* our Minds in any particular mode consists ; and hence we see the fundamental importance of early learning to *fix* our attention, and to resist all influences which would tend to distract it. And this is essential, not merely to the advantageous employment of our Intellectual powers in the acquirement of Knowledge, but also to the due regulation of our Emotional nature : for it is by fixing the Attention upon those states of *feeling* which we desire to intensify, and, conversely, by withdrawing it from those we desire to repress (which is most easily effected by choosing *some other* object that exercises a healthful attraction for us), that we can encourage the growth of what we recognize as worthy, and can keep in check what we know to be wrong or undesirable.—This part of the subject will be more fully treated hereafter (Chaps. VI—IX).

CHAPTER IV.

OF SENSATION.

132. Sensation is that primary change in the condition of the conscious *Ego*,* which results from some change in the *Non-ego* or External World,—this last term including the Bodily organism itself; for it is through the instrumentality of a certain part of the Nervous apparatus, that the change in the Non-ego is enabled to affect the *Ego*. A physical impression made upon an afferent nerve, is propagated by it to its Ganglionic centre forming part of the *Sensorium*; and according to the particular centre which is thus affected, will be the nature of the Sensation produced. Thus impressions on the Olfactive, Optic, or Auditory nerves excite sensations of Smell, Sight, or Hearing, in virtue of their transmission to the Olfactive, Optic, or Auditory ganglia respectively. This is proved by the fact that *similar Impressions* will produce *entirely diverse Sensations*, according as they are made on one or another of the nerves of Sense. Electric stimulation does this most effectively, producing in each Sensory nerve the change which is necessary to call forth the particular affection of the Consciousness to which it ministers; so that, by proper management, the *Ego* may be made conscious at the same time of flashes of light, of distinct sounds, of a phosphoric odour, of a peculiar taste, and of a feeling of pricking, all excited by the same stimulus, the effects of which are modified by the respective peculiarities of the instru-

* Some Physiologists, it is true, have spoken of *Sensation without Consciousness*; but it seems very desirable, for the sake of clearness and accuracy, to limit the application of the word to the *mental* change; especially since the term "impression" serves to designate that change in the state of the Nervous system, which is its immediate antecedent.

ments through which it operates. So pressure, which produces through the nerves of common Sensation the feeling of resistance, is well known to occasion, when exerted on the Eye, the sensation of light and colours; and when made with some violence on the Ear, to produce a ringing sound. It is not so easy to excite sensations of Taste and Smell by mechanical irritation; and yet, as was shown by Dr. Baly, a sharp light tap on the papillæ of the tongue excites a Taste which is sometimes acid, sometimes saline. The sense of nausea may be easily produced, as is familiarly known, by mechanical irritation of the fauces.—But although there are some stimuli which can produce sensory impressions on all the nerves of Sense, those to which any one is specially fitted to respond, produce little or no effect upon the rest. Thus the Ear cannot distinguish the slightest difference between a luminous and a dark object. A tuning-fork, which, when laid upon the Ear whilst vibrating, produces a distinct musical tone, excites no other sensation when placed upon the Eye, than a slight jarring feeling, which is a modification of common not of visual sensation. The most delicate Touch cannot distinguish a substance which is sweet to the Taste, from one which is bitter; nor can the Taste (if the communication between the mouth and the nose be cut-off) perceive anything peculiar in the most strongly odorous bodies.—It may hence be inferred that no nerve of *special* Sense can take-on the function of another, any more than it can minister to common Sensation (§ 38).

133. The first stage in the Mental operation excited by a Sense-impression, is the *localization* of the Sensation; and this is clearly an *automatic* action, in regard to which it is impossible to say with certainty whether it is *primary* or *secondary*, a *congenital Intuition*, or an *acquired Instinct*. The latter view is perhaps the more probable; for though the young Infant cries when it feels pain, it does not show by any sign that it refers that pain to any particular seat; and we ourselves often wake out of sleep with a feeling of

discomfort or distress, which we are not at first sufficiently wide-awake to refer to a local origin. Yet the fully-developed Consciousness unhesitatingly refers Sense-impressions to the *origins* of the nerves that convey them to the Sensorium ; those of any special Sense to the particular organ of that sense, and those of common Sensation to the part in which the afferent nerve-trunks have their roots. There is, as Professor Huxley has phrased it, “an *extradition* of that consciousness which has its seat in the Brain, to a definite point of the body ; which takes place without our volition, and may give rise to ideas which are contrary to fact.” Thus after amputations, the patients are for some time affected with sensations (probably excited by irritation at the cut ends of the nerves), which they refer to the fingers or toes of the lost limbs ; and flashes of light are often experienced when the Eye has been completely extirpated, as also when its structure has been destroyed by disease. The effects of the Taliacotian operation afford a curiously-illustrative example of this principle ; for until the flap of skin from which the new nose is formed, obtains vascular and nervous connections in its changed situation, the sensation produced by touching it is referred to the forehead.

134. There are cases, however, in which Sensations are referred to parts quite remote from those on which the impressions are made that give rise to them. Thus, disease of the hip-joint is often first indicated by pain in the knee ; various disorders of the liver occasion pain under the left scapula ; attention is often drawn to disease of the heart by shooting pains along the arms ; the sense of nausea is more commonly excited by conditions of the stomach, than by the direct contact of the nauseating substance with the tongue or fauces ; the sudden introduction of ice into the stomach will cause intense pain in the supra-orbital region ; and the same pain is frequently occasioned by the presence of acid in the stomach, and may be very quickly relieved by its neutralization with an alkali. It will be seen that in most of these cases, it is

impossible to refer the sensations to any direct nervous connection with the parts on which the impressions are made ; and they can scarcely be otherwise accounted-for, than by supposing that these impressions produce Sensorial changes, which are referred to other parts in virtue of some *central* track of communication with them, analogous to that through which reflex movements are excited. There are circumstances, indeed, which seem to render it not improbable, that just as the impression brought by the afferent nerves to the central organs, calls forth a reflex Motion by exciting the nerve-force of a motor nerve, it may produce a reflex Sensation by a like excitation of a sensory nerve. Certain it is, that, after a long continuance of some of these reflex sensations, the organs to which they are referred often themselves become diseased, although previously quite healthy ; this perversion of their normal action being not improbably due to that habitual direction of the Attention to the part, which is prompted by the habitual Sensation (§ 129).

135. It has already been pointed out (§ 41) that, for the production of Sensations, each part of the Nervous apparatus must be in a state of activity, which can only be maintained by the constant Circulation of blood ;—this being specially needed at what may be considered the *origins* of the Sensory nerves in the general surface of the Skin and in the organs of special Sense, and at their *terminations* in the Ganglionic centres. An enfeeblement of the circulation where impressions are first *received*, diminishes their strength, as we see in the numbness produced by an obstruction to the flow of blood through the main artery of a limb ; and a like enfeeblement of the circulation in the Ganglionic centre through the instrumentality of which we are rendered *conscious* of the physical impression, produces a corresponding torpor of Sensibility. The local action of Cold, in like manner, produces numbness, not only by retarding the blood-circulation, but also (it would appear) by directly lowering the conducting power of the Nerve

itself; for if cold be applied to an afferent nerve-trunk *in its course*, complete insensibility is produced in all the parts from which it receives fibres. So, local *anæsthesia* or want of sensibility may be produced by the action of Ether or Chloroform on the nerves of the part.—On the other hand, in that first stage of local Inflammation in which the capillary circulation is unduly active, and the heat of the part is augmented, there is an unusual susceptibility, or “tenderness,” which renders ordinary impressions productive of pain.

136. The like diminution or exaltation of Sensibility may arise from states of the Sensorium. Thus in *Sleep* there is a want of receptivity for *ordinary* Sense-impressions; though *extraordinary* impressions will make themselves felt, recalling the sleeper to consciousness. In the profound *Coma* of apoplexy or of narcotism, on the other hand, complete suspension of Sensorial activity is produced, in the one case by continued pressure within the skull (which probably acts by disturbing the circulation), in the other by the direct action of the poison on the nerve-substance; whilst the torpor which is produced by continued exposure to severe Cold, is attributable to the congestion of the veins of the brain, which results from the contraction called-forth by the cold in the vessels of the general surface of the body. On the other hand, there are states of general *exaltation* of Sensibility, which obviously depend upon affections of the Sensorial centres. Thus the first stage of Inflammation of the Brain is characterized by an extreme susceptibility of this kind; the most ordinary impressions of light, sound, &c., giving rise to sensations of unbearable violence. The presence of certain poisons, as lead, in the blood, sometimes induces the condition termed *hyperæsthesia*, or excessive sensibility; though it more commonly induces local *anæsthesia*, or want of sensibility.—In all these cases it is perfectly clear to the Physiologist, that the degree in which Sensations are *felt*, entirely depends upon the condition of the Mechanism by

the instrumentality of which Physical Impressions are received and are translated into states of Consciousness.

137. It is no less certain, however, that the intensity of Sensations is greatly affected by the degree in which the recipient Mind is directed towards them; and this may operate in regard either to Sensory impressions generally, or to those of some particular class. Of the former we have a characteristic example in what is known as the *hysterical* condition; in which the patient's Attention is so fixed upon her own bodily state, that the most trivial impressions are magnified into severe pains; while there is often such an extraordinary acuteness to sounds, that she overhears a conversation carried-on in an undertone in an adjoining room, or (as in a case known to the Writer) in a room on the second floor beneath. There is here, doubtless, a peculiar Physical susceptibility to Nervous impressions, which is to a certain degree remediable by medical treatment; but much depends upon the diversion of the patient's Attention from her own fancied ailments; and we here see the importance of the *self-determining* power of the Will, which, if duly exercised, can substitute a *healthful* direction of the Mental activity, for the *morbid* imaginings to which the patient has previously yielded herself.*—The transition is easy from the cases in which there is an exaggeration of *real* Sensations, to those in which there is an actual *production* of sensations not originating in any external impressions, by an *expectation* generated in the Mind itself (§ 147).

138. The vividness of Sensations usually depends rather on the degree of *change* which they produce in the system, than on

* This condition is by no means peculiar to Females; although, from the greater impressibility of the Nervous system, and the lower development of Volitional power, by which the Sex is ordinarily characterized, it is more common among them than in males. It is often fostered, from a very early date, by the habit in which injudicious Parents and Nurses indulge, of *fixing* the Child's attention on any little hurt or ache, instead of *withdrawing* it by the *counter-attraction* of some object of interest. (See § 269.)

the *absolute amount* of the impressing force; and this is the case with regard alike to special and to ordinary sensations. Thus, our sensations of Heat and Cold are entirely governed by the previous condition of the parts affected; as is shown by the well-known experiment of putting one hand into hot water, the other into cold, and then transferring both into tepid water, which will seem *cool* to one hand, and *warm* to the other. Every one knows, too, how much more we are affected by a warm day at the commencement of summer, than by an equally hot day later in the season. The same is the case in regard to Light and Sound, Smell and Taste. A person going out of a totally dark room into one moderately bright, is for the time painfully impressed by the light, but soon becomes habituated to it; whilst another, who enters it from a room brilliantly illuminated, will consider it dark and gloomy. Those who are constantly exposed to very loud noises, become almost unconscious of them, and are even undisturbed by them in illness; and the medical student well knows that even the effluvia of the dissecting-room are not perceived, when the Sensorium has been habituated to impressions they produce: although an intermission of sufficient length would, in either instance, occasion a renewal of the first unpleasant feelings, when the individual is again subjected to the impression.—Thus there seems reason to believe that Sensorial changes of frequent occurrence, produce a modification in the nutrition of the Sensorium itself, which *grows-to* them, as it were, just as the Nervous system generally may be considered as growing-to “nervine stimulants” habitually taken-in (§ 155); for not only would the production of such a modification be quite in accordance with the general phenomena of Nutrition,* but we can scarcely other-

* We have a remarkable exemplification of this, in the *tolerance* which may be gradually established in the system for various Poisons, especially for such as particularly affect the Nervous substance, such as Opium or Alcohol. It seems impossible to explain this tolerance on any other hypothesis, than that of the

wise explain the progressive formation of that connection between Sensorial changes and Motor actions, which gives rise to the "secondarily automatic" movements (§ 191). Hence it seems reasonable to attribute that diminution in the force of Sensations which is the ordinary consequence of their *habitual* recurrence, to the want of such a *change* in the condition of the Sensorium, as is needful to produce an impression on the Consciousness; the effects which they at first induced being no longer experienced in the same degree, when the structure of that part has accommodated itself to them.—But the same principle does not apply to those impressions to which the *attention* is habitually directed; for these lose none of their power of exciting Sensations by frequent repetition; on the contrary, they are so much *more* readily recognized, that they affect the Consciousness under circumstances in which the Ego is insensible to much stronger impressions of other kinds (§ 480).

139. *Subjective Sensations*.—The designation "subjective" is commonly given to all those Sensations which arise out of either bodily or mental states, whose existence is not consequent upon any "objective" or external change. But, strictly speaking, it should be limited to those which arise from the workings of the Ego's own Mind; since those which are produced by Physical impressions made on the nerves *within* his Body, just as truly belong to the *Non-ego*, as do those made by impressions operating from *without*. Thus, for example, when incipient Inflammation of a part produces the sense of Heat in it, exactly resembling that which would be excited by the proximity of a heated body, it can scarcely be doubted that the Physical impression on the afferent nerves *of the part*, exciting Sensorial change, is the same in both cases: such a Sensation, therefore, is no more truly "subjective" in the one case than in the other. But when a "biologized"

alteration of the Nutrition of the tissue by repeated doses, so that no further change can be produced by the quantity originally taken.

subject is made to believe that a body he holds in his hands is unbearably hot, and throws it down accordingly (§ 458), the *sensorial* change is produced by the Mental suggestion ; the Sensation, which is only *referred* to the locality by the mental preconception, being the creation of the Ego himself.

140. Of those so-called "subjective" Sensations which have their origin in *local* changes that produce impressions on the nerves of the parts to which they are referred, we have examples in the flashes of light which are symptomatic of disease of the Retina or of the Optic nerve ; and in the ringing in the ears, which, while sometimes due to a disordered condition affecting the nervous apparatus within the ears themselves, appears more frequently to arise from an affection of the Auditory nerve in its course by the pulsations of a neighbouring artery. And it is probable that the persistence of a bad taste or of an unpleasant odour, having no source *outside* the body, is often to be attributed to analogous *local* changes *within* it. — On the other hand, there is probably no kind of Sensation that may not be produced by physical conditions of the Sensorium, which have *not* been induced by impressions transmitted thither by the afferent nerves, but which arise from morbid changes, either in its own substance, or in the blood which circulates through it. For subjective sensations are among the commonest indications of incipient Brain-disease ; and they are especially noticeable as results of the presence of *poisons* in the blood, whose action is specially exerted on the Cephalic nerve-centres.

141. We have now to consider, however, that class of *truly* "subjective" Sensations, of which the origin is to be looked-for, neither in local impressions on the nerves of the external senses, nor in abnormal affections of the Sensorium ; but in impressions transmitted to the Sensorium by the "nerves of the internal senses," which convey to it the results of changes taking place in that cortical layer of the Cerebrum which we have seen reason

to regard as the instrument of the higher Psychological operations (§ 100).

142. Every one is familiar with the fact that Sensations formerly experienced are *reproduced* in Dreaming, with a vividness and reality quite equal to that with which his consciousness was originally impressed by the actual objects. And this not unfrequently happens also in the waking state; in which we are able distinctly to trace-out the causation of this reproduction, in the suggestive action of pre-formed Ideational associations (§§ 101, 103). Of these associative actions, it cannot be reasonably doubted that the *Cerebrum* is the instrument; and the mechanism by which they occasion the reproduction of Sensations, has been already explained to be (according to the Writer's view) the transmission to the Sensorium, along the nerves of the *internal* senses, of an impression equivalent to that which it originally received through the nerves of the *external* senses (§§ 99—105).—But if Cerebral (ideational) states can *reproduce* Sensations, they can also *produce* them; and as this fact is of fundamental importance in our interpretation of a large class of phenomena to which attention has been drawn of late years under the designations "Odyllism," "Spiritualism," &c., it will be desirable to adduce the proofs of it in some detail. For nothing is more common than to hear the advocates of these doctrines appealing to "the evidence of their senses" as conclusive in regard to the actual occurrence of the phenomena which they believe themselves to have witnessed; in utter ignorance of the fact that *nothing is more fallacious* than that evidence, when the Mind is previously "possessed" by an idea of what the Sense-impressions are to be. Of this we have an apposite illustration in the well-known exclamation of Dr. Pearson, "Bless me, how heavy it is," when he first poised upon his finger the globule of Potassium produced by the battery of Sir H. Davy; his preconception of the coincidence between metallic lustre and high specific gravity, causing him to feel *that* as ponderous,

which the unerring test of the balance determined to be lighter than water. The excitement of the peculiar sensation of tickling in a "ticklish" person, by a threatening movement that suggests the idea, and of that of creeping or itching by the mention of bed-infesting insects to those who are peculiarly liable to their attacks, are familiar instances of the same fact.

143. In the two following cases related by Professor Bennett, the effect of the Idea was not limited to the production of the Sensations, but extended itself to the consequences which would have followed those sensations, if their supposed cause had been real:—

a. "A clergyman told me, that some time ago suspicions were entertained in his parish, of a woman who was supposed to have poisoned her newly-born infant. The coffin was exhumed, and the Procurator-fiscal, who attended with the medical men to examine the body, declared that he already perceived the odour of decomposition, which made him feel faint, and in consequence he withdrew. But, on opening the coffin, it was found to be empty; and it was afterwards ascertained that no child had been born, and consequently no murder committed."

b. The second case is yet more remarkable. "A butcher was brought into the shop of Mr. Macfarlan, the druggist, from the market-place opposite, labouring under a terrible accident. The man, on trying to hook-up a heavy piece of meat above his head, slipped, and the sharp hook penetrated his arm, so that he himself was suspended. On being examined, he was pale, almost pulseless, and expressed himself as suffering acute agony. The arm could not be moved without causing excessive pain; and in cutting-off the sleeve, he frequently cried out; yet when the arm was exposed, it was found to be quite uninjured, the hook having only traversed the sleeve of his coat." —(*The Mesmeric Mania* of 1851.)

No evidence *could* be stronger than that afforded by the almost pulseless condition of the subject of the second of these cases, as to the *reality* of the severe pain which he experienced; and yet

this pain entirely arose from his Mental conviction that the hook had penetrated the flesh of his arm.

144. Nearly thirty years ago, the scientific world was startled by the announcement made by Baron von Reichenbach (who had previously attained considerable reputation as a chemist) of the discovery of "a new Imponderable,"—a peculiar Force existing in nature and embracing the Universe, distinct from all known forces—to which he gave the name *Odyde*. This force could only be recognised by the effects it produced on certain "sensitive subjects;" who could *see*, it was averred, flames streaming from the poles of magnets, could *smell* odours issuing from them, and could *feel* sensations of warmth or coolness when magnets were drawn over any part of the surface of the body; some of them being also similarly affected by crystals; and one, in particular, by almost *any substance whatever*, so that she saw (in the dark) flames issuing from nails or hooks in a wall, or streaming from the finger-ends of human beings. Experienced Physicians, however, at once recognized in Baron Reichenbach's descriptions, the influence of the *ideas* with which these "sensitives" had become "possessed;" the phenomena being only, under another form, the manifestations of a tendency with which they were previously familiar in Hysterical and Hypochondriacal patients. Hence there was to them nothing in the least surprising in the fact, that such persons, *placed in a perfectly dark room for two hours*, could be brought to see a multitude of luminous phenomena, could hear varied sounds, could smell odours, and could touch intangible things, quite independently of any "Odyde" whatever, by the mere *suggestion* of what they were to experience. And although Reichenbach himself considered that he had taken adequate precautions to exclude the conveyance of any suggestion of which his "sensitives" should be conscious, yet those who were familiar with the extraordinary receptivity for Sense-impressions which is a special characteristic of Hysterical subjects (§ 137), could readily discern the modes in

which such suggestions would reach the "sensitives," without any intention on the part of the operator.

145. The very fact that *no manifestation of this supposed Force could be obtained, except through the conscious Human being,** was quite sufficient to convince every philosophic investigator, that he had to do, not with a new Physical Force, but with a peculiar phase of Psychological action, by no means unfamiliar to such as had previously studied the influence of the Mind upon the Body. From this point of view, Reichenbach's researches were accepted as an important contribution to Mental Physiology; and this estimate of their character was entirely confirmed by the inquiries of Mr. Braid, of Manchester, who was early led to the adoption of it by the experience he had already gained in a parallel line of investigation, the results of which had thrown great light on the phenomena of Mesmerism (Chaps. XIV, XV). For he found that whatever Sensations were producible by the agency of magnets, crystals, &c., the very same sensations occurred when the "subjects" *believed* that such agency was being employed, although nothing whatever was really being done; and further, that the character of the Sensations experienced by the "subjects" depended very much on the Ideas they had been led to form of them, either by their own mental action, or by the suggestion of others. The following are a few examples of the results obtained by Mr. Braid, of many of which the Writer was himself a witness:—

"A lady, upwards of fifty-six years of age, in perfect health, and wide awake, having been taken into a dark closet, and desired to look at the poles of the powerful horse-shoe magnet of nine elements, and describe what she saw, declared, after looking a considerable

* Thus although certain of the "sensitives" felt their hands powerfully attracted towards a magnet, yet, as Reichenbach himself confessed, when the magnet was poised in a delicate balance, and the hand was placed above or beneath it, *the magnet was never drawn towards the hand.* The "attraction," therefore, although *real* to the "subject" of it, was generated by the Idea in the "sensitive's" own Mind (§448).

time, that she saw nothing. However, after I told her to look attentively, and she would see fire come out of it, she speedily saw sparks, and presently it seemed to her to burst forth, as she had witnessed an artificial representation of the volcano of Mount Vesuvius at some public gardens. Without her knowledge, I closed down the lid of the trunk which contained the magnet, *but still the same appearances were described as visible.* By putting leading questions, and asking her to describe what she saw from *another* part of the closet (where there was nothing but bare walls), she went on describing various shades of most brilliant coruscations and flame, according to the leading questions I had put for the purpose of changing the fundamental ideas. On repeating the experiments, similar results were repeatedly realised by this patient. On taking this lady into the said closet after the magnet had been removed to another part of the house, she still perceived the same visible appearances of light and flame when there was nothing but the bare walls to produce them; and, two weeks after the magnet was removed, when she went into the closet by herself, the mere association of ideas was sufficient to cause her to realize a visible representation of the same light and flames. Indeed such had been the case with her on entering the closet, ever since the few first times she saw the light and flames. In like manner, when she was made to touch the poles of the magnet when wide awake, no manifestations of attraction took place between her hand and the magnet; but the moment the idea was suggested that she would be held fast by its powerful attraction, so that she would be utterly unable to separate her hands from it, such result was realized; and, on separating it by the suggestion of a new idea, and causing her to touch the *other* pole in like manner, predicating that *it would exert no attractive power* for the fingers or hand, such negative effects were at once manifested.—I know this lady was incapable of trying to deceive myself, or others present; but she was self-deceived and spell-bound by the predominance of a pre-conceived idea, and was not less surprised at the varying powers of the instrument than others who witnessed the results.”—(*The Power of the Mind over the Body*, 1846, p. 20.)

146. Other “subjects” taken by Mr. Braid into his dark closet, and unable to see anything in the first instance, when told to look

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steadily at a certain point (though there was no magnet there), and assured that they would see flame and light of various colours issuing from it, very soon declared that they saw them; and in some of them, "individuals of a highly concentrative and imaginative turn of mind," the same sensations could be called up in open daylight. The following was an experiment made *with* and *without* the magnet, upon the sensations of the general surface; the "subject" being a young gentleman twenty-one years of age:—

α. "I first operated on his right hand, by drawing a powerful horse-shoe magnet over the hand, without contact, whilst the armature was attached. He immediately observed a sensation of cold follow the course of the magnet. I reversed the passes, and he felt it *less cold*, but he felt no attraction between his hand and the magnet. I then removed the cross-bar, and tried the effect with both poles alternately, but still there was no change in the effect, and decidedly no proof of attraction between his hand and the magnet.—In the afternoon of the same day I desired him to look aside and hold his hat between his eyes and his hand, and observe the effects when I operated on him, whilst he could not see my proceedings. He very soon described a recurrence of the same sort of sensations as those he felt in the morning, but they speedily became more intense, and extended up the arm, producing rigidity of the member. In the course of two minutes this feeling attacked the other arm, and to some extent the whole body; and he was, moreover, seized with a fit of involuntary laughter, like that of hysteria, which continued for several minutes—in fact, until I put an end to the experiment. His first remark was, 'Now this experiment clearly proves that there must be some intimate connection between mineral Magnetism and Mesmerism; for I was most strangely affected, and could not possibly resist laughing during the extraordinary sensations with which my whole body was seized, as you drew the magnet over my hand and arm.' I replied that I drew a very different conclusion from the experiments, as *I had never used the magnet at all*, nor held it, nor anything else, near to him; and that the whole proved the truth of my position as to the extraordinary power of the Mind over the Body."—(*Op. cit.*, p. 15.)

Phenomena of the same kind were found to be producible without the use of a Magnet at all :—

b. "Another interesting case of a married lady, I experimented with in presence of her husband, was as follows. I requested her to place her hand on the table, with the palm upwards, so situated as to enable her to observe the process I was about to resort to. I had previously remarked, that by my drawing something slowly over the hand, without contact, whilst the patient concentrated her attention on the process, she would experience some peculiar sensations in consequence. I took a pair of her scissors, and drew the bowl of the handle slowly from the wrist downwards. I had only done so a few times, when she felt a creeping, chilly sensation, which was immediately followed by a spasmodic twitching of the muscles, so as to toss the hand from the table, as the members of a prepared frog are agitated when galvanized. I next desired her to place her *other* hand on the table, in like manner, but in such a position, that by turning her head in the opposite direction she might not see what was being done, and to watch her sensations in that hand, and tell us the result. In about the same length of time, similar phenomena were manifested as with the other hand, although in this instance *I had done nothing whatever*, and was not near her hand. I now desired her to watch what happened to her hand, when I predicted that she would feel it become *cold*; and the result was as predicted; and *vice versa*, predicting that she would feel it become intensely *hot*, such was realized. When I desired her to think of the tip of her nose, the predicted result either of heat or cold was speedily realized in that part.

"Another lady, twenty-eight years of age, being operated on in the same manner, whilst looking at my proceedings, in the course of half a minute, described the sensation as that of the blood rushing into the fingers; and when the motion of my pencil-case was from below upwards, the sensation was that of the current of blood being reversed, but less rapid in its motion. On resuming the downward direction, the original feeling recurred, still more powerfully than at first.—This lady being requested now to look aside, whilst I operated, realized similar sensations, and that whilst *I was doing nothing*.

"The husband of this lady, twenty-eight and a half years of age, came into the room, shortly after the above experiment was finished.

She was very desirous of my trying the effect upon him, as he was in perfect health. I requested him to extend his right arm laterally, and let it rest on a chair with the palm upwards, to turn his head in the opposite direction, so that he might not see what I was doing, and to concentrate his attention on the feelings which might arise during my process. In about half-a-minute he felt an *aura* like a breath of air passing along the hand; in a little after, a slight pricking, and presently a feeling passed along the arm, as far as the elbow, which he described as similar to that of being slightly electrified:—*all this, while I had been doing nothing*, beyond watching what might be realized. I then desired him to tell me what he felt now,—speaking in such a tone of voice, as was calculated to lead him to believe I was operating in some different manner. The result was that the former sensations ceased; but when I requested him once more to tell me what he felt *now*, the former sensations recurred. I then whispered to his wife, but in a tone sufficiently loud to be overheard by him, observe now, and you will find his fingers begin to draw, and his hand will become clenched,—see how the little finger begins to move, and such was the case; see the next one also going in like manner, and such effects followed; and finally, the entire hand closed firmly, with a very unpleasant drawing motion of the whole flexor-muscles of the fore-arm. I did nothing whatever to this patient until the fingers were nearly closed, when I touched the palm of his hand with the point of my finger, which caused it to close more rapidly and firmly. After it had remained so for a short time, I blew upon the hand, which dissipated the previously existing mental impression, and instantly the hand became relaxed. The high respectability and intelligence of this gentleman rendered his testimony very valuable; and especially so, since he was not only wide awake, but had never been either mesmerised, hypnotised, or so tested before.—(*Op. cit.*, pp. 15—17.)

147. The results thus obtained by experiment, being at the same time consistent with ordinary Medical experience, and accordant with Physiological probability, have an adequate claim to acceptance as *Scientific facts*; and it is obvious that, if the principle be once admitted that *real Sensations are producible by Mental states*,

this principle furnishes the key to the explanation of a large number of those "spiritualistic" experiences, in which objects are affirmed to be actually seen and felt, that only exist in the Imagination of the "subjects" of them. It has been no less happily than philosophically said by the Laureate, that "Dreams are true while they last ;" but we become conscious in our waking state of the "objective" *unreality* of what was for the time *real* to us, by its discordance with that general resultant of our waking experiences which we call "Common Sense." (Chap. XI.) Occasionally we are puzzled to answer the question, "Did this really happen, or did I dream it?"—our perplexity arising from the fact, that the "trace" of what passed in our dream equals in vividness that which would have been left by the actual occurrence, and that there is nothing inconsistent with our experience, in the idea that it *might* have happened.—Now when a number of persons who are "possessed" with the current ideas in regard to Spiritualistic manifestations, sit for some time in a dark room in a state of "expectant attention," it is conformable to all scientific probability that they should *see* luminous manifestations, should *smell* flowers, should *feel* the contact of spirit-hands or the crawling of live lobsters, or should *hear* musical sounds or the voices of departed friends;—just as they are prompted to do by their own course of thought, or by the suggestions of others; the correction of these dreamy imaginings, by bringing common sense and scientific knowledge to bear upon them, being just what the votaries of the doctrine referred-to scornfully repudiate.

148. Very nearly connected with the foregoing, are the phenomena of *Spectral Illusions*; which, like the creations of dreaming or delirium, are the products of the excitement of *Sensorial* activity by *Cerebral* change, operating through the "nerves of the *internal* senses;" the essential difference being that as the Sensorium is not closed to external impressions, these mental images mingle with the sensations called forth by objective realities. A simple but

very illustrative case of this kind, which occurred in the experience of Sir John Herschel, has already been cited (§103); and it is probable that we are to regard in the same light that Spectrum of the Sun, which Sir Isaac Newton was able to recall by going into the dark and directing his mind intensely, "as when a man looks earnestly to see a thing which is difficult to be seen," and which, after a frequent repetition of this process, came (he says to return "as often as I began to meditate on the phenomena, even though I lay in bed at midnight with my curtains drawn." For although phenomena of this class are often regarded as *ocular* spectra produced by *retinal* change, their reproduction by *mental* states seems to place them in the same category as the visual sensations which are distinctly reproduced by Memory, that is, by *cerebral* change (§102). In fact, there is such a gradational transition from the one state to another, that it seems clear that they have a common origin. Thus Dr. Abercrombie (*Inquiries concerning the Intellectual Powers*, 5th Edit., p. 382) mentions the case of a gentleman who was all his life haunted by Spectral figures, and could call up any at will, by directing his attention steadily to some conception of his own mind, which might either consist of a figure or a scene that he had seen, or might be a composition of his own imagination: but although possessing the faculty of producing the illusion, he had no power of banishing it; so that when he had called-up any particular figure or scene, he could not say how long it might continue to haunt him. In this case the Sensorial state produced by Cerebral action so closely resembled the impression produced by the actual object, that, on meeting a friend in the street, the subject of it could not satisfy himself whether he saw the real individual or the spectral figure, save by touching his body, or by hearing the sound of his footsteps,—the correction being here supplied by other Sense-impressions. In certain instances the unreality of these phantasms, however vivid, is recognized by the Intellect, from the consideration of the circum-

stances under which they occur: as in the well-known case of Nicolai, who, when suffering from intermittent fever, saw coloured pictures of landscapes, trees, and rocks, resembling framed paintings, but of half the natural size; so long as he kept his eyes closed, they underwent constant changes, some figures disappearing while new ones showed themselves; but as soon as he opened his eyes, the whole vanished. The following is another case of this kind, in which the same Sensorial condition as in dreaming or delirium was accompanied by an Intellectual recognition of its objective unreality:—

“We knew a gentleman of strong mind, and a most accomplished Scholar, who was for many years subject to such phantasms, some sufficiently grotesque; and he would occasionally laugh heartily at their antics. Sometimes it appeared as if they interrupted a conversation in which he was engaged; and then, if with his family or intimate friends, he would turn to empty space, and say, ‘I don’t care a farthing for ye; ye amuse me greatly sometimes, but you are a bore just now.’ His spectra, when so addressed, would to his eye resume their antics, at which he would laugh, turn to his friend, and continue his conversation. In other respects he was perfectly healthy, his mind was of more than ordinary strength, and he would speak of his phantoms, and reason upon their appearance, being perfectly conscious that the whole was illusive.”

149. It is a curious confirmation of the view here advocated as to the distinctness between the parts of the Brain which are the instruments of *sensorial* and of *ideational* states respectively, and of the immediate relation of the former to the *motor* apparatus, that the presence of a Spectral illusion will often operate in directing movement, even though there be an intellectual consciousness that there is no objective cause for it, and that the movement is consequently inappropriate. A lady nearly connected with the Writer, having been frightened in childhood by a black cat, which sprang-up from beneath her pillow just as

she was laying her head upon it, was accustomed for many years afterwards, whenever she was at all indisposed, to see a black cat on the ground before her ; and although intellectually aware of the spectral character of the appearance, yet she could never avoid lifting her foot as if to step over the cat, when it seemed to be lying in her path.*

150. When, as the cases last cited, the Spectral image distinctly represents an external object, it must be regarded as not merely a Sensorial but as a Perceptual illusion. A far more frequent cause of false *perceptions*, however, lies in the *misinterpretation* of real Sense-impressions, under the influence of pre-existing Ideational states,—a subject which will be more fitly considered hereafter (§ 186).

151. *Relation of Sensations to other Mental States.*—It is through the medium of Sensation, that we acquire a knowledge of the Universe external to us, by the Psychological operations which its changes excite in ourselves. The Psychologist of the present day views Matter entirely through the light of his own consciousness:—his idea of matter in the abstract being that it is a “something” which has a permanent power of exciting Sensations ; his idea of any property of matter being the mental Representation of some kind of sense-impression he has received from it ; and his idea of any particular kind of matter being the Representation of the whole aggregate of the sense-perceptions which its presence has called up in his mind.

“ Thus when I press my hand against this table, I recognise its unyieldingness through the conjoint medium of my sense of Touch, my Muscular sense, and my Mental sense of Effort, to which it will be convenient to give the general designation of the Tactile sense ; and I attribute to that table a *hardness* which resists the effort I

* A very interesting collection of cases of Spectral Illusions will be found in Dr. Abercrombie’s Treatise, and in Sir B. Brodie’s “ Psychological Inquiries ;” see also Sir John Herschel’s own experiences in his “ Familiar Lectures on Scientific Subjects,” pp. 403-5.

make to press my hand into its substance, whilst I also recognise the fact that the force I have employed is not sufficient to move its mass. But I press my hand against a lump of dough; and finding that its substance yields under my pressure, I call it *soft*. Or again, I press my hand against this desk; and I find that although I do not thereby change its *form*, I change its *place*; and so I get the Tactile idea of *Motion*. Again, by the impressions received through the same Sensorial apparatus, when I lift this book in my hand, I am led to attach to it the notion of *weight* or ponderosity; and by lifting different solids of about the same size, I am enabled, by the different degrees of exertion I find myself obliged to make in order to sustain them, to distinguish some of them as *light*, and others as *heavy*. Through the medium of another set of Sense-impressions (which some regard as belonging to a different category), we distinguish between bodies that *feel* 'hot' and those that *feel* 'cold'; and in this manner we arrive at the notion of differences of Temperature. And it is through the medium of our Tactile sense, without any aid from Vision, that we first gain the idea of *solid form*, or the three dimensions of Space.

"Again, by the extension of our Tactile experiences, we acquire the notion of *liquids*, as forms of matter yielding readily to pressure, but possessing a sensible weight which may equal that of solids: and of *air*, whose resisting power is much slighter, and whose weight is so small that it can only be made sensible by artificial means. Thus, then, we arrive at the notions of *resistance* and of *weight* as properties common to all forms of Matter; and now that we have got rid of that idea of Light and Heat, Electricity and Magnetism, as 'imponderable fluids,' which used to vex our souls in our scientific childhood, and of which the popular term 'electric fluid' is a 'survival,' we accept these properties as affording the practical distinction between the 'material' and the 'immaterial.'

"Turning, now, to that other great portal of Sensation, the Sight, through which we receive most of the messages sent to us from the Universe around, we recognise the same truth. Thus it is agreed alike by Physicists and Physiologists, that *colour* does not exist *as such* in the object itself; which has merely the power of reflecting or transmitting a certain number of millions of undulations in a second; and these only produce that affection of our consciousness which we

call Colour, when they fall upon the retina of the living percipient. And if there be that defect either in the retina or in the apparatus behind it, which we call 'colour-blindness' or 'Daltonism,' some particular hues cannot be distinguished, or there may even be no power of distinguishing any colour whatever. If we were all like Dalton, we should see no difference, except in form, between ripe cherries hanging on a tree, and the green leaves around them: if we were all affected with the severest form of colour-blindness, the fair face of Nature would be seen by us as in the chiaroscuro of an engraving of one of Turner's landscapes, not as in the glowing hues of the wondrous picture itself."—(*Address to the Meeting of the British Association, 1872.*)

152. If it were possible for a Human being to come into the world with a Brain perfectly prepared to be the instrument of Psychical operations, but with *all* the inlets to Sense-impressions closed, we have every reason to believe that the Mind would remain dormant, like a seed buried deep in the earth. The attentive study of cases in which there is congenital deficiency of one or more Sensations, makes it evident that the Mind is utterly incapable of forming any definite Ideas in regard to those properties of objects, of which those particular sensations are adapted to take cognizance. Thus the man who is born blind, can form no conception of colour; nor the congenitally-deaf, of musical tones. And in those lamentable cases in which the sense of Touch is the only one through which Ideas can be called-forth, the Mental operations necessarily remain of the simplest and most limited character,—unless the utmost attention be given by a judicious instructor, to the development of the Intellectual faculties, and the cultivation of the Moral feelings, through that restricted class of ideas which there *is* a possibility of exciting.*

153. The activity of the Mind, then, is just as much the result of its consciousness of external impressions, by which its faculties

* Of the extent to which this *may* be accomplished, the well-known case of Laura Bridgeman affords a most remarkable exemplification.

are called into play, as the life of the Body is dependent upon the appropriation of nutrient materials, and the constant influence of external forces. But there is this difference between the two cases,—that whilst the Body continually requires *new* materials and a continued action of external agencies, the Mind, when it has been once called into activity, and has become stored with Ideas, may remain active, and may develop new relations and combinations amongst these, after the complete closure of the Sensorial inlets by which new ideas can be excited *ab externo*. Such, in fact, is what is continually going-on in the state of Dreaming ; but examples yet more remarkable are furnished in the vivid conceptions which may be formed of a landscape or a picture, from oral description, by those who have once enjoyed sight ; or in the composition of music, even such as involves new combinations of sounds, by those who have become deaf, as in the well-known case of Beethoven. The mind thus feeds, as it were, upon the store of Ideas which it has laid-up during the activity of its Sensory organs : and not only are those impressions which it *consciously* retains, worked-up into a never-ending variety of combinations and successions of ideas, thus continuing to afford new sources of mental activity, even to the very end of life ; but impressions of which the Mind, though once conscious of them, seems even to itself to have entirely lost the traces, may recur spontaneously, and influence its trains of thought, at periods long subsequent to their reception. (Chap. X.)

154. With particular Sensations are connected *feelings of Pain or Pleasure*, which cannot (for the most part at least) be explained upon any other principle than that of the necessary association of these feelings, by an original law of our nature, with the sensations in question. As a general rule, it may be stated that the *violent* excitement of *any* sensation is disagreeable, even when the same sensation in a moderate degree may be a source of extreme pleasure. This is the case alike with those impressions which are

communicated through the organs of Sight, Hearing, Smell, and Taste, as with those that are received through the nerves of Common sensation ; and the association of painful feelings with such violent excitement, serves to stimulate the individual to remove himself from what would be injurious in its effects. Thus, the pain resulting from violent pressure on the cutaneous surface, or from the proximity of a heated body, gives warning of the danger of injury, and excites mental operations destined to remove the part from the influence of the injurious cause ; and this is shown by the fact, that loss of sensibility is frequently the indirect occasion of severe lesions,—the individual not receiving the customary intimation that an injurious process is taking place.* Thus, violent inflammation of the membrane lining the air-passages has resulted from the effects of ammoniacal vapours incautiously introduced into them during a fainting-fit,—the patient not receiving that notice of the irritation, which, in the active condition of his Nervous

* The following case, recorded in the “*Journal of a Naturalist*,” affords a remarkable instance of this general fact. The correctness of the statement having been called in question, it was fully confirmed by Mr. Richard Smith, the late senior Surgeon of the Bristol Infirmary, under whose care the sufferer had been :—“A travelling man, one winter’s evening, laid himself down upon the platform of a lime-kiln, placing his feet, probably numbed with cold, upon the heap of stones newly put on to burn through the night. Sleep overcame him in this situation ; the fire gradually rising and increasing, until it ignited the stones upon which his feet were placed. Lulled by the warmth, the man slept on : the fire increased until it burned one foot (which probably was extended over a vent-hole) and part of the leg above the ankle entirely off, consuming that part so effectually that a cinder-like fragment was alone remaining,—and still the wretch slept on ! and in this state was found by the kiln-man in the morning. Insensible to any pain, and ignorant of his misfortune, he attempted to rise and pursue his journey ; but missing his shoe, requested to have it found ; and when he was raised, putting his burnt limb to the ground to support his body, the extremity of his leg-bone, the tibia, crumbled into fragments, having been calcined into lime. Still he expressed no sense of pain, and probably experienced none ; from the gradual operation of the fire, and his own torpidity during the hours his foot was consuming. This poor drover survived his misfortunes in the hospital about a fortnight ; but the fire having extended to other parts of his body, recovery was hopeless.”

system, would have prevented him from inhaling the noxious agent.

155. The feelings of Pain or Pleasure which unaccustomed sensations excite, are often exchanged for each other when the system is *habituated* to them ; this is especially the case in regard to impressions communicated through the organs of Smell and Taste. There are many articles in common use among mankind,—such as Tobacco, Alcoholic liquors, &c., the use of which cannot be said to produce a natural enjoyment, since they are at first unpleasant to most persons ; and yet they first become tolerable, then agreeable ; and at last the want of them is felt as a painful privation, and the stimulus must be applied in an increasing degree in order to produce the usual effect. These all belong to the class of “nervine stimulants ;” and it can scarcely be questioned that the result of their continual employment is to produce a modification of the *nutrition* of the Nervous system, which engenders a Physical want when they are withheld, comparable to that of Hunger or Thirst (§ 138).

156. On the same level with the simple feelings of Pleasure and Pain which are associated with particular Sensations, but distinct from these in the manner in which they affect us, are those *general* feelings of personal *well-being*, or of its reverse *malaise*, which, whilst so intimately connected with states of the Bodily system as to be producible by them alone, are also the rudimentary forms of those higher Psychological states which we term *emotions*. These feelings, in their lowest stage of development, are purely “subjective ;” the individual being simply conscious of them, and not referring them to any external source. There are many persons who are so keenly susceptible of both, that they pass their whole lives in an alternation between *cheerfulness* and *depression* : the former state being favoured by freedom from anxiety, by the healthful activity of all the organic functions, by a bright sun and a dry bracing atmosphere ; whilst the latter is immediately induced by

mental disquietude, by a slight disorder of digestion or excretion, or by a dull oppressive day. And a concurrence of favourable conditions may even exalt this *Cœnæsthesis* (or self-feeling) into *exhilaration* or absolute *joy*; whilst the combined influence of those of the opposite kind may produce *gloom*, which may be exaggerated almost to *despair*. We shall hereafter see cogent reasons for regarding these conditions as purely Physical (§§ 535, 552). The condition of "the spirits" (as these Mental affections are commonly designated) most to be desired, however, is that of *tranquil comfort*; which is far more favourable than the alternation of extremes, to healthful activity and to sustained energy, alike of Body and of Mind. And this may be cherished by cultivating the habit of Volitional self-control (§ 271), whereby any tendency to undue exhilaration is moderated, and excessive depression is resisted by a determinate effort not to yield to it.

157. Similar states of Consciousness may be excited by causes purely Psychical; and although we are then accustomed to designate them as Emotions, yet their nature and their seat are probably the same in the one case as the other. The simple *feeling* which we experience from a piece of "good" or of "bad news," is so nearly allied to the Pleasure or Pain we experience in connection with Sensations, that we may fairly regard the instrumentality by which we become conscious of it as *sensorial* rather than Cerebral; the state of the Sensorium being affected, in the one case, by impressions conveyed to it by the "nerves of the *internal* senses," just as it is in the other by those brought to it by the nerves of the *external* senses. It often happens, moreover, that the impression thus made upon the "emotional sensibility" is more persistent than the ideational state which gave rise to it; for after some disagreeable occurrence, or the receipt of ill-tidings, we feel an abiding consciousness of discomfort or distress, although we determinately keep from our Mental view the recollection of the unpleasant idea, in order that we may not be disturbed by dwelling

too painfully on it. It may often be observed, moreover, that when the passions have been stirred in states of Somnambulism, Hypnotism, &c., a disturbed *cœncæsthesis* is carried-on into the ordinary state, although the "subject" is altogether unconscious of the nature or causes of the emotional excitement (§ 491).—There are few other forms of emotional sensibility which are so completely subjective as the foregoing; most of them having reference to some object which is felt to be external to Self, and therefore belonging to the next category (§ 189). But we seem justified in referring to this group, as being nearly allied to the foregoing, though scarcely capable of being grouped together with them, *the sense of enjoyment in activity*, and its converse *the sense of tedium in inactivity* (commonly known as *ennui*); both of which are purely subjective states, and are obviously manifested by the lower Animals,—chiefly, however, in connection with their *bodily* functions,—whilst in Man it is the want of *mental* occupation that is the chief source of *Ennui*.*

* The Writer would here express his obligations to his friend Dr. Noble, of Manchester, for many valuable suggestions in regard to the diversified forms of "Emotional Sensibility," and its relations to Sensational, Perceptual, and Ideational states respectively—See his "Elements of Psychological Medicine" 2nd Ed., 1855, and his subsequent treatise on "The Human Mind" (1858).

CHAPTER V.

OF PERCEPTION AND INSTINCT.

158. NEITHER the operations of the Intellectual Powers, nor the higher Emotional states, are *immediately* called-forth by Sensations ; for in that stage of consciousness we merely recognize the fact that certain changes have occurred in our own "subjective" state, and do not refer these changes to any external or "objective" source. Of such a limitation, we occasionally meet with examples among the phenomena of Sleep, and in some of the conditions resulting from the use of Anæsthetic agents : for if we fall asleep whilst suffering from bodily pain, we may entirely lose all perception of the cause of that pain, and yet remain conscious of a perturbed state of feeling, which may affect the course of our dream ; and when a surgical operation is performed in a state of incomplete anæsthesia, it is obvious that pain is felt without any distinct consciousness of its source, and the patient may subsequently describe his state as an uneasy dream. Such, it is probable, is the condition of the infant at the commencement of its Psychological life. "If," as has been well remarked by Dr. J. D. Morell (*Philosophy of Religion*, p. 7), "we could by any means transport ourselves into the mind of an Infant before the Perceptive consciousness is awakened, we should find it in a state of absolute isolation from everything else in the world around it. Whatever objects may be presented to the Eye, the Ear, or the Touch, they are treated simply as *subjective feelings*, without the Mind's possessing any consciousness of them *as objects* at all. To it, the inward world is *everything*, the outward world is *nothing*."—However difficult it may be, under the influence of our

life-long experience, to dissociate any Sensation of which we are cognizant, from the notion of its external cause—since, the moment the feeling is experienced, and the Mind is directed to it, the *object* from which it arises is immediately suggested,—yet nothing is more certain than that all of which we are *primarily* conscious in any case whatever, is a certain internal or subjective state, a change in our previous Consciousness; and that the *mental recognition* of the object to which that change is due, is dependent upon a higher process, to which the name of *Perception* is now generally accorded. We may recognize the manifestation of this process in the Child, as it advances beyond the first few months of its helplessness. “A sight or a sound,” remarks Dr. Morell (*Op. cit.*), “which at first produced simply an involuntary start, now awakens a smile or a look of recognition. The mind is evidently struggling *out of itself*; it begins to throw itself into the objects around, and to live in the world of outward realities.” A similar transition, more rapidly effected, may be distinguished in ourselves, during the passage from Sleep, or from the insensibility of a swoon, to the state of wakeful activity; when we are at first conscious only of our own sensations, and gradually come to the knowledge of our condition as it relates to the world around, and of the position and circumstances, new and strange as they may be, in which we find ourselves.

159. Now the *apprehension*, or the formation of an elementary Notion, of the *outness* or *externality* of the cause of a Sensational change, is an operation which the Mind seems necessarily to perform, when it has attained a certain stage of development; instinctively or intuitively making a definite distinction between the *self* and the *not-self*, the *subject* and the *object*. We do not infer the existence of objective realities by any act of the Reason; in fact, the strict application of logical processes tends rather to shake than to confirm the belief in the External World; but our Minds being at first subjectively impressed by the qualities of matter,

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we gradually learn to interpret and combine the impressions they make upon our consciousness, so as to derive from them a more or less definite *notion* of the object (§ 151). Some of these Notions are so simple, and so constantly excited by certain Sensations, that we can scarcely do otherwise than attribute their formation to original and fundamental properties of the Mind, called into activity by the sensations in question; thus, the notion of *hardness* seems to connect itself from the first with the sense of absolute resistance, the notion of *direction* with the consciousness of diversity of parts in the visual picture. Such perceptions are said to be *instinctive* or *original*. In other cases, however, the notions are connected with the sensations by *habit* alone; the connection being the result of the association which gradually establishes itself between them, so that a certain sense-impression invariably calls up a certain notion of an object answering to it. And thus it may happen that a *wrong* interpretation may be put upon the sensational state, merely through some change in the conditions under which it has been habitually received; as in the following very simple experiment:—If the middle finger of either hand be crossed behind the fore-finger, so that its extremity is on the thumb-side of the latter, and the ends of the two fingers thus disposed be rolled over a marble, pea, or other round body, a sensation will be produced, which, if uncorrected by reason, would cause the mind to believe in the existence of two distinct bodies; this being due to the impression being made at the same time upon two spots, which, in the ordinary position of the fingers, are at a considerable distance from each other.

160. There can be no doubt that, during the period of Infancy, a very rapid and energetic process of self-education is going on; the *whole mind*, so far as it is yet developed, being concentrated upon its Perceptive activity: and when once a complete interpretation has thus been attained of any particular group of Sensations, it so immediately occurs to the consciousness whenever

those sensations may be renewed, as to have all the directness of an *original* perception. Thus it is very difficult, at later periods of life, to discriminate the Perceptions which are really *instinctive*, from those which have been *acquired* during Infancy.

It would be wrong to draw inferences on this point from the actions of the lower Animals; for in those cases in which the young are dependent from the first on the exertion of their own powers, it is obvious that they have a larger range of Instinctive perceptions than is possessed by those which derive their early sustenance from their parents. Many of them, for example, manifest a guiding appreciation of direction and distance, which Man can only gain by long experience. Thus, a Fly-catcher just come out of its shell, has been seen to peck-at and capture an Insect, with an aim as perfect as if it had been all its life engaged in learning the art.*—Still more remarkable is the perception that guides the actions of a little Fish, the *Chaetodon rostratus*, which shoots-out drops of fluid from its prolonged snout, so as to strike Insects that happen to be near the surface of the water, thus causing them to fall-in, and to be brought within its reach. Now by the refraction of light, the real place of the Insect in the air will not be that at which it appears to the Fish in the water, but will be a little *below* its apparent place; and to this point the aim must be directed. The difference between the real and the apparent place, moreover, will not be constant; for the more perpendicularly the rays enter the water, the less will be the variation; and, on the other hand, the more oblique the direction, the greater will be the difference.

161. It has been recently maintained that the want, both of the apprehension of *distance*, and of the power of *directing* the Muscular movements so as at once to lay hold of an object, which every one who carefully observes the actions of the Human Infant must recognize, is a mere matter of *development*; the human infant coming into the world in a less advanced condition

* See the experiments of Mr. Spalding on this subject, detailed in his paper in "Macmillan's Magazine" for February, 1873, to which reference has already been made (§ 77).

than the young of many other animals, which are able to run about and seek their own sustenance from the first. But the Writer has strong personal reasons for asserting that such is not the fact. Having been introduced into the Medical profession by an eminent Surgeon of Bristol (the late Mr. J. B. Estlin), who had a large Ophthalmic practice in the West of England and South Wales, he had the opportunity of seeing many cases of congenital Cataract cured by operation; the condition of these children being exactly parallel in respect of Vision, to that of Mr. Spalding's hooded chicks. Generally speaking, the operation was performed within the first twelve months; but he distinctly remembers two cases, in one of which the subject was a remarkably sturdy little fellow of three years old, whilst the other was a lad of nine. In the latter, however, there had been more visual power before the operation, than in the former; and he therefore presents the well remembered case of Jemmy Morgan as the basis of his assertion, that the acquirement of the power of visually guiding the muscular movements is *experiential* in the case of the Human Infant:—

Jemmy had most assuredly come to that stage of his development, which would justify the expectation that if he *had* his Sight he would *at once* use it for his guidance, supposing the power of doing so to be congenital, for his father being a farmer a few miles out of Bristol, he was accustomed to go about by himself in the farm-yard, where he made friends with every one of its inhabitants, and picked up from the labourers a very improper accomplishment,—that of swearing most horribly. He was so strong, that it was necessary for the performance of the operation that his body should be bound down upon a table, and that each of his limbs and his head should be held by a separate assistant. The Writer remembers that he had charge of his head, which he found it impossible altogether to prevent him from rolling from side to side; whilst his roars and curses seem even now ringing in the Writer's ears. The operation, performed with consummate dexterity,—the handle of the cataract-needle being left by Mr. Estlin to “play” between his fingers, as Jemmy's head

would move in spite of the strongest efforts to restrain it,—was entirely successful. In a few days both pupils were almost clear; and it was obvious from his actions that he had distinct Visual Perceptions. But though he clearly recognised the *direction* of a candle or other bright object, he was as unable as an Infant to apprehend its *distance*; so that when told to lay hold of a watch, he *groped* at it, just like a young child lying in its cradle. It was *very gradually* that he came to use his Sight for the guidance of his movements: and when, going about the house at which he was staying in Bristol, with which he had familiarized himself before the operation, he generally *shut his eyes*, as if puzzled rather than aided by them. When he came up to Mr. Estlin's house, however, he would show that he was acquiring a considerable amount of visual power; and it was his favourite amusement there, to blow about with his breath a piece of white paper on the surface of a dark mahogany table, round and round which he would run, as he wafted the paper from one side to another, shouting with glee at his novel exploit. Nevertheless, when he returned *home* to his father's house and farm-yard, his parents (very intelligent people) remarked that he was for some time obviously puzzled by his Sight, *shutting his eyes* as he went about in his old way; though whenever he went to a *new* place, he was obviously aided by it. But it was several months before he came to trust to it for his guidance, as other children of his age would do.—Jemmy's case was very carefully observed, both by Mr. Estlin and the Writer, with full knowledge of the interest attaching to such observations; and every fact the Writer has here stated remains as distinctly impressed on his mind at the distance of more than forty years, as if it had only happened yesterday,—the image of Jemmy, in his red frock, and with his still redder legs, being more vivid than any other reminiscence of his early professional life.

162. This formation of *acquired* Perceptions, and their gradual assumption of the *immediate* character of those which belong to our original constitution (§§ 167, 168), bear a striking analogy to the process by which habitual Movements come to be linked-on to the Sensations that prompt them, so as at last to be automatically performed, although originally directed by the Will. And it can scarcely be regarded as improbable, that, in the one case as in the

other, the Nervous Mechanism *grows-to* particular modes of activity (§ 138); so that successions of change are uniformly excited by particular stimuli, which were not provided-for in its original construction. Such a view harmonizes well with the fact, that such associations, alike between Sensations and respondent *movements*, and between Sensations and respondent *ideas*, are formed much more readily during the period of Childhood and Adolescence, than they are after the full measure of development has been attained; and that they are much more durable in the former case than in the latter. Throughout the whole Constitution of Man, as well Physical as Mental, we witness a marked capacity of adaptation to a great variety of circumstances; and by the self-education directed by those circumstances, he gradually *acquires* those modes of action, which in other Animals are originally and uniformly prompted by their Instinctive tendencies. It will be shown hereafter (§ 275) to be accordant with the general laws of Nutrition, that such habitual modes of action should express themselves in the formation of the Nervous mechanism, so as to *develope* in it arrangements corresponding to those which it elsewhere originally possessed; and that such arrangements, when once formed, should be kept-up through life, provided that they are not allowed to pass into disuse. Hence, although placed at a disadvantage in comparison with other Animals during the earlier periods of his life, Man is enabled ultimately to attain to a far wider range of Perceptive appreciation than that to which *they* are limited; there being, in fact, no class of Sense-impressions, from which, by habitual Attention to them (§ 127), he may not draw information of a far more precise and varied nature, than they seemed at first to be capable of affording.

163. We have seen that, for the production of a Sensation, a *conscious* state of Mind is all that is required; whilst, on the other hand, for the exercise of the Perceptive power, a certain degree of *Attention* is requisite; or, in other words, the Mind must be *directed*

towards the sensation. And thus it happens that, when the Mind is either inactive, or is completely engrossed by some other subject of thought, the Sensation may neither be perceived nor remembered, notwithstanding that we have evidence, derived from the respondent movements of the body, that it has been felt. Thus a person in a state of imperfect Sleep may start at a loud sound, or may turn-away from a light shining on his face ; being conscious of the Sensation, and acting automatically upon it, but forming no kind of appreciation of the externality of its source. And, in like manner, a person in a state of profound Abstraction (§ 443) may perform many automatic movements, which cannot (so far as we know) be excited otherwise than through the medium of Sensation ; and yet the exciting sensations are neither *perceived* by him at the time, nor are they afterwards remembered ; so that when he is aroused from his reverie, he may be astonished to find himself in circumstances altogether different from those under which he passed into it. Sometimes, however, the Sense-impression may excite a sort of imperfect Perception, which is subsequently remembered and completed. For example, the Student who does not hear the repeated strokes of the clock, when his mind is entirely given-up to his object of pursuit, may have a sort of vague consciousness of them if his attention be less completely engrossed by his studies ; and although the sounds may not suggest at the moment any distinct idea of the passage of time, yet, when he subsequently gives his attention to the Sensorial impression, he may remember to have heard the clock strike, and may even be able to retrace the number of strokes.* When the Attention

* It is curious that, in so retracing a number, we are often assisted by mentally reproducing the succession of strokes ; *imagining* their recurrence, until we feel that we have *counted-up* to the impression that was left upon our Sensorium.—In the same way, if asked how many stairs there are in a staircase which we are in the habit of using, we may not be able to name the number ; yet, when actually ascending or descending, we are conscious that we have arrived at the top or the bottom, by the completion of that series of Sensorial changes which has become habitual to us.

is directed, however, to the sonorous impressions (as when we are *listening* for the striking of the clock), or when it is not so closely fixed on any other object as to prevent it from being attracted by the Sense-impressions, the sounds are not only recognized as proceeding from an external source, which is a simple act of Perception, but the sensations we perceive are discriminated from all others of like nature; and it is by this kind of mental intensification of the perceptive change to which they give rise, that the sensations themselves are impressed with so much additional force on our consciousness, as to seem extraordinarily increased in acuteness. Although we are accustomed to see this chiefly in cases where some particular kind of perceptive acuteness has been acquired by *habit* (§ 127), yet we may learn from certain phenomena of Somnambulism (both spontaneous and artificial) that nothing more is needed, than that concentration of the *whole mind* upon the Sensorial indications, which is the natural state of the Infant (§ 498).

164. Taking as the basis of the knowledge possessed by Man of any object external to him (and therefore of the External World generally), *first*, a subjective Sensation called forth by the presence of that object; *secondly*, the recognition of the *externality* of the cause of that sensation; and *thirdly*, the formation of a *notion* respecting the quality of the object which called it forth,—we have next to inquire into the mode in which such elementary Notions or Cognitions (which are afterwards to be combined into the composite Idea of the object) are generated. How far *any* of them are original or intuitive, is a question which has been much discussed by Psychologists: some maintaining that *all* such Notions are generalizations based on experience; whilst others regard them as the products of Intuition, that is, as mental instincts, of which no other account can be given, than that such cognitions are formed—like the sensations that excite them—from “a law of our nature.” Psychologists of both schools agree in considering the

formation of these elementary Notions, like the performance of movements prompted or guided by them, as an *automatic* action ; the difference in their views consisting in this,—that Intuitionists regard this action as *primarily* automatic, while Psychologists of the Experience-school regard it as *secondarily* automatic. As it appears to the Writer that Physiology can throw considerable light on this question, he will here examine in some detail the mode in which those *visual* perceptions are formed, whereon we mainly depend for our ordinary guidance.

165. One of the most elementary of our Visual cognitions is the *Sense of Direction*, whereby we recognize the relations of the points from which luminous rays issue, and thus see objects *erect*, though their pictures on the retina are *inverted*. Some Psychologists have gone so far as to assert that Infants really see all objects *inverted*, and only acquire the true notion of their position in reference to themselves, by the corrective experience gained by touching and handling them. But this is a pure assumption, founded on an entirely erroneous notion of the nature of Sensation. For it supposes that we look at the picture formed on the retina, by the “mind’s eye” placed behind it, just as we look at the picture formed by a camera with the bodily eye ; whereas the fact is unquestionable, that Sensation is a state of consciousness excited by the transmission to the Sensorium (through the optic nerve) of the impression produced by the picture on the retina ; and as we know nothing whatever of the mode in which the Physical change is *translated*, so to speak, into the Mental, there is no reason why it should be *less natural* for the retinal impression to suggest to the mind the notion of the *real* position of an object, than to call up a representation corresponding to its *inverted* picture. As a matter of fact, it is found that persons who have for the first time acquired Sight by operation, at an age when they can describe their sensations, are able to recognise the *direction* of any luminous object, though quite incapable of appreciating its

distance. And it appears from the experiments of Dr. Serre,* that the luminous spectra produced when pressure is made upon the eye in a dark room, are seen in a direction which has in each case a constant and definite relation to the part of the retina that is affected by the pressure, either directly, or secondarily through its transmission to the opposite side of the globe. By an extensive series of observations on the relation of the positions of these primary and secondary *phosphènes*, both to each other and to the seat of compression, Dr. Serre has been able to deduce the important conclusion, that the lines joining these spectra and the spots of the retina by the affection of which they are produced, all pass through a common "centre of direction," which is situated nearly in the middle of the crystalline lens. And from these facts it seems a legitimate conclusion, that our sense of the relative directions of external objects, which affect different points of our retina by their luminous rays, is primarily derived from a kind of *extradition* of the Visual sensation, corresponding to that which takes place in the case of our Tactile (§ 132). The Writer quite agrees, however, with Professor Bain, that in our ordinary use of Vision we are greatly guided as to the recognition of *relative* direction, by the Muscular Sense called forth in the movements we give to our eyeballs, when we transfer our gaze from one point of a visual picture to another.

166. The recognition of the *singleness* of the object which forms a simultaneous visual picture on both eyes, has been very generally regarded by Physiologists as necessarily arising, by "a law of our nature," from a certain structural relation between what have been termed "corresponding points" on the two retinae; "double vision," or the recognition of two distinct images, taking place whenever, through a want of harmony in the action of the muscles, the axes of the two eyes do not converge in the object looked-at. But this view of the case is inconsistent with the fact, that if such

* "Essai sur les Phosphènes," Paris, 1853.

abnormal conditions should become permanent (as in squinting) the vision after a time becomes "single" again, notwithstanding that the pictures are formed on parts of the retinae which do not correspond. Further, if the Muscular irregularity be rectified by surgical means, so that the axes of the two eyes can be again brought into convergence in the object looked at, *double vision recurs for a time*, although the images are now formed upon the original "corresponding points." It is also a fact well known to Ophthalmic Surgeons, that if an opaque spot has been formed in the centre of the cornea, or an artificial pupil has been made at the margin of the iris, so that the most distinct vision is gained when the axis of one eye is directed, not to the object, but to some other point, such direction will become habitual; yet although, when the two eyes work together, there is a decided squint, there is no "double vision." Since it is clear from these facts, that the recognition of the singleness of the object of sensation is the result of *experience*, in the cases in which it supersedes a temporary double vision, it may be fairly so regarded in the case of the Infant; more particularly since observation shows that the convergence of its eyes upon the object looked-at, is, in the first instance, by no means so immediate or exact as it subsequently becomes. And, further, it is obvious that if (as seems not improbable) there is some structural arrangement which conduces to singleness of vision when the images are thrown on the originally corresponding points of the two retinae, such mechanism must have developed itself *de novo*, whenever single vision is the result of the habitual conjoint use of two eyes whose axes do *not* converge so as to meet in the object.

167. A like process of *experiential acquirement* of Perceptual cognitions having the immediateness and trustworthiness of the Sensations on which they are based, is demonstrable in regard to those notions of *form* which we derive from the Visual sense alone, when it has been educated by *co-ordination* with the Tactile. It

may now be affirmed with certainty, that Sight originally informs us only of what can be represented in a Picture—that is, light and shade, and colour ; and it may be affirmed, with equal certainty, that the notions of form which we obtain through the sense of Touch (when exercised in combination with muscular movements, of which the “muscular sense” renders us cognizant) are originally unrelated to those derived from Sight ; so that when a blind adult first acquires vision, objects with which he (or she) possesses the greatest tactile familiarity, are not recognized by its means, until the two sets of Sense-impressions have been co-ordinated by repeated experience. The best evidence of this kind is derived from observations made upon persons born blind, to whom sight has been communicated by an operation, at a period of life which enabled them to give an accurate description of their sensations :—

a. The case long ago recorded by Cheselden still remains one of the most interesting of these. The youth (about twelve years of age), for some time after tolerably distinct vision had been obtained, saw everything *flat* as in a picture, simply receiving the consciousness of the impression made upon his retina ; and it was some time before he acquired the power of judging, by his sight, of the real forms and distances of the objects around him. An amusing anecdote recorded of him, shows the complete want which there is in Man of any *original* or *intuitive* connection between the ideas formed through visual and through tactile sensations. He was well acquainted with a Dog and a Cat by *feeling*, but could not remember their respective characters when he *saw* them ; and one day, when thus puzzled, he took up the cat in his arms, and felt her attentively, so as to associate the two sets of cognitions, and then, setting her down, said, “So puss, I shall know you another time.”

The same indication, moreover, is obviously afforded by the case of Jemmy Morgan already cited (§ 161).—In a recently-recorded case in which sight was imparted by an operation to a young woman who had been blind from birth, it was interesting to contrast the

rapidity and accuracy of her Tactile perception, which was highly educated, with the slow, laborious process by means of which she arrived at a conception of the shape and nature of an object through the medium of her newly-acquired and imperfectly-educated Vision :—

b. "I found," says the operator, "that she was never able to ascertain what an object really was by Sight alone, although she could correctly describe its shape and colour; but that after she had once instructed one sense, through the medium of the other, and compared the impressions conveyed by touch and sight, she was ever after able to recognise the object without touching it. In this respect her memory was very perfect: I never knew her fail in a single instance, though I put this power frequently to the test of experiment. It was curious to place before her some very familiar object that she had never compared in this way, such as a pair of scissors. She would describe their shape, colour, glistening metallic character, but would fail in ascertaining what they really were, until she put a finger on them, when in an instant she would name them, and laugh at her own stupidity, as she called it, in not having made them out before." —(See Critchett, in *Medico-Chirurgical Transactions*, vol. xxxviii.)

168. Still more remarkable is the acquirement of those Perceptions of *solid form* or *Relief*, which we derive, as Sir C. Wheatstone's admirable investigations have shown, from the Mental combination of the dissimilar perspectives that are projected by solid objects upon our two retinae. When we bring to our right and left eyes respectively, by means of the Stereoscope, pictures corresponding to those which would be formed on their two retinae by the actual object if placed before them at a moderate distance, the resulting perception of the solidity of the image seems as necessary and immediate as if it were the product of an original Intuition; and this perception is strong enough to assert itself, in spite of our intellectual knowledge that we are looking at two plane surfaces. Now, although it may be inferred from the actions of many of the lower Animals, that the perception of the relative

distances of near objects or parts of an object (which constitutes the basis of the conception of solidity) is in their case intuitive, it may be affirmed, as a conclusion beyond reasonable doubt, that this also is *acquired* by the Human infant during the earliest months of its life, by a co-ordination of its muscular and visual sensations; which enables the automatic mechanism to adopt the dissimilarity of position between corresponding points in the two pictures, as the measure of their relative distances. The self-education of this Perceptive faculty which goes on during the first few months of infantile life, is the basis of our subsequent Visual knowledge of the External World, as it seems to be for the most part also of the primary belief in its objective reality (§ 159).

169. In this Visual recognition of the solid form of an object by the mental combination of its two dissimilar perspectives, we have an exercise of *judgment*, the decision of which may be as implicitly trusted (at least under ordinary circumstances) as if it were authoritatively delivered by a congenital faculty, but which really rests on a basis of Experience. It is scarcely conceivable that the Infant consciously asks itself the question, "What do I see?" But there can be little doubt that, in the earlier stages of its experience, it is incapable (like the newly-seeing adult) of distinguishing between a picture and the solid object which it represents; and that the essential condition of a judgment—the possibility of the opposite, or of something else—therefore exists for it. But with every consentaneous exercise of the visual, tactile, and muscular sensations, during the Infant's gaze at an object grasped in its hands and carried to different distances by the motion of its arms, there is a new co-ordination, which helps to supply the deficiency in the sum of all that preceded; and this process is repeated until the complement of the whole serves as the basis of the cognition, which we thenceforth rightly characterize as "self-evident."

170. It is not a little remarkable that even that Visual percep-

tion of Solidity, which is based on the Binocular combination of dissimilar perspectives, may, under certain circumstances, be antagonized by a higher experience, so as to be for a time, or even permanently, excluded. The very ingenious Pseudoscope contrived by Sir C. Wheatstone, effects a lateral reversal of the perspective projections of actual objects on the two retinæ, corresponding to that which would be made by "crossing" the pictures in the Stereoscope; and thus, in viewing through it any solid object, we ought at once, if the visual perception were a necessary product (as Sir David Brewster maintained) of the geometrical relations of the two images, to see all its projections and depressions reversed,—the exterior of a basin, for example, being changed into a concave interior; and the projecting rim on which it rests, into a deep furrow. But this "conversion of relief" is generally resisted, for a time at least, by the preconception of the actual form which is based on habitual experience; and it only takes place immediately, in cases in which the converted form is at least as familiar to the mind as the actual form. Thus, when we look with the Pseudoscope at the *interior* of a mask, or at a hollow *mould* of a plaster bust, the mental representation of the image in relief is at once called-up. But when we look pseudoscopically at the *face* of a plaster bust, or at the *outside* of a mask, it is only after a lengthened gaze that such "conversion of relief" occurs; the mind being so much more familiar with the actual form, that the mental image of the interior of a mould or mask is not called-up, until the visual perception has overcome, as if by continued pressure, the resistance of the preconception; and for this a considerable *time* is often required. In the case of the *living human face*, however, it seems that no protraction of the Pseudoscopic gaze is sufficient to bring about a "conversion of relief"; the perceptive consciousness (probably here under the complete domination of the Intellectual) refusing to entertain the notion of an *actual visage* having the form of the interior of a mask.

171. The notion of *Solidity* or *projection in three dimensions*, as distinct from a representation of an object on a plane surface, may, under certain circumstances, be derived from a *single flat picture*, no less strongly than from the combination of the two dissimilar perspectives of the object. It has long been known that if we gaze steadily at a picture, whose perspective projection, lights and shadows, and general arrangement of details, are such as accurately correspond with the reality which it represents, the impression it produces will be much more vivid when we look with *one* eye only, than when we use both; and that the effect will be further heightened, when we carefully shut out the surroundings of the picture, by looking through a tube of appropriate size and shape. This fact has been commonly accounted for in a very erroneous manner. "We see more exquisitely," says Lord Bacon, "with one eye than with both, because the vital spirits thus unite themselves the more and become the stronger;" and other writers, though in different language, agree with Bacon in attributing the result to the *concentration* of the visual power, when only one eye is used. But the fact is, that when we look with *both* eyes at a picture within a moderate distance, we are *forced* to recognize it as a flat surface; whilst, when we look with only *one*, our Minds are at liberty to be acted on by the suggestions furnished by the perspective, chiaroscuro, &c.; so that, after we have gazed for a little time, the picture may begin to start into relief, and may even come to possess the solidity of a model. The completeness of this illusion will essentially depend upon the exactness with which the picture represents the real "projection" of its object upon a flat surface. It is very rarely that pictures painted by human hands "come out" after this fashion in a degree at all comparable to sun-pictures; for the obvious reason that the Photograph represents not merely the exact perspective of the scene or object, but the actual chiaroscuro as it was at any one moment, with a fidelity which the Artist, who requires *time* for his work, cannot possibly

equal, since the shadows on the object are so constantly changing as he proceeds, that he can scarcely by any possibility avoid a departure from strict truth in his combinations.—The nearest approach to sun-pictures in respect to the truthfulness of the chiaroscuro, is presented by pictures painted by artificial light, the uniformity of which can be maintained while the “sitting” lasts.

a. The Writer possesses three Photographs, two of *bassi-relievi*, and one of an *alto-relievo*, by Lucca della Robia; which, when looked at with one eye in the manner now described, give rise to a feeling of *solidity* so vivid, that it is almost impossible not to credit it.

b. As the shadows are strong in all these Photographs, the illusion is promoted by causing the light by which they are viewed, to fall on them in the direction corresponding to that in which it fell on the originals, when (so to speak) they sat to the photographic camera for their portraits; but this is by no means a necessary condition, the effect being produced with nearly the same vividness in diffused daylight.—If, indeed, a strong light be seen to proceed from the *opposite* side, so that the direction of the shadows in the Photograph is reversed with reference to it, a picture may be turned (as it were) inside-out, so as no longer to present the *relievo*, but its hollow mould, *provided that the Mind will readily accept the conversion*. This effect the Writer can produce most effectively with a beautiful Photograph of a large American Trilobite imbedded in its rocky matrix; for according to the direction in which the light is allowed to fall upon it, the surface of the back of the Trilobite appears to project, or is turned into a concave reverse, representing the “cast” of that surface in the surrounding rock,—the effect in either case being aided by a Mental predetermination as to which view shall be seen.

c. In the beautiful Medallion-engravings (produced by mechanical means) that were in fashion some years ago, the like illusion could be produced; the same picture being caused to represent either a cameo or an intaglio, by such a disposition as made its lights and shadows correspond with those which would have been thrown from the source of illumination, had the rays fallen on an actual cameo or an actual intaglio.

It is remarkable that the effect of this mode of viewing Photo-

graphic pictures is not limited to bringing out the solid forms of objects; for other features are thus seen in a manner more true to the reality, and therefore more suggestive of it. This may be noticed especially with regard to the representation of *still water*, which is generally one of the most unsatisfactory parts of a Photograph; for although, when looked at with *both* eyes, its surface appears opaque, like white wax, a wonderful depth and transparency are often given to it by viewing it with only *one*.—And the same holds good also in regard to the characters of *surfaces* from which light is reflected,—as bronze or ivory; the material of the object from which the Photograph was taken being recognized much more certainly when the picture is looked at with *one* eye, than when *both* are used, unless in stereoscopic combinations.

172. The superiority of Monocular to Binocular vision depends in these cases upon the freedom with which the Mind is left to interpret the picture after its own fashion, when no longer forced to view it as a flat surface; and the interpretation is here so obviously based on experience, which gives to every incident of the picture a *suggestive* power of its own, as to destroy the force of any argument that might be erected on the immediateness and uniformity of the perception of Relief derived from the binocular combination of two dissimilar perspectives, as to the *original* or *intuitive* character of that perception. For it thus becomes clear that this combination is only *one* out of *several* modes of suggestion by which that notion is formed; whilst the phenomena of the Pseudoscope show that the notion is by no means *necessarily* called up by the visual impressions which *ordinarily* produce it.

173. But further, it is not a little curious that an actual *conversion* of relief may be produced by a Mental preconception, when we look at certain solid forms with *one* eye only. For just as the want of power to appreciate distance monocularly, enables us to invest a pictorial representation with the attribute of solid form, so is a solid form represented to the mind as a flat picture; and to this picture we may *mentally* give a solid form *the very*

opposite of that which it really possesses. Of this fact, which is of no small importance in elucidating the nature of *false perceptions* (§ 186), the following are illustrations :—

a. It has long been known that when a *seal* is looked-at through a Microscope, it will appear sometimes projecting as a cameo, sometimes excavated as an intaglio; this “conversion of relief” taking place alike with the engraven stone or its waxen impression. That it is due, not (as some have supposed) to an optical change effected by the Microscope, but simply to the limitation of the visual impression to a single eye, which deprives the judgment of the positive guidance whereon it ordinarily relies, is clearly proved by the fact that no such conversion can be produced under a properly constructed Binocular Microscope,—a seal, like every other object, being represented in its true projection; while it is readily effected in regard to larger objects of a suitable nature, without the intervention of any optical instrument. Thus, as Sir D. Brewster pointed out in his “Natural Magic,” if we take the intaglio mould of a bas-relief, and look steadily on it for a time with one eye, excluding surrounding objects as much as possible from our attention, we may distinctly see the bas-relief as if projecting. “After a little practice,” he says, “I have succeeded in raising a complete hollow mask of the human face, the size of life, into a projecting head.”

b. If instead of a plaster mould, we take a common pasteboard mask (such as is sold in every toy-shop), and paint the inside, which is usually left in the rough, so that the colours of its different parts may imitate, as closely as possible, those of the corresponding parts of its exterior, and the inside or hollow surface of the mask be then held at arm’s length from the eye, with the light so arranged that no shadow falls anywhere upon it,—not only will the image of the projecting face very readily present itself, but it will be difficult for an observer who has once caught this, to see the mask as it really is, even by a determinate effort. The illusion is the more complete, if his view be limited to the mask itself, and he be brought to the proper point of sight without being aware of what he is to see; so that, of a large number of persons on whom the Writer has tried this experiment, almost all have at once pronounced that they were looking at the projecting surface of the mask, and have only been convinced to the contrary by the conjoint use of both eyes.

The facility with which these conversions, and others of like nature, occur to the "mind's eye," may be readily shown to depend upon the degree of readiness with which, in virtue of our previous habits and experiences, the visual picture *suggests* the real form, or its converse.

c. In the case of a seal, the hollow mould and its projecting cast are objects almost equally familiar; hence the representation of either may offer itself, and the one may be substituted for the other by a slight effort of the volitional power of Conception. The conversion of the hollow mask into the projecting face is, to most persons, still more easy, because they are more accustomed to the life-like features of the plaster-model, than they are to the concave mould which has no similitude in nature; whilst, on the other hand, the Writer has not found it possible to convert the face of a bust into the likeness of a hollow mask by the simple monocular gaze, however long continued, even with the aid of the strongest effort so to conceive it.—When a seal is looked at in a Microscope, or larger objects of the same kind are seen through an inverting Telescope, the "conversion of relief" is aided by the fact that the optical inversion of the images has caused the relation of the shadows to the known source of the light to be also reversed, so that they fall as they would do if the cameo were really replaced by the intaglio, or the intaglio by the cameo.

174. Another singularly interesting demonstration of the inability of monocular vision to afford any *certainly-true* idea of solid form, was given by Sir C. Wheatstone in the first of his two remarkable memoirs on Binocular Vision:—

If we hold up at arm's length a small skeleton-cube made of wire or ebony-beading, and look at it with one eye whilst placing it in a variety of positions by turning it between the fingers, so long as the Mind perceives the cube, its various perspective projections are interpreted by it as so many different representations of one object, all of them suggesting the same primitive form. But as certain of these perspective projections might be given by an object of very different shape, it will probably happen that in some position of the cube one of these dissimilar figures will suggest itself to the mind; and, if this new conception be fixed by a steady gaze for a short

time, it will take such possession of the Mind, that some effort is required to bring back the original conception, so long, that is, as the position of the cube remains unchanged. But if, whilst the Mind is thus possessed with the false idea, the cube be again made to turn between the fingers, the series of successive projections then presented not being reconcilable with the converse form, either the Mind reverts to the original conception of the cube as the only one with which they are consistent, or (if this should not be adopted) the skeleton-figure seems to be continually undergoing a change of shape, *as if its sides were hinged together and fell into new inclinations with every new position given to the object.*—(*Philosophical Transactions*, 1838.)

175. Thus our Perception of solid form, when only *one* eye is used, is clearly a matter of *judgment*, determined by the tendency of the Mind to interpret the visual picture according to its previous familiarity with the forms which that picture may represent: its choice between two or more of these being quite involuntary, when one is decidedly more familiar to the mind than another; but being to a certain extent under volitional control, when they present themselves with equal or nearly equal readiness, through the power possessed by the Will of *fixing the attention* upon either one, to the exclusion of the others.—In ordinary Binocular Vision of a moderately near object, on the other hand, there is no wavering; we feel that there *can* be no mistake. There is but one solid form that *can* furnish the two dissimilar perspective projections. Hence that form presents itself to our Minds, independently of any previous acquaintance with it, as the *necessary resultant* of the combination of those pictures; and this is the case even with pairs of pictures which differ in a degree that is itself quite inconsistent with our experience, provided that the *resultant* suggested by their combination is *conformable to our experience*. Thus, when we look at an actual Landscape, the perspective views we receive through the right and left eyes respectively, of every part of it save the fore-ground, are so nearly the same, as to convey no sugges-

tion of their relative distances; that suggestion being here conveyed by other differences, as of size, distinctness, and the like (§ 180). But the two Photographs of such a landscape taken for the Stereoscope, represent it as seen from two points of view sufficiently remote from each other, to produce that degree of dissimilarity in the pictures to which we are accustomed in looking at a *near* object; and thus the idea of the relative distances of the different parts of the landscape, is suggested with all the force derived from that difference. So, the Photographs of the Moon which are taken at the extremes of her "libration in longitude," are sufficiently dissimilar to one another to "pair" in the Stereoscope, and thus to bring out not only the solid form of her globe, but even the projection of some of the principal craters, with unmistakable effect. And further, a most striking effect is sometimes produced by the Stereoscopic combination of a pair of pictures, of which neither by itself suggests any idea of the scene it represents. But in all these cases, the result of the combination is *consistent* with our previous experience, or, at any rate, is *not inconsistent* with it. As we intellectually know that the Moon is really globular, though her face—as ordinarily seen by us—*looks* flat, we are quite prepared for the acceptance of the suggestion made by the Stereoscopic view of it. And when a dark patch upon the apparent face of an ice-cliff is carried back stereoscopically to a remote distance beyond, we interpret it as representing a far-off village seen through an arch in the cliff,—a view readily conceivable by our minds, though we may have never actually seen it.

176. However different in kind, then, may be the visual data on which our ordinary Monocular and Binocular perceptions are based, the mental operation by which we build upon them is essentially the same in both cases. For the binocular view of an object, like the monocular, does nothing else than *suggest* to the Mind the conception of a certain solid form; and that the adoption of this conception depends much more upon the antecedent condition of

the *mind*, than it does upon the purely *optical* relations of the two retinal pictures, is rendered quite certain (in the Writer's opinion) by the application of the pseudoscopic test (§170). For according to the theory of *intuitive cognition*, based on the *optical* differences of the two pictures, *every thing* at which we look with the Pseudoscope ought to be at once "turned inside-out." But a large proportion of the objects on which we try its converting powers, are proof against them; those only being readily *metamorphosed*, whose new forms can be readily *conceived*. And the percipient Mind will not admit too strange a novelty; it obstinately clings to so much of the reality, as is recognized by its previous Tactile experience to be the necessary interpretation of the Visual impression ordinarily received from the object; and it can only accept such modifications as are capable of being fitted-on to the results of that experience.

177. Our visual recognition of solid form is aided by suggestions of another kind, which are furnished by that measurement of the relative *distances* of the different points of an object, which we make by bringing the axes of the eyes into convergence upon those points successively; the degree of such convergence being indicated to us by the "muscular sense" that originates in the state of the Muscles we put in action to produce it. Here, again, it is obvious from what has been already stated, that our interpretation of that sensation is *acquired*, not intuitive; and it will be presently shown that, under certain circumstances, an increase or diminution of the angle of convergence rather suggests change of *size*, than change of *distance* (§182). How much of our right estimation of the relative distances of objects not far removed from the eye, depends upon the conjoint use of *both* eyes, is made evident by the fact that if we close *one* eye, we find ourselves unable to execute with certainty any actions which require the guidance of that estimation,—such as threading a needle, or passing a crooked stick through a suspended ring. And it has sometimes happened that

persons who have lost the sight of one eye, have been first made aware of its want by their inability to execute such actions.

178. It will now be apparent how, when one eye is closed, we lose that power of *certainly* distinguishing a flat picture from a projecting relievo, or either from a concave mould, which we derive from the conjoint use of both organs. We can make no mistake in our *binocular* estimation of such objects, provided their dimensions and distances be such as to make their two retinal projections appreciably different, and to require a sensible difference in the convergence of the optic axes as they are successively directed to different points. We are *forced* to see that a picture is nothing but a plane-surface, that the outside of a mask represents the actual features of a human face, and that the hollow mould is the concave reflex of the cast which has been turned out of it, so long as these objects are within a few feet distance, and are seen by both eyes at once. And thus it becomes evident that the remarkable converting power of *monocular* vision, by which a single picture may be raised into stereoscopic relief, and cameos and intaglios be mistaken for each other (§§ 171-173), is—however interesting as a Psychological phenomenon—really a mark of imperfection in the visual sense when thus exercised.

179. That such is the true view of the case, appears further from this ; that we are liable to be thus deceived in regard to the very same objects, even when we look at them with *both* eyes, provided that they are removed to a sufficient distance to render the difference of their retinal projections inappreciable, and to prevent the relative distances of their parts from being measured through the sense of convergence.

The large Architectural pictures formerly exhibited in the Diorama often gave such an impression of projection, that almost everyone who saw them would have been ready to affirm that a particular column or statue *must* have been painted on a different surface from the rest, like a detached part of a scene in a theatre ;—until,

on slightly moving the head from side to side, the absence of any alteration in its apparent position made it evident that it must be on the same plane with the adjacent parts. The perplexing vividness of this deception was due, as is now well known, to the early possession by MM. Daguerre and Niepce of one form of the Photographic art; which enabled them to impart to their architectural pictures a truthfulness previously unattainable, and therefore gave to these pictures an extraordinary power of *suggesting* the solid forms of the objects they represented.—Many of the apartments in the Louvre are decorated with cornices which so vividly represent projecting forms, as to be generally mistaken for them by such as see them for the first time; and visitors to the Bourse of Paris will recollect the large allegorical paintings in its interior, which are so executed, and so disposed, as very strongly to suggest to those who only view them from a distance the perception of high relief.

180. Our estimate of the distance of *remote* objects is clearly a matter of *judgment* based on experience; being chiefly founded upon their apparent size, if their actual size be known or guessed; or, if we have no knowledge of this, and our view does not range over the intervening space, upon that modification of their distinctness of colour and outline, which is known to Artists as “*aërial perspective*.” Hence this estimate is liable to be greatly affected by varying states of the atmosphere: the same mountain-peak, for example, being apparently brought much nearer than it is in reality, when an extraordinary clearness of the air enables all its features to be distinctly seen; and carried to a much greater apparent distance, when a slight haziness of the air softens them all down. This alteration has a very curious effect upon our appreciation of the *sizes* of distant objects (§ 181).

181. Of the relative *sizes* of objects, our estimate is partly based on the sizes of the pictures formed of them on our retina, or, in other words, on the “*visual angles*” they subtend; and partly on our appreciation of their distances,—the *apparent* size of an object seen under a given visual angle being estimated as larger or smaller than the reality, according as we suppose it to be more or

less distant than it really is. Thus the apparent *height* of mountains is so greatly affected by our estimate of their *distance*, that, according to the varying atmospheric conditions which modify the latter (§ 180), the same mountain may appear much higher or much lower than it really is; its height being *under-estimated* when the peak is made to seem very near, and *over-estimated* when its apparent distance is exaggerated,—just as, when we are walking across a common in a fog, a child dimly seen through it seems to have the stature of a man, and a man that of a giant. In the case of a near object, however, we are not liable to any such error; since, if we truly appreciate its *distance* in the mode already described (§ 177), the appreciation of its *size* can be derived with certainty from the dimensions of its visual picture.

182. The appreciation of size, like that of solid form, is a matter of *immediate judgment*: but there is strong evidence that in this, as in the preceding case, the power of forming that judgment has been *acquired by experience*. Much light has been thrown upon this as upon other phenomena of Binocular Vision, by the ingenious experimental researches of Sir Charles Wheatstone. A simple modification of his mirror-stereoscope enables the observer to vary the *distances* of the pair of pictures from his eyes, without altering the angle of their convergence; and, conversely, to alter the *angle of convergence of the optic axes*, without altering the distance of the pictures. Now in the first case, the *perceived dimensions* of the pictures change—diminishing as their distance increases, and *vice versa*,—in accordance with the change in the *actual* dimensions of the retinal pictures; the effect being very much like that of the phantasmagoria. But in the second case, a most remarkable change takes place in the *perceived dimensions* of the pictures, although the *actual* dimensions of their retinal pictures remain unaltered. For when the optic axes are made to converge upon them more and more, as they would do if they were fixed upon a single picture gradually brought very near the eyes, the *apparent*

size of the pictures undergoes a most remarkable reduction ; whilst, if the arms of the stereoscope are so turned, that the optic axes, instead of being moderately convergent, are brought into parallelism, or even into slight divergence, the apparent dimensions of the pictures undergo a not less remarkable increase. (Phil. Trans., 1852).

183. It does not seem possible to account for this fact in any other way, than by supposing that the percipient Mechanism has been developed in conformity with the experience gained during the early part of Infantile life ; in which objects held in the hand are brought nearer to, or removed further from, the eyes, the axes of which are steadily directed to them at varying angles of convergence. The *identity* of the object being recognized throughout, the two sets of changes are brought into *mutally corrective action* ; but when either of them takes place without the other, the Mechanism evolves a wrong result. If the *angle of convergence* remain unaltered, changes in the size of the retinal images produce corresponding changes in the *apparent* size of the picture ; whilst if the *size of the retinal image* remain unaltered, changes in the angle of convergence, acting on the Mechanism in the same manner that a change of distance would do, cause (as it were) an *organic expectation* that the size of the retinal image will vary accordingly ; and, as it does *not* change, it is instinctively interpreted exactly like the image of a mountain or other distant object, which is made to seem *larger* by an *increase*, and *smaller* by a *diminution* of its apparent distance.—It is a curious illustration of the same principle, that if we take up such a position at a Railway-station as to see a train approaching “end on,” it seems to *swell-out* as it approaches our stand-point ; the retinal image being rapidly enlarged, without any such corresponding indication of diminished distance, as would serve to account (so to speak) to our percipient Mechanism for that enlargement.

184. Every *acquired* visual Perception, then, may be regarded as the *resultant of our whole previous experience* relating to the

object of it ; such resultant, however, not being worked out by a process of conscious reasoning, but being the reflex action of the nervous Mechanism of the Ego, which has *formed itself* in accordance with that experience, so as to acquire powers of reaction of a far higher kind than it originally possessed. The “self-evidence” of the truthfulness of the Perception is of the same kind, therefore, as that of the Sensation which has called it forth ; the Mental affection being in each case the *immediate* and *invariable* response of the organization to the impression made upon it. But whilst that response, in the case of the deliverances of our *sensational* consciousness, is given by our *original* constitution, it is given in the case of our *perceptual* consciousness by our *acquired* constitution ; in which are embodied those results of primary experience, which are common to every normally-constituted Human being.

185. The power of immediate and acute Perception is one eminently capable of being increased by habitual Attention. We are here concerned not so much with that exaltation of the *discriminating consciousness* of Sense-impressions, which has been already noticed (§ 127) ; as with the augmentation of the power of *taking cognizance* of the objects that excite Sensations, which depends upon a rapid exercise of that higher faculty by which those sensations are interpreted. It would be easy to adduce many examples of the improvement of this faculty by practice ; so that individuals who have cultivated it in particular modes, derive from ordinary Sense-impressions an amount of information which they could scarcely have been supposed capable of conveying. The following, however, will suffice :—

a. It has long been known that individuals among the Deaf-and-Dumb have acquired the power of “lip-reading” ; that is, of so interpreting the visible movements of the mouth and lips of a speaker, as to apprehend the words he utters, no less accurately than if they were heard. And it has been latterly proposed to make this a

matter of systematic instruction ; so that every deaf-mute should be enabled to understand what is said, without the aid of the "sign-language" or the "finger-alphabet."—It appears, however, that it is not every one who is capable of acquiring this power; and it is still questionable whether it can be even *generally* attained by any amount of practice. But that it should have been even *exceptionally* acquired, shows the extraordinary improbability of the Perceptive faculty.

b. The celebrated conjuror, Robert Houdin, relates in his Autobiography the mode in which he prepared himself and his son for the performance of the trick which he termed "second sight;" the success of it mainly depending upon the rapidity with which the information given by Sense-impressions could be apprehended and interpreted, and the accuracy with which (for a short time at least) they could be remembered :—In the first instance, Houdin put down a single domino, and required his son to name the total number of points *without counting them*, which each could readily do. *Two* dominoes were then tried; and, after a little practice, the total number of points on both was correctly named by each *at the first glance*. The next day the lesson was resumed, and they succeeded in naming the points on *four* dominoes at a single glance; on the following day those of *six*; and, at length, they found themselves able to give, without counting, the sum of the points on *twelve* dominoes.—This result having been attained, they applied themselves to a far more difficult task, over which they spent a month. The father and son passed rapidly before a toy-shop, or any other displaying a variety of wares; and each cast an attentive glance upon it. A few steps further on, each drew paper and pencil from his pocket, and tried which could enumerate the greater number of the objects momentarily seen in passing. The son surpassed the father in quickness of apprehension, being often able to write down forty objects, whilst his father could scarcely reach thirty; yet, on their returning to verify his statement, he was rarely found to have made a mistake.

The following remarkable proof of the efficacy of this training may be best given in Houdin's own words:—

c. "One evening, at a house in the Chaussée d'Antin, and at the end

of a performance which had been as successful as it was loudly applauded, I remembered that while passing through the next room to the one we were now in, I had begged my son to cast a glance at the library, and remember the titles of some of the books, as well as the order they were arranged in. No one had noticed this rapid examination.

“‘To end the second-sight experiment, Sir,’ I said to the master of the house, ‘I will prove to you that my son can read through a wall. Will you lend me a book?’

“‘I was naturally conducted to the library in question, which I pretended now to see for the first time; and I laid my finger on a book.

“‘Emile,’ I said to my son, ‘what is the name of this work?’

“‘It is Buffon,’ he replied, quickly.

“‘And the one by its side?’ an incredulous spectator hastened to ask.

“‘On the right or the left?’ my son asked.

“‘On the right,’ the speaker said, having a good reason for choosing this book, for the lettering was very small.

“‘The Travels of Anacharsis the Younger,’ the boy replied. ‘But,’ he added, ‘had you asked the name of the book on the left, Sir, I should have said Lamartine’s Poetry; a little to the right of this row, I see Crébillon’s works; below, two volumes of Fleury’s Memoirs;’ and my son thus named a dozen books before he stopped.

“The spectators had not said a word during this description, as they felt so amazed; but when the experiment had ended, they all complimented us by loud plaudits.” — (*Autobiography of Robert Houdin*, p. 206.)

186. *False Perceptions.*—It has been shown (§ 148) that the action of *ideational* states upon the Sensorium can modify or even produce *sensations*. But the action of pre-existing states of Mind is still more frequently shown in modifying the *interpretation* which we put upon our sense-impressions. For since almost every such interpretation is an act of *judgment* based on experience, that judgment will vary according to our Mental condition at the time it is delivered; and will be greatly affected by any domi-

nant idea or feeling, so as even to occasion a complete mis-interpretation of the objective source of the sense-impression, as often occurs in what is termed "absence of mind" (§ 445). The following case, mentioned by Dr. Tuke as occurring within his own knowledge, affords a good example of this fallacy:—

a. "A lady was walking one day from Penryn to Falmouth, and her mind being at that time, or recently, occupied by the subject of drinking-fountains, thought she saw in the road a newly erected fountain, and even distinguished an inscription upon it, namely—

"If any man thirst, let him come unto me and drink."

Some time afterwards, she mentioned the fact with pleasure to the daughters of a gentleman who was supposed to have erected it. They expressed their surprise at her statement, and assured her that she must be quite mistaken. Perplexed with the contradiction between the testimony of her senses and of those who would have been aware of the fact had it been true, and feeling that she could not have been deceived ("for seeing is believing"), she repaired to the spot, and found to her astonishment that no drinking fountain was in existence—only a few scattered stones, which had formed the foundation upon which the suggestion of an expectant imagination had built the super-structure. The subject having previously occupied her attention, these sufficed to form, not only a definite erection, but one inscribed by an appropriate motto corresponding to the leading idea."—(*Influence of the Mind upon the Body*, p. 44.)

So it is mentioned by Sir Walter Scott, in his "Demonology and Witchcraft," that having been engaged in reading with much interest, soon after the death of Lord Byron, an account of his habits and opinions, he was the subject of the following illusion:—

b. "Passing from his sitting-room into the entrance-hall, fitted up with the skins of wild beasts, armour, &c., he saw right before him, and in a standing posture, the exact representation of his departed friend, whose recollection had been so strongly brought to his imagination. He stopped, for a single moment, so as to notice the wonderful

accuracy with which fancy had impressed upon the bodily eye the peculiarities of dress and posture of the illustrious poet. Sensible, however, of the delusion, he felt no sentiment save that of wonder at the extraordinary accuracy of the resemblance; and stepped onwards towards the figure, which resolved itself, as he approached, into the various materials of which it was composed. These were merely a screen occupied by great-coats, shawls, plaids, and such other articles as are usually found in a country entrance-hall. Sir Walter returned to the spot from which he had seen this product of what may be called imagination proper, and tried with all his might to recall it by the force of his Will, *but in vain*—a good illustration of the slight influence of volition over sensation, compared with that of a vivid Mental image or idea acting upon the Sensorial centres, and distorting or moulding into other forms the impressions received from objects of sense.”—(*Op. cit.*, p. 45.)

187. Moreover, if not only a single individual, but several persons, should be “possessed” by one and the same idea or feeling, the same misinterpretation may be made by all of them; and in such a case the concurrence of their testimony does not add the least strength to it.—Of this we have a good example in the following occurrence cited by Dr. Tuke as showing the influence of a “dominant idea” in falsifying the perceptions of a number of persons at once:—

d. “During the conflagration at the Crystal Palace in the Winter of 1866-67, when the animals were destroyed by the fire, it was supposed that the Chimpanzee had succeeded in escaping from his cage. Attracted to the roof, with this expectation in full force, men saw the unhappy animal holding on to it, and writhing in agony to get astride one of the iron ribs. It need not be said that its struggles were watched by those below with breathless suspense, and, as the newspapers informed us, ‘with sickening dread.’ But there was no animal whatever there; and all this feeling was thrown away upon a tattered piece of blind, so torn as to resemble, to the eye of fancy, the body, arms, and legs of an ape!”—(*Op. cit.*, p. 44.)

Another example of a like influence affecting several individuals

simultaneously in a similar manner, is mentioned by Dr. Hibbert in his well-known Treatise on Apparitions :—

b. A whole ship's company was thrown into the utmost consternation, by the apparition of a cook who had died a few days before. He was distinctly seen walking a-head of the ship, with a peculiar gait by which he was distinguished when alive, through having one of his legs shorter than the other. On steering the ship towards the object, it was found to be a piece of floating wreck.

Many similar cases might be referred-to, in which the Imagination has worked-up into "apparitions" some common-place objects, which it has invested with attributes derived from the previous Mental state of the observer; and the belief in such an apparition as a reality, which usually exists in such cases, unless antagonized by an effort of the reason, constitutes a *delusion*.—The delusions of Insanity usually have their origin in a perverted state of *feeling*; which begins by imparting a *false* colouring to *real* occurrences; and then, if not checked or diverted, goes on to suggest Ideas having no foundation in fact, which are accepted as realities on account of the incapacity of the disordered mind to bring them to the test of Common Sense (§ 562). And there are many persons quite sane upon ordinary matters, and even (it may be) distinguished by some special form of ability, who are yet affected with what the writer once heard Mr. Carlyle term a "diluted Insanity"; allowing their minds to become so completely "possessed" by "dominant ideas," that their testimony as to what they declare themselves to have witnessed—even when several individuals concur in giving exactly the same account of it—must be regarded as utterly untrustworthy. Of this we have examples at the present time, alike in the asserted appearances of the Virgin, and in the marvels of "Spiritualism;" while the same lesson is taught by the records of the prevalent delusions of past ages, and pre-eminently by those of Witchcraft.

188. *Instinctive Feelings*.—The attainment of that grade of

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Mental development which enables us to apprehend the objective reality of external things, seems to make us capable of experiencing certain *feelings* in regard to them, which are nearly akin to those that are immediately associated with Sensations (§ 154), but constitute the germs (so to speak) of higher forms of consciousness. Thus the *æsthetic* sense of the beautiful, of the sublime, of the harmonious, &c., seems in its most elementary form to connect itself immediately with the Perceptions which arise out of the contact of our Minds with external Nature. "All those," says Dr. J. D. Morell, "who have shown a remarkable appreciation of form and beauty, date their first impressions from a period lying far behind the existence of definite ideas or verbal instruction. The germs of all their *Æsthetic* impressions manifested themselves, first of all, as a spontaneous Feeling or Instinct, which, from the earliest dawn of reason, was awakened by the presentation of the phenomena which correspond objectively with it in the Universe." These primitive feelings exist in very different intensity in different individuals; and it is where they have most strongly manifested themselves at a very early period of life (the sense of Harmony, for example, in the infant Mozart, § 206), that we can see how fundamental a part of our nature they constitute, although they may be but faintly shadowed-forth in a large part of Mankind. They are peculiarly susceptible of development, however, by appropriate culture; under the influence of which they not merely grow-up in the individual, but manifest themselves with increased vigour and more extended range in successive generations (§§ 201—203).

189. The same may be said of those simple forms of *Emotional* sensibility (§ 157), which, being no longer purely subjective, require as a condition of their existence that they shall relate to an external object. This is pre-eminently the case with all those which are termed *emotions of sympathy*: thus, the Perception of the pain or distress of another tends to call forth (except in individuals of a

peculiarly unsympathetic temperament) a corresponding affection in the percipient Self; and the opposite state of cheerfulness or mirth has a like tendency to affect those who are brought into contact with it, provided that there be nothing positively antagonistic in their own condition. But further, the Perception of enjoyment in others calls-forth a respondent *gladness* in ourselves; whilst the perception of suffering tends to excite in ourselves that feeling of sorrow which we term *pity*; and either of these feelings may be experienced, even when we do not ourselves share in the state of elevation or depression which excited them.—More closely connected with the foregoing than is commonly conceived, is that sense of the *humorous*, which attaches itself to certain manifestations of character presented to us in the actions of others; that *sympathy with human nature* in which the former have their source, being the foundation of the latter also; and thus it happened that those writers who have the strongest power of exciting our sense of Humour, are usually distinguished also by their mastery of the Pathetic. To the sense of the humorous, that of the *ludicrous* is obviously related. Both these, however, when excited by operations of the Intellect, instead of by external objects, belong to a different category (§ 404). The same may be said of the sense of *wonder*; which in its simplest form may be connected with our Sense-perceptions, but which is more commonly experienced in regard to the Ideas which they excite.—Another group of Instinctive feelings belonging to the same category, is that which may receive the general designation of *attractions* and *repulsions*. These are the elementary states of those Emotions which involve a distinct *idea* of the object which attracts or repels, and which then assume the forms of *desires* and *aversions* (§ 261); but it is in this form that they seem to act in the lower Animals and in young Children, whose minds are not yet fully developed into the stage of Ideational consciousness. The various terms *like* and *dislike*, *partiality* and *distaste*, *love* and *hatred*, which we use to

signify the modes in which we ourselves feel affected by external objects, indicate the existence of this elementary form of Emotional sensibility in connection with the Perceptive consciousness.—There are other Emotional states, some of them rising to the intensity of *Passions*, which seem to belong to this category ; but the examples already cited are sufficient to illustrate the principle, that the *elementary forms of Emotion* belong to the *Perceptual* stage of consciousness.

190. So, too, there seems to lie in this Perceptual stage of Mental activity, the germ which, in a higher phase of development, is evolved into the *Moral* sense. Experience shows, as Dr. J. D. Morell justly remarks, “that an Instinctive *apprehension* of ‘right’ and ‘wrong,’ as attached to certain actions, precedes in the child any distinct *comprehension* of the language by which we convey Moral truths. Moreover, the power and the purity of Moral feeling not unfrequently exist even to the highest degree, amongst those who never made the question of Morals in any way the object of direct thought, and may perchance be unconscious of the treasure they possess in their bosoms.” Of these elementary Moral feelings, those of the lower Animals which associate most closely with Man are obviously capable. The *sense of duty* towards a being of a higher nature, which shows itself in the *actions* of the young Child towards its Parent or Nurse, long before any Ideational comprehension of it can have been attained, is exactly paralleled by that of the Dog or the Horse towards its Master. “Man,” as Burns truly said, “is the God of the Dog.” It is the substitution of the *superior* for the *inferior* directing principle, the distinct Intellectual comprehension of it, and the Volitional direction of the Attention to it, which constitutes the essential difference between the most conscientious effort of the enlightened Christian, and the honest and self-sacrificing response to his sense of Duty, which is seen in the Horse that falls down dead from exhaustion after putting forth his utmost power at the behest of his rider, or

in the Dog who uses his utmost skill and intelligence in seeking and collecting his master's flock (§ 92).—The elementary form of the Religious sense appears to connect itself, not merely with that simple apprehension of a Power external to ourselves which comes to us from the recognition of its manifestations, but with those feelings of Awe and Solemnity which are directly excited by objects of sublimity, grandeur, and mystery. Its higher development, however, requires an Ideational exercise of the Mind; and with this are connected Emotional states of a more elevated character (§§ 213—215).

191. *Instinctive Movements.*—It has been already shown that the Instinctive actions of the lower Animals may be regarded as constituting the *direct and immediate response* of their Nervous Mechanism to the impressions made upon it; and that there is reason to believe that, in some instances at least, this mechanism has shaped itself in accordance with the manner in which it has been habitually called into activity (§§ 84, 93). Now there are, perhaps, no movements in Man of a higher character than those immediately related to the maintenance of his Organic Functions (§ 32), which *originally* have this character; but there is a very large class in which the immediate response *comes* to be made, in consequence of the habitual “training” of the Automatic mechanism to a certain sequence of movements, under the direction of a certain sequence of Sense-perceptions.

192. One of the most universal of these *secondarily automatic* actions is that of *walking erect*; for which the whole Human organization is so obviously adapted, that it seems probable that every Child would acquire the habit *proprio motu*, without either teaching or example. But this acquirement depends upon the establishment of a very complicated set of relations between Sense perceptions and respondent Muscular contractions; in virtue of which the latter come to be instinctively prompted by the former. Thus the effort needed for the mere *support* of the body is

ordinarily kept up by the "muscular sense;" of which, indeed, we only become cognizant when our attention is directed to it; but the necessity for which is evidenced by the fact, that if the *sensory* nerve of a limb be paralysed, the contraction of its muscles cannot be sustained by the strongest exertion of the Will, unless the Sight be used to replace the lost Feeling (§ 80). The existence of this partial paralysis may sometimes be recognized by the persistent *looking-downwards* of those who suffer from it; for if, whilst walking, they were to withdraw their eyes from their feet, their legs would at once give way under them. In the ordinary *balancing* of the body, our movements are still prompted in great degree by the Muscular sense; and this is alone sufficient to the blind, as it is to the seeing man when walking in the dark. It frequently happens, indeed, that Vision, instead of aiding and guiding, brings to us sensations of an antagonistic character; and our movements then become uncertain, from the loss of that power of control over them, which the harmony of the two sensations usually affords. Thus a person unaccustomed to look down heights, *feels* insecure at the top of a tower or a precipice, although he *knows* that his body is properly supported; for the void which he sees below him contradicts (as it were) the Muscular sense by which he is made conscious of its due equilibrium. So, again, although any one can walk along a narrow plank which forms part of the floor of a room, or which is elevated but little above it, without the least difficulty, and even without any consciousness of effort, yet if that plank be laid across a chasm, the bottom of which is so far removed from the eye that the Visual sense gives no assistance, even those who have braced their nerves against all Emotional distraction, feel that an effort is requisite to maintain the equilibrium during their passage over it; that effort being aided by the withdrawal of the eyes from the depth *below*, and the fixation of them on a point *beyond*, which at the same time helps to give steadiness to the movements, and distracts the

mind from the sense of its danger. On the other hand, the sufficiency of the Muscular sense, when the Mind has no consciousness of the danger, and when the Visual sense neither affords aid nor contributes to distract the attention, is remarkably illustrated by the phenomena of Somnambulism; for the sleep-walker traverses, without the least hesitation, the narrow parapet of a house, crosses narrow and insecure planks, clambers roofs, &c.—But how soon a new co-ordination of this kind can be acquired, is shown (as Mr. H. Mayo pointed-out) by what happens to a landsman on first going to sea. “It is long before the passenger acquires his ‘sea-legs.’ At first, as the ship moves, he can hardly keep his feet; the shifting lines of the vessel and surface of the water unsettle his Visual stability; the different inclinations of the planks he stands-on, his Muscular sense. In a short time, he learns to disregard the shifting images and changing motions, or acquires facility in adapting himself (like one on horseback) to the different alterations in the line of direction in his frame.” And when a person who has thus learned by habit to maintain his equilibrium on a shifting surface, first treads upon firm ground, he feels himself almost as much at fault as he did when he first went to sea: and it is only after being some time on shore, that he is able to resume his original manner of walking. Indeed, most of those who spend the greater part of their time at sea, acquire a peculiar gait, which becomes so habitual to them, that they are never able to throw it off.

193. Not less universal, in the ordinarily constituted Human being, is some definite form of *Vocalization*; requiring a very exact and complicated co-ordination between the Respiratory movements, and those of the Larynx, the Tongue, and the Lips, which is ordinarily directed by the sense of Hearing. This co-ordination is acquired, in the first instance, under the guidance of the Sounds actually heard; but, when subsequently called into action volitionally, it depends on the presence of a mental conception

(or internal sensation) of the tone to be uttered,—save in those cases in which a special training has brought “deaf-mutes” to regulate the action of their organs of Speech by the guiding sensations originating in the muscles themselves (§ 80). It is very rarely that a person who has once enjoyed the sense of Hearing, afterwards becomes so *completely* deaf, as to lose all auditory control over his vocal organs. An example of this kind, however, was communicated to the public by a well-known Author, as having occurred in himself; and the record of his experiences contains many points of much interest:—

The deafness was the result of an accident occurring in childhood, which left him for some time in a state of extreme debility; and when he made the attempt to speak, it was with considerable pain in the vocal organs. This pain probably resulted from the unaccustomed Muscular effort which it was necessary to make, when the usual guidance was wanting; being analogous to the uneasiness we experience when we attempt to move our eyes with the lids closed. His voice at that time is described as being very similar to that of a person born deaf-and-dumb, but who has been taught to speak. With the uneasiness in the use of the vocal organs, was associated an extreme mental indisposition to their employment; and thus, for some years, the voice was very little exercised. Circumstances afterwards forced it, however, into constant employment; and great improvement subsequently took place in the power of vocalization, evidently by attention to the indications of the Muscular sense. It is a curious circumstance fully confirming this view, that the words which had been in use previously to the supervention of the deafness, were still pronounced (such of them, at least, as were kept in employment) as they had been in childhood; the muscular movements concerned in their articulation being still guided by the original Auditory conception, in spite of the knowledge derived from the information of others that such pronunciation was erroneous. On the other hand, all the words subsequently learned were pronounced according to their spelling; the acquired associations between the Muscular sensations and the written signs being in this case the obvious guide. —(See Dr. Kitto's *Lost Senses*, vol. i., chaps. 2, 3.)

194. The extraordinary *adaptiveness* of the Organism of Man, is shown in his power of acquiring a vast number of more *special* actions, which have no direct relation to his bodily wants, but minister to requirements of his own creation. These often become, by a process of prolonged "training," not less *automatic* than the act of walking; as is shown by the fact that, when once set going, they will continue in regular sequence, not only without any Volitional exertion, but whilst the Attention is wholly directed elsewhere. Thus a Musical performer will play a piece which has become familiar by repetition, whilst carrying on an animated conversation, or whilst continuously engrossed by some train of deeply interesting thought; the accustomed sequence of movements being directly prompted by the *sight* of the notes, or by the remembered succession of the *sounds* (if the piece is played from memory), aided in both cases by the guiding sensations derived from the Muscles themselves. But further, a higher degree of the same "training" (acting on an Organism specially fitted to profit by it) enables an accomplished Pianist to play a difficult piece of music at sight; the movements of the hands and fingers following so immediately upon the sight of the notes, that it seems impossible to believe that any but the very shortest and most direct track can be the channel of the Nervous communication through which they are called forth. The following curious example of the same class of *acquired aptitudes*, which differ from Instincts only in being prompted to action by the Will, is furnished by Robert Houdin :—

With a view of cultivating the rapidity of visual and tactile Perception, and the precision of respondent Movements, which are necessary for success in every kind of "prestidigitation," Houdin early practised the art of juggling with balls in the air; and having, after a month's practice, become thorough master of the art of keeping up *four* balls at once, he placed a book before him, and, while the balls were in the air, accustomed himself to read without hesitation. "This," he says, "will probably seem to my readers very extraordi-

nary ; but I shall surprise them still more when I say that I have just amused myself with repeating this curious experiment. Though thirty years have elapsed since the time I was writing, and though I have scarcely once touched my balls during that period, I can still manage to read with ease while keeping *three balls up*."—(*Autobiography*, p. 26.)

This last fact appears to the Writer to be one of peculiar significance, for it seems to justify the conclusion, that even a most complex series of actions which essentially depends on guiding perceptions, may be performed by the automatic mechanism, without any other Volitional action than that which "starts" it, when once this mechanism has been developed by the *habitual exercise* originally imposed on the Nerve-centres by the Will. And further, it shows that this mechanism, having been originally so shaped *at an early period of life*, is kept up by Nutritive action, even though not called into use (§ 276) ; just as the "traces" of our early mental acquirements are persistently retained in our organism, long after we have lost the conscious Memory of them (§ 339).

195. To the same category as Instinctive movements, may be referred those movements of *expression*, which are automatically prompted by states of *feeling* connected with the Perceptual consciousness. These Movements are often more powerfully significant than any verbal language can be ; for they convey the immediate experiences of the percipient mind, which have not been (and are often incapable of being) evolved into ideas, and thence translated into words (§ 198) ; and they are immediately or instinctively apprehended by other minds. It may be noticed that long before Children have attained to any comprehension of verbal language, they intuitively interpret the expressions of emotion, and are sympathetically affected by them ; as seems the case, too, with regard to such of the lower Animals as habitually associate with Man, and thus acquire that sympathy with his emotional nature,

which enables them to recognize its manifestations. And they often reveal the state of Mind of the individual even *more truly* than his spoken words ; being less under the control of his Will, which may use his Speech rather to conceal than to make known his thoughts.*

* The subject of the Movements of Expression being too large to be here discussed in detail, the reader who seeks further information upon it may be referred to the recent Treatise of Mr. Darwin, by whom it is handled with his usual ability.

CHAPTER VI.

OF IDEATION AND IDEO-MOTOR ACTION.

SECTION I.—*Of Ideation Generally.*

196. IN ascending the scale of Psychological activity, we find the operations of the *Intelligent Mind* becoming more and more independent of the Sensorial changes which first excited them. It has been shown that in the first or *sensational* stage, the Consciousness is engrossed with *self*, not being as yet awake to the existence of any external cause for the *subjective* change it experiences; whilst in the second or *perceptive* stage, in which that objective cause is apprehended as something *not-self*, the Mind is entirely given-up to the contemplation of it, and recognizes its properties as the sources of the various affections it experiences. Some of these affections relate to *knowledge*, whilst others partake more of the nature of *feeling*; but in all of them the percipient mind is brought face to face, as it were, with the object perceived; and the knowledge which comes to us from this direct relation, whether through our *original* or our *acquired* intuitions, has a certainty to which no other kind of knowledge can lay claim. But it is not until the Mind attains a still higher kind of activity, that it forms that distinct *mental representation*, or *idea*,* of the object, which stands altogether apart from our

* The Writer does not think it expedient to enter into the inquiry which has been the subject of so many abstruse and laboured Metaphysical discussions, as to whether our fundamental Ideas originate altogether *without*, or altogether *within*, the Mind; or partly without, and partly within. It will be sufficient for him to express his own conviction, that the latter is the view at which any Psychological inquirer *must* arrive, who looks at the subject from the Physiological side. An Idea can no more correctly be designated a "transformed sensation," than a Sensation could be designated "a transformed impression," or Muscular Con-

immediate experience, and assumes the character of an independent Intellectual reality. Thus *Ideation* forms, as it were, the climax of that reaction between the external world and the intelligent *Ego*, of which *sensation* and *perception* constituted the lower stages; and looking at the *Cerebrum* (as we seem justified in doing) as the instrument of that activity, we see how its operations, prompted in the first instance by changes in the Sensorium, may come to be entirely independent of them, by that singular power of recording ideational changes, which constitutes the Physiological basis of Memory (§ 344). And in all the higher intellectual operations, it is by its own ideational activity, rather than by sensorial promptings, that the further action of the *Cerebrum* is sustained.—In forming these “mental representations,” the Mind is determined by the nature and intensity of the various affections of its consciousness which have been excited by the object; and as these depend in part upon the original constitution of the *Cerebrum*, and in part upon the mode in which its activity has been habitually exercised, it follows that the ideas of the same object or occurrence which are formed by different individuals, may be widely discrepant. This, indeed, continually proves to be the case; and we cannot have a better example of the fact, than is afforded by the variety of modes in which the same face or landscape shall be depicted by different Artists, each expressing in his peculiar “manner” that representation of the object which his Mind has formed. As Carlyle has well said; “The eye sees what it brings the power to see.”

traction could be called a “transformed stimulation.” The one is antecedent; the other is consequent. Just as an electrical or chemical stimulus, applied to a Muscle, calls it into contraction, so does the sensational stimulus, acting on the *Cerebrum*, excite the changes which give rise to the Ideational form of consciousness. On the other hand, to affirm that ideas are either “innate,” or are in any way generated by the mind itself without original excitement by sensations *ab extra*, is a position so entirely inconsistent with experience, as not to bear any careful scrutiny.—For a concise view of the various doctrines which have been propounded on this subject, see Dr. J. D. Morell’s “Elements of Psychology,” pp. 269 *et seq.*

How much more the Artist's pencil is guided by his *mental* than by his *sensorial* view of certain objects, has been recently pointed out by Mr. Hamerton, who states it as a fact that every Landscape-painter *represents* mountains much higher than he *sees* them; as is shown by the comparison of his drawings either with photographs, or with tracings taken by a perspective apparatus (*Thoughts about Art*, p. 62).—Another departure from *visual* truth, for the purpose of producing *ideal* truth, is made by every Artist in his pictorial representation of the perpendicular lines of a building as vertical and parallel; notwithstanding that, as projected upon his retina, they converge towards a vanishing point in the sky.*

197. The influence either of preconceived *notions*, or of the *feelings* by which the Mind is habitually pervaded, may be continually recognized by the observant, as modifying the ideas which every one forms of what is presented to his observation: and it is by an exaggeration of such influences, in such as allow themselves to become "possessed" by "dominant ideas" without bringing them to the test of Common Sense, that those *mis-representations* come to be accepted as realities, which have the same source as the delusions of Insanity; differing from them only in their degree of fixity and intensity, and in the kind of influence which they exert over the conduct (§§ 187, 561).—This want of conformity between the *ideal* and the *actual* is peculiarly apt to arise in the minds of those who live too much in the former and too

* The Writer's statement on this point has been called in question, on the ground that a perspective projection on a *vertical plane* shows perpendicular lines as vertical and parallel. But when we are looking at a lofty building, like the west front of York Minster, we do not direct our eyes horizontally, but look towards a point some way up, so that *the retinal plane becomes oblique*; and what our visual picture really is under such circumstances, is proved by the unerring test of Photography. For, in taking a picture of a lofty building, the Photographer tilts his camera upwards, so that the plane of the picture becomes oblique; and in every Photograph thus taken, the perpendiculars of the building most unmistakably converge. Now when a pair of such Photographs, taken stereoscopically, are so viewed in the Stereoscope that their planes are brought into parallelism to that on which they were taken (which is easily done by *sloping* the pictures, so that their upper edges are brought nearer to the eye), the perpendicularity of the verticals is restored.

little in the latter; for in proportion as the Mind dwells too exclusively upon its own conceptions, and refrains from bringing these into contact with the realities of every-day life, do aberrations which would speedily be checked by experience, progressively gain a preponderating influence, until at last they may acquire the character of settled delusions, and may altogether upset the balance of the Intellect.

198. The whole tendency of the Ideational activity of the Mind, being thus to separate the "representation" formed by itself, from the restraints of outward experience, so as to make it a distinct and intelligible object of contemplation, it is requisite for the perfection of this *objectifying* process, that we should possess some mode of *signifying* our ideas, so that they may at the same time be made clear and distinct to ourselves, and be rendered intelligible to other minds. This may be accomplished by means of *signs* visible to the eye, or transmissible through the touch; or by means of *spoken language*, in which certain combinations of sounds are made to symbolize ideas.

The deaf-and-dumb are trained to communicate with each other, not merely by the "finger-language," by which words are *alphabetically* spelled, but also by the "sign-language," by which ideas are conveyed through the much more direct medium of *single signs*. These signs, though partly conventional, are made to conform as nearly as possible to the *natural* expressions of ideas; and are usually acquired very quickly by the deaf-and-dumb, whose want of other modes of utterance forces into activity a mode of expressing their ideas and emotions, which is unnecessary to those who have the command of language, and is consequently but little exercised by them. Young Children, however, who associate much with the deaf-and-dumb, very readily acquire this sign-language, and will often prefer the continued use of it to the acquirement of *spoken* language. —The inquiries of Mr. E. B. Tylor ("Researches into the Early History of Mankind," chaps. ii., iii.) have shown that the sign-language is very generally used among the least civilized Races; and that it presents such a remarkable uniformity among different

Families of Mankind, that it must be regarded as the most *natural* and *direct* mode in which ideas can be expressed.

The *range* of such signs, however, is necessarily very limited ; and every Family of Mankind has substituted for them a set of *arbitrary* sounds, which are not only much more perfect in themselves as instruments for the expression of ideas, but are capable of being made to convey (by means of that wonderful apparatus of *articulation* with which Man is provided) an unlimited variety of meanings. In proportion as, by inflexion and combination, a verbal Language is capable of readily and precisely embodying the results of the Intellectual processes, in that proportion can these results be *objectified* by each individual, and be thus made the basis of further operations ; and in the same proportion can they be clearly presented to the minds of others, and be employed by them for the same purpose. Thus whilst the structure of the Language of any people is to a certain extent a measure of its mental development, it comes to exert a most important influence over the further progress and direction of that development ; different languages being in their very nature adapted for the expression, both of different *classes*, and of different *relations*, of Ideas, and having very different capacities for further development.

Some have maintained that Words which are used to designate external objects are the signs of those objects, and that such words form a class distinct from that of the words which stand as signs of abstract ideas. It is true that to the Child first learning the use of language, as among the lower Races of Mankind, every such noun is originally a *proper name*, standing as the symbol of the *individual* object with which it has become associated. But the Child is very early led by the familiar experiences of its nursery, to apply such words as chair, table, bed, to *classes* of objects, and thus to appreciate their significance as symbols of generalized or abstract ideas. And when that process has been accomplished in a few instances, the child's intellect soon extends it to others (its chief activity in this stage of its development being directed to the expansion and multi-

plication of its ideas); and thus—except in the case of *proper names* which are only applicable to individuals—all words come really to express *generalized representations* of the objects to which they refer. If, for example, we attempt to define the most familiar object, such as a house, a table, or a basket, by any verbal description, we find it extremely difficult to frame a definition that shall include *all* houses, *all* tables, *all* baskets; notwithstanding that our *idea* of a house, of a table, or of a basket, is sufficiently precise to enable us to say at once with regard to any particular object, whether it *does*, or *does not*, fall under one of these categories.

Hence Words do not appeal directly to the Intuitions of other minds, but must be comprehended by translation through their Ideational consciousness; signifying to each one the ideas he is prepared by his previous habits of thought to attach to them.

Thus every branch of Knowledge has its own Language, the terms of which, even when identical with words in ordinary use, can only convey their full and peculiar signification to those who have already gained an extensive acquaintance with the department of thought to which they relate. So, in rendering from one Language into another, great difficulty is continually experienced in the choice of words which shall convey in the translation the precise ideas signified in the original; the difficulty being greater in proportion to the diversity between the habits of thought of the two nations respectively. We can scarcely have a more “pregnant instance” of the obstruction thus created to the transmission of ideas through language, by the peculiarity of Scientific Terminology, in combination with diversity of National habitudes of thought, than is presented in the attempt to bring the abstract refinements of German Metaphysics within the comprehension of a “common-sense” English mind.

It is from their purely ideational significance, that, as expressions of *feeling*, words are often less potent than tones or gestures, which directly appeal to the emotional sensibility of the Percipient. And it is a striking testimony to the correctness of the view to be hereafter advocated in regard to the composite nature of the Emotions (§ 260), that they are most strongly excited by *language*

that appeals to their *ideational* component, uttered in a *tone* and *manner* that calls forth the associated *feeling*.

199. There are certain Ideas which spring up in the Mind during the course of its own operations, whenever it *attends* to these ; presenting themselves so universally, being so little subject to modification by peculiarities of individual character (whether original or acquired), and being so unhesitatingly recognized as "necessary" Truths, either when they spontaneously occur to ourselves, or are presented to our acceptance by others, that they take rank as *Primary Beliefs*, or *Fundamental Axioms*. Such are :—

I. The belief in our own *present existence*, or the faith which we repose in the evidence of Consciousness ; this idea being necessarily associated with every form and condition of Mental Activity.

II. The belief in our *past existence*, and in our *personal identity* so far as our Memory extends (§ 364); with this, again, is connected the general Idea of *Time*.

III. The belief in the *external and independent existence* of the causes of our Sensations, leading to the recognition of the External World as distinct from the Ego ; out of this arises the general idea of *Space*.

IV. The belief in the existence of an *efficient Cause* for the changes that we witness around us, which springs from the recognition of our own conscious agency in the production of such changes ; whence is derived our idea of *Power*.

V. The belief in the *Uniformity of the Order of Nature*, or in the *invariable sequence* of similar effects to similar causes, which also springs from the perception of external changes, and is the foundation of all applications of our own experience, or of that of others, to the Conduct of our lives, or to the extension of our Knowledge.

VI. The belief in our *own free will*, involving the general idea of Volitional agency ; which is in like manner a direct result of our recognition of a self-determining power (§ 5) within ourselves.

200. Again, those Axioms or first truths upon which the whole fabric of Geometry rests (such as "Things which are equal to the same thing, are equal to one another"), are statements of *universal fact, necessarily true under all circumstances*; which we unhesitatingly accept as such, because *any statement inconsistent with them would be inconceivable*. And so every step of a Mathematical or a Logical demonstration, which is based on such fundamental axioms, derives its validity from the fact, that either the *contrary* or *anything else* than the fact asserted is "unthinkable." Where each step is thus necessarily true to our Minds, the final Q. E. D. carries with it the same authority. So, too; the deliverances of our "Common Sense" (§ 378) derive their trustworthiness from what we consider the "self-evidence" of the propositions affirmed. Hence it is evident that "the only foundation of much of our belief, and the only source of much of our knowledge, is to be found in the Constitution of our own Minds."

201. The origin of these Primary Beliefs is one of the great Philosophical problems of our day, which has been discussed by Logicians and Metaphysicians of the very highest ability as leaders of opposing Schools, with the one result of showing how much can be said on each side.—By the *Intuitionists* it is asserted that the tendency to form them is an intellectual instinct inborn in Man, an original part of his Mental organization; so that they grow up spontaneously in his mind as its faculties are gradually unfolded and developed, requiring no other experience for their genesis, than that which suffices to call these faculties into exercise. But by the advocates of the doctrine which regards *Experience* as the basis of all our knowledge, it is maintained that the primary beliefs of each individual are nothing else than generalizations which he forms of such experiences as he has either himself acquired, or has consciously learned from others; and they deny that there is any original or intuitive tendency to the formation of such beliefs, beyond that

which consists in the power of retaining and generalizing experiences.—A careful study, however, of the manner in which those Beliefs grow-up in our minds, seems to supply a means of reconciliation between these opposing doctrines. Even the generalization of actual experiences requires a certain preparedness of Intellect ; and we can readily trace the growth of this in the Child, whose mind, like that of the untutored savage, dwells minutely on the *particular*, long before any idea of the *general* occurs to it ; whilst a far higher development is required for it to pass from the general to the *universal*, to extend its conceptions from the experiential sphere of the *actual* to the imaginary range of the *possible*. And this development can only take place in a Mind which is continually acquiring new experiences ; these being as necessary a *pabulum* to the mental organism, as *food* is to the bodily. But as the growth of the Body and the increase of its capabilities are dependent, not on the accumulation, but on the assimilation, of the food it has ingested, even so it is not in the accumulation of experiences, but in the increase of its capacity to deal with them, that the growth of the Mind essentially consists ; of which capacity one most essential feature is the power of *direct apprehension* of truth. And in view of the many considerations hereafter to be adduced, no Physiologist can deem it improbable that the Intuitions which we recognise in our own Mental constitution have been thus acquired by a process of gradual development in the Race, corresponding to that which we trace by observation in the Individual.—That the great Master of the Experiential school, Mr. J. S. Mill, was latterly tending towards the acceptance of this view, will hereafter appear (p. 486).

The doctrine that the Intellectual and Moral Intuitions of any one Generation are the embodiments in its Mental constitution of the experiences of the Race, was first explicitly put forth by Mr. Herbert Spencer, in whose Philosophical Treatises it will be found most ably developed. But it had been distinctly foreshadowed as regards the

Instincts of animals (which are only lower forms of Man's intellectual Intuitions) by Sir John Sebright, Mr. T. A. Knight, and M. Roulin; of whose observations a summary has been given by the Writer in the "Contemporary Review," January, 1873. Sir John Sebright went so far as to express it as his decided conviction "that by far the greater part of the propensities which are generally supposed to be instinctive, are not implanted in animals by Nature, but are the results of long experience, acquired and accumulated through many generations, so as, in the course of time, to assume the characters of instinct." And in the Fourth and Fifth Editions of his "Human Physiology," published respectively in 1852 and 1855, the Writer had distinctly expressed his belief that the Cerebrum of Man *grows-to the modes of thought in which it is habitually exercised; and that such modifications in its structure are transmissible hereditarily.* (See § 838 of the Fourth Edition, and §§ 629, 630, of the Fifth Edition.) He here refers to this fact, merely to show that the *general doctrine* above enunciated (which he believes to have been held also by other Physiologists who had made Psychology their study, such as Sir H. Holland, Sir B. Brodie, and Dr. Laycock), is much older than Mr. Herbert Spencer.

202. We have an illustration of this progress in the fact of continual occurrence, that Conceptions which prove inadmissible to the minds of one generation, in consequence either of their want of Intellectual power to apprehend them, or of their pre-occupation by older habits of thought, subsequently find a universal acceptance, and even come to be approved as "self-evident." Thus the First Law of Motion, divined by the genius of Newton, though opposed by many Philosophers of his time as contrary to all experience, is now accepted by common consent, not merely as a legitimate inference from experiment, but as the expression of a necessary and universal truth. And the same axiomatic value is extended to the still more general doctrine, that Energy of *any* kind, whether manifested in the "molar" motion of masses, or consisting in the "molecular" motion of atoms, *must* continue under some form or other without abatement or decay; that which all admit in

regard to the indestructibility of Matter, being accepted as no less true of Force, namely, that as *ex nihilo nil fit*, so *nil fit ad nihilum*.*

203. But, it may be urged, the very conception of these and similar great truths is in itself a typical example of Intuition. The men who divined and enunciated them stand out above their fellows, as possessed of a Genius which could not only combine but create, of an Insight which could clearly discern what Reason could but dimly shadow forth. Granting this freely, it may yet be shown that the Intuitions of individual Genius are but specially-exalted forms of endowments which are the general property of the Race at the time, and which have come to be so in virtue of its whole previous culture.—This appears readily capable of proof in the case of two forms of Mental activity, the tendency to which occasionally manifests itself so remarkably in individuals as a *congenital aptitude*, that it must be considered as embodied in their Constitution; and which are yet so completely the products of *culture*, that we are able to trace pretty clearly the history of their development. These are the Ideas which relate to *Number*, and those which relate to *Music*.

204. There can be no reasonable question that the definite Ideas which we now form of *numbers* and of the *relations of numbers* are the products of Intellectual operations based on experience. There are Savages at the present time, who cannot count beyond five; and even among races that have attained to a considerable proficiency in the arts of life, the range of numerical power seems extremely low. In Eastern nations generally, it would appear that *definite conceptions* of Number are more limited than their language implies; for in their descriptions of what they have themselves witnessed, they are in the habit of using what to *our*

* This is the form in which the doctrine now known as that of the "Conservation of Energy" was enunciated by Dr. Mayer, in the very remarkable Essay published by him in 1845, entitled "Die organische Bewegung in ihrem Zusammenhange mit dem Stoffwechsel."

“matter-of-fact” apprehension are ludicrous exaggerations in regard to numbers, although these descriptions would probably not convēy any erroneous ideas to those for whom they were intended.* Although the ancient Greeks developed the science of Arithmetic up to a certain point, they were incapacitated from carrying it further by the clumsiness of their mode of expressing large numbers; which made it necessary for their higher computations to use symbols borrowed from Geometry—the science of Space; as when they spoke of the *square* or the *cube* of a number. It was the introduction into Europe, from India, of what we are accustomed to call the “Arabic notation,” that gave an entirely new development to Arithmetical science; the essential features of this notation being the combination of the *local* value of each of the figures representing any number, with the *decimal* multiplication in the value given to them by their position. The science of Arithmetic, as at present existing, may be regarded as the accumulated *product* of the intellectual ability of successive generations; each generation building up some addition to the *knowledge* which it has received from its predecessor. But it can scarcely be questioned by any observant person, that an *aptitude* for the apprehension of numerical ideas has come to be embodied in the congenital Constitution of races which have long cultivated this branch of knowledge; so that it is far easier to teach Arithmetic to the child of an educated stock, than it would be to a young Yanco of the Amazons, who, according to La Condamine, can count no higher than *three*, his name for which is *Poettarrar-orincoaroac*.

205. The most satisfactory evidence of the existence of a *numerical intuition*, or congenital aptitude for recognising the relations of Numbers, is furnished by the not unfrequent display of

* A very interesting example of this tendency was presented by the “Journal of Two Parsee Shipbuilders,” who visited this country about forty years ago, and published their experiences for the benefit of their countrymen.

this faculty among Children ; for, as the Writer is informed by a friend who has a large field of observation among Primary Schools in which “mental arithmetic” is cultivated, it often happens that individuals who have received very little instruction surpass their fellows in the quickness and accuracy of their replies to numerical questions proposed to them, though they cannot be brought to explain the processes by which they have worked-out their results. More remarkable instances, however, are presented by the occasional display of very extraordinary Arithmetical ability on the part of individuals, who, having received very little instruction, have not only anticipated, but have gone far beyond, any power derivable from instruction, in almost immediately arriving at the answers to questions, which, according to ordinary Arithmetical methods, would involve long computations of a very elaborate character. The case of Zerah Colburn, the son of an American peasant, is especially remarkable among these, not only for the immediateness and correctness with which he gave the answers to questions resolvable by simple but prolonged computation,—such as the product of two numbers, each consisting of two, three, or four figures ; the exact number of minutes and seconds in a given period of time ; the raising of numbers up to high powers ; or the extraction of the square and cube roots ;—but, still more, for his power of at once answering questions to which no rules known to Mathematicians would apply. It was when the lad was under six years of age, and before he had received any instruction either in writing or in arithmetic, that he surprised his father by repeating the products of several numbers ; and then, on various arithmetical questions being proposed to him, by solving them all with facility and correctness. Having been brought over to London in 1812, at the age of eight years, his powers were tested by several eminent Mathematicians ; among them Francis Baily, from whose account of him the following examples are selected :—

He raised any number consisting of *one* figure progressively to the

tenth power; giving the results (by actual multiplication, and not by memory) *faster than they could be set down in figures* by the person appointed to record them. He raised the number 8 progressively to the *sixteenth* power; and in naming the last result, which consisted of fifteen figures, he was right in every one. Some numbers consisting of *two* figures he raised as high as the *eighth* power; though he found a difficulty in proceeding when the products became very large.

On being asked the *square root* of 106929, he answered 327, *before the original number could be written down*. He was then required to find the *cube root* of 268,336,125; and with equal facility and promptness he replied 645.

He was asked how many *minutes* there are in 48 years; and before the question could be written down, he replied 25,228,800, and immediately afterwards he gave the correct number of *seconds*.

On being requested to give the *factors* which would produce the number 247483, he immediately named 941 and 263, which are the *only two* numbers from the multiplication of which it would result.—On 171395 being proposed, he named 5×34279 , 7×24485 , 59×2905 , 83×2065 , 35×4897 , 295×581 , and 413×415 .—He was then asked to give the factors of 36083, but he immediately replied that it had none, which is really the case, this being a prime number.—Other numbers being proposed to him indiscriminately, he always succeeded in giving the correct factors, except in the case of prime numbers, which he generally discovered almost as soon as proposed. The number 4,294,967,297, which is $2^{32} + 1$, having been given to him, he discovered (as Euler had previously done) that it is not the prime number which Fermat had supposed it to be, but that it is the product of the factors $6,700,417 \times 641$. The solution of this problem was only given after the lapse of some weeks; but the method he took to obtain it clearly showed that he had not derived his information from any extraneous source.

When he was asked to multiply together numbers both consisting of more than three figures, he seemed to decompose one or both of them into its factors, and to work with these separately. Thus, on being asked to give the square of 4395, he multiplied 293 by itself, and then twice multiplied the product by 15. And on being asked to tell the square of 999,999, he obtained the correct result,

999,998, 000,001, by twice multiplying the square of 37037 by 27. He then of his own accord multiplied that product by 49; and said that the result (viz. 48,999,902,000,049) was equal to the square of 6,999,993. He afterwards multiplied this product by 49; and observed that the result (viz. 2,400,995,198,002,401) was equal to the square of 48,999,951. He was again asked to multiply this product by 25; and in naming the result (viz. 60,024,879,950,060,025) he said that it was equal to the square of 244,999,755.

On being interrogated as to the method by which he obtained these results, the boy constantly declared that he did not know *how* the answers came into his mind. In the act of multiplying two numbers together, and in the raising of powers, it was evident (alike from the facts just stated, and from the motion of his lips) that *some* operation was going forward in his mind; yet that operation could not (from the readiness with which the answers were furnished) have been at all allied to the usual modes of procedure, of which, indeed, he was entirely ignorant, not being able to perform on paper a simple sum in multiplication or division. But in the extraction of roots and in the discovery of factors of large numbers, it did not appear that any operation *could* take place: since he gave answers *immediately*, or in a *very few seconds*, which, according to the ordinary methods, would have required very difficult and laborious calculations; and *prime* numbers cannot be recognized as such by any known rule.

It is remarked by Mr. Baily that the same faculty, improved by cultivation, appears to have been possessed by the illustrious Euler; who had not only a most extraordinary *memory* for numbers—to the extent, it is said, of being able to recall the first six powers of any number under 100,—but also a kind of *divining power*, by which “he perceived, almost at a glance, the factors of which his formulæ were composed; the particular system of factors belonging to the question under consideration; the various artifices by which that system might be simplified and reduced; and the relation of the several factors to the conditions of the hypothesis.”—This power of *divining* truths in advance of existing knowledge, is the special attribute of those Mathematicians who have done most for the

development of their science. A notable instance of it is furnished by the celebrated formula devised by Newton for the solution of equations ; for although its correctness was proved experientially by the results of its application in every conceivable variety of case, its *rationale* seems to have been unknown to Newton himself, and remained a puzzle to succeeding Mathematicians, until discovered by the persevering labours of Professor Sylvester, who is himself specially distinguished for the possession of this highest form of Mathematical genius.—That such a power as Zerah Colburn's should exist in a child who had never been taught even the rudiments of Arithmetic, seems to point (as Mr. Baily remarks) to the existence of *properties of numbers* as yet undiscovered, somewhat analogous to those on which the system of Logarithms is based. And if, as he grew older, he had become able to make known to others the methods by which his results were obtained, a real advance in knowledge might have been looked for. But it seems to have been the case with him, as with George Bidder and other "calculating boys," that with the *general* culture of the mind, this *special* power faded away.

206. The development of the Science and Art of *Music* has been even more recent. Whatever may have been the advances made in early times towards the "scale" of notes which all civilized Races now accept as the basis alike of Melody and of Harmony, it is pretty certain that the ancients cultivated Melody (or the *succession* of notes) exclusively, and that Harmony (or the combination of *simultaneous* tones) is of quite modern origin, the first indications of such combination not showing themselves until the Middle Ages. It was not, indeed, until the 16th century, that the system of *counterpoint*, or the arrangement of separate "parts" in harmony, was developed ; and although this rapidly attained a high degree of perfection, as regards both Vocal and Instrumental music, the art of *orchestration*—that is, the use, either in combination or in contrast, of Instruments of different capacities and

qualities of tone, so as enormously to increase the range and variety of musical effects—is the product of the 18th century. Now whilst, as in the case of Number, the Musical science of any given period is the general expression of the accumulated *knowledge*, based on *experience*, of those who had devoted themselves to its culture in previous generations, there have arisen, from time to time, individuals in whom there has obviously been not merely a congenital aptitude for the *acquisition* of the Musical knowledge previously attained, but a power of *anticipating*, without any experience of their own, the results at which their predecessors had arrived, and then of *creating* forms of Musical thought entirely new, which have served as standards or models for those who have come after them.—No more remarkable instance of this kind could be adduced, than that which is presented by the short but brilliant career of Mozart :* and this will also furnish illustrations of the *spontaneous* working of Genius of the highest order, trained and disciplined by the most thorough Culture (§§ 232, 400).

The father of Mozart was not only an excellent performer on the violin (for which instrument he produced a Method that was long esteemed the best of its kind), but was well skilled in the Theory of Music, and wrote in various styles with no inconsiderable success. Of his seven children, only two survived the period of infancy; Anna Maria (born Aug. 29, 1751), and Wolfgang (born Jan. 27, 1756), who was four years and a half younger than his sister. That the girl inherited considerable musical ability, appears from the fact that at seven years old she was her father's pupil on the clavier (the early form of pianoforte), at which her progress was great and uniform; that when on the musical tour which she made with her brother, her performance was considered only less wonderful than his; and that she finally gained the highest reputation that any female performer on a keyed instrument had at that time acquired. She seems, however, to have been altogether destitute of the *inventive* faculty by which her brother was pre-eminently distinguished.

* The materials of the following sketch are chiefly derived from the admirable "Life of Mozart," by Edward Holmes, London, 1845.

At the time that his sister was commencing clavier practice, Wolfgang, then three years old, "was a constant attendant on her lessons; and already showed, by his fondness for striking thirds, and pleasing his ear by the discovery of other harmonious intervals, a lively interest in Music. At four he could always retain in memory the brilliant solos in the Concertos which he heard; and now his father began, half in sport, to give him lessons. The musical faculty seems to have been intuitive in him; for in learning to play, he learned to compose at the same time: his own nature discovering to him some important secrets in melody, rhythm, symmetry, and the art of setting a bass. To learn a minuet, he required half an hour, for a longer piece an hour; and having once mastered them, he played them with perfect neatness and in exact time. His progress was so great, that at four years of age, or earlier, he composed little pieces, which his father wrote down for him." From four to six years old, he was continually exercising himself in this manner, and acquired great experience in design and modulation; so that there could be no longer a doubt of the extraordinary precocity of his Musical genius.

"His desire of knowledge was great on all subjects; but in Music he astonished his teacher, not so much by an avidity for information, as by the impossibility of telling him anything which he did not know before. At the age of six years, Mozart knew the effect of sounds as represented by notes, and had overcome the difficulty of composing unaided by an instrument. Having commenced composition without recourse to the clavier, his powers in mental music constantly increased, and he soon imagined effects of which the original type existed only in his brain."

An incident which occurred at Wassenburg when the boy, not yet eight years old, first tried an organ with pedals, is thus narrated in one of his father's letters:—"To amuse ourselves, I explained the pedals to Wolfgang. He began immediately *stante pede* to try them, pushed the stool back, and preluded standing and treading the bass, and really as if he had practised many months. Every one was astonished; this is a new gift of God, which many only attain after much labour." This is the more remarkable, as not merely the execution, but the style suitable to it, must have been new to the juvenile musician.

When young Mozart was nearly fourteen, his father took him to

Italy for about sixteen months; and this tour seems to have had a considerable influence on his musical development. "In a country which was pre-eminently the seat of excellence in the fine arts, and where to excite admiration was proportionably difficult, his progress was a perpetual ovation. Under these circumstances, his genius was in a state of peculiar exaltation; *for sympathy*, it is to be observed, *was the atmosphere of his artistic existence*; and he could neither play nor compose to his own satisfaction, without the consciousness of being enjoyed and appreciated. But the stamp of his great individuality as a dramatic musician was not as yet visible." In his Church music he seems to have followed the dictates of his artistic feelings and musical science; but in writing for the Theatre he at first aimed chiefly at gaining success by consulting the taste of his audience.—"In reviewing the numerous instrumental Compositions of Mozart's youth, we are struck with the effort he made to master his ideas. The Quartett and Symphony productions of this period show many beautiful thoughts not yet turned to due account, but which he resumed and more fully developed in subsequent compositions. Thus his memory in after-life became a perfect storehouse of melodies and subjects which had long been floating in his imagination, and which his exquisite tact and judgment enabled him instantly to apply. We find this particularly in his Operas and Symphonies."

It was in 1780, when Mozart was in his twenty-fifth year, that he produced the Opera of Idomeneo; the first of that series of great Dramatic works, which have retained a permanent place to the present time in the estimation of all true Musicians. Up to this period, in attempts at dramatic composition, he had followed existing models; but in "Idomeneo" he asserted his independence of them, and developed modes and powers of musical expression, which took the most cultivated musicians by surprise, and have ever since been accepted as true and appropriate. "Youthful fire and invention," says Mr. Holmes, "were never so happily tempered by consummate experience." The performers, who had brought tone and facility of execution upon their instruments to great perfection, but had never been *animated* by what they played, "were awakened by the magic touch of genius to a new life in their art; they found themselves discoursing in an unheard and rapturous language; and the effect upon them was one of intoxication and enchantment."—Though it

is usual to assign to Haydn that development of the powers and capacities of the different instruments of the Orchestra, which unquestionably constitutes the distinguishing feature of the Music of this epoch, yet competent critics maintain that the basis of this development was clearly laid in "Idomeneo," which was produced several years before the great Symphonies of Haydn. The position to which Mozart was at once raised by its production, as the greatest of dramatic composers, was made still more glorious by the immortal works that followed it, "Le Nozze di Figaro" and "Don Giovanni:" of the former of which it has been said that "while all the comic operas coeval with it are lost, not a note of that composition has faded, so that when reproduced it still finds as many enthusiastic admirers as a Comedy of Shakspeare;" while the latter still "stands alone in dramatic eminence, combining the labour of the greatest melodist, symphonist, and master of dramatic expression ever united in the same individual."

But even these grand works, each of which occupied only a few weeks in its composition, constitute only a small part of the productions poured forth from the pen of Mozart, which seemed to be an inexhaustible fountain of music of the most varied character. There are scarcely any of the "unconsidered trifles" which he briefly gave forth, sometimes as the mere overflowings of his inventive faculty, that do not bear the stamp of his genius; while every one of those which he purposely elaborated with all the resources of his art, such as his Quartetts and Quintetts, his Symphonies, and above all the "Requiem," would of itself, if it stood alone, have marked an era in Musical history. "These works," it has been said, "show the variety of powers that Mozart brought to composition: the great organist and contrapuntist—the profound master of harmony and rhythm, are there—but taste and imagination ever preside. The quality of these productions can, in fact, only be estimated by the attempts which musicians have been making ever since to attain some credit in the same path." Like other works in advance of their time, however, they were not at first appreciated. The Six Quartetts dedicated to Haydn, for example,—in which Mozart, making use of the constructive skill which he had learned from the works of the same kind previously produced by his great contemporary, advanced beyond him in the invention of new har-

monic combinations,—were repudiated by many musicians as full of unauthorised innovations; the Italians, in particular, imputing to mistakes of the engraver what *they* regarded as grievous blemishes, though *now* accepted as the greatest beauties of these fascinating compositions.

The most remarkable evidence of the *fertility* and *versatility* of Mozart's creative power, is furnished by the closing part of his history. It was soon after he commenced the "Zauberflöte," that, in an interval of depression which marked the commencement of the malady that terminated his life before the attainment of his thirty-sixth year, he composed the "Ave Verum;" a short strain of calm but elevated devotion, which has nowhere its equal for its combination of expressive beauty, religious feeling, and scientific skill. He then resumed the "Zauberflöte," and had nearly finished it, when he undertook the "Requiem;" having, as he told his wife, a desire to produce a work in which he could develop the elevated and the pathetic in Church music to the highest degree. The "Zauberflöte" was put aside, and the "Requiem" was begun; but he had not proceeded far, when his further progress was interrupted by a commission to compose the opera "La Clemenza di Tito" for the Coronation of the Emperor Leopold at Prague; and though this was completed within the wonderfully short space of *eighteen days*, he astonished his friends at whose house he was staying, by also producing the beautiful Quintett in the first act of the "Zauberflöte," the subject of which had come into his mind while he was playing a game of billiards, and had been at once noted down in a memorandum-book of "musical ideas" which he carried with him. On his return to Vienna, he completed and produced the "Zauberflöte;" and then, while stricken down by mortal disease, resumed the "Requiem," which he did not live entirely to complete, but in which, according to the judgment of all cultivated Musicians, there is a more wonderful combination of sublimity with pathetic beauty, than is to be found in any other Ecclesiastical composition, whether of earlier or later date.

207. In each of the foregoing cases, then, we have a typical example of the possession of an extraordinary congenital aptitude for certain forms of Mental activity; which showed itself at so early a period as to exclude the notion that it could have been

acquired by the experience of the individual ; and which, in the case of Mozart, led its possessor far beyond the accumulated experience of his predecessors. To such congenital gifts we give the name of *Intuitions* ; and it can scarcely be questioned that, like the *Instincts* of the lower Animals, they are the expressions of constitutional tendencies embodied in the organism of the individuals who manifest them. But whilst extraordinary in *degree*, they were not so in *kind* ; for Zerah Colburn's faculty for numbers only placed him on the level of those who had previously attained the same results ; and the creations of Mozart's genius, even when they passed the previous boundaries of musical thought, were soon appreciated by those who had already reached them. And it can scarcely be conceived that a Zerah Colburn could suddenly arise in a race of savages who cannot count above five ; or that an infant Mozart could be born amongst a tribe, whose only musical instrument is a tom-tom, whose only song is a monotonous chant.

208. Again, by tracing the *gradual genesis* of some of those Intellectual Ideas which we now accept as "self-evident,"—such, for example, as that of the "Uniformity of Nature"—we are able to recognize them as the expressions of certain tendencies, which have progressively augmented in force in successive generations, and now manifest themselves as Mental Instincts that penetrate and direct our ordinary course of thought (§ 199). Such instincts constitute a precious heritage, which has been transmitted to us with ever-increasing value through the long succession of preceding generations ; and which it is for us to transmit to those who shall come after us, with all that further increase which our higher culture and wider range of knowledge can impart.

209. In a similar light we are probably to rank those elementary notions of Truth, Beauty, and Right, which present themselves to our consciousness in connection with certain Ideational conditions respectively adapted to excite them ; the first being associated especially with the operations of the Reason, the second with those

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of the Imagination as directed by the Æsthetic sense, and the third with the determination of the Will in the regulation of conduct under the guidance of the Moral sense.—*Truth* may be defined to be an apprehension of the relations of things as they actually exist ; and the conception of Truth, which is originally based upon Sensational Ideas, comes to be also applied to those which are purely Intellectual.—The notion of *Beauty*, the germ of which, as we have seen (§ 188), exists in the Perceptive consciousness, is one that is very difficult to define ; but it seems to consist, when fully developed, in the conformity of an external object to a certain ideal standard, by which conformity a pleasurable feeling is produced. That ideal standard is a work of the Imagination, and is generated (by a kind of automatic process, § 412) by the elimination of all those elements which we recognize as inferior, and by the intensification and completion of all those which we regard as excellent. Hence according to the Æsthetic judgment which every individual pronounces as to these particulars, will be his ideal of Beauty ; and although this judgment is subject to so wide a variation, that the uselessness of disputing about matters of Taste has become proverbial, yet a gradual approximation to agreement shows itself among those who are distinguished by the possession of a high measure of the Æsthetic sense, and who have cultivated it by the intelligent study of what, by common consent, are regarded as the noblest works of art. In fact, it is from the careful scrutiny of the products of the highest Genius (§ 409), that the *rules of art*, alike in Poetry and Music, in Painting and Sculpture, are derived. The notion of Beauty extends itself also to the pure conceptions of the Intellect ; and thus we may experience the sense of Beauty in the recognition of a Truth. We experience the sense of Beauty, too, in witnessing the conformity of conduct to a high standard of Moral excellence ; which excites in our minds a pleasure of the same order as that which we derive from the contemplation of a noble work of Art.—The notion of

Right, which is purely Ideational, connects itself with Voluntary action. We have no feeling of approval or disapproval with respect to actions that are necessarily connected with our Physical well-being ; but in regard to most of those which are left to our choice, it is impossible to feel indifferent ; and the sphere of operation of this principle becomes widened, in proportion as the mind dwells upon the notion of Moral obligation which arises out of it. Then, too, the idea of Right is brought to attach itself to *thoughts* as well as to *actions*; and this, not merely because the right regulation of the thoughts is perceived to be essential to the right regulation of the conduct, but also because *whatever* we can govern by the Will may present itself to the Mind in a Moral aspect.

210. It has been usually considered by Moralists and Theologians, that *Conscience*, or the *Moral sense*, is an "autocratic" faculty, which unmistakeably dictates *what is right* in each individual case, and which should consequently be unhesitatingly obeyed as the supreme and unerring guide. Now this view of the case is attended with practical difficulties, which make it surprising that it can ever have been entertained. For it must be obvious to every one who carefully considers the matter, that whilst a *notion of right as distinguished from wrong*, attaching itself to certain actions, is as much a part of the Moral nature of every individual, as the *feeling of pleasure or pain* attaching itself to certain states of consciousness is of his Sensational nature, yet the determination of *what is right*, and *what is wrong*, is a matter in great degree dependent upon race, education, habits of thought, conventional associations, &c. ; so that the Moral standard of no two men shall be precisely alike, while the moral standards of men brought up under entirely different circumstances shall be of the most opposite nature. (Without having recourse, for an illustration of this position, to the strange estimates of right and wrong which prevail amongst Savage nations, it may be sufficient to

refer to the different views which used to be *conscientiously* entertained on the question of Slavery, by high-minded, estimable, and Christian men and women in different parts of the American Union.) Moreover, in what have been designated as "cases of conscience," the most enlightened Moralist may have a difficulty in deciding what is the right course of action, simply because the Moral sense finds so much to approve on both sides, that it cannot assign a preponderance to either. Thus, individuals in whose characters the love of *truth* and of *justice* and the *benevolent* affections are the prominent features, and who would shrink with horror from any violation of these principles of action for any selfish purpose whatever, are sorely perplexed when they are brought into collision with each other; a strong motive to tell a falsehood (for example) being presented by the desire to protect a defenceless fellow-creature from unmerited oppression or death.

211. It is evident, then, that the determination of *what is right* and *what is wrong* in any individual case, must be a matter of *judgment*; the rule of Moral action being based on a comparison of the *relative nobility of the motives* which impel us to either course, and being decided by the preference which is accorded to one motive or combination of motives above another. As Mr. Martineau has well said,* "Every Moral judgment is *relative*; and involves a comparison of (at least) two terms. When we praise what *has been done*, it is with the co-existent conception of *something else that might have been done*; and when we resolve on a course as *right*, it is to the exclusion of some other that is *wrong*." If it be asked, how are the relative values of these motives to be decided, the answer must be sought in the Moral consciousness of Mankind in general; which is found to be more and more accordant in this respect, the more faithfully it is interpreted, the more habitually it is acted-on, and the more the whole Intelligence is expanded and enlightened.—It is this tendency towards universal agree-

* "Prospective Review" for November, 1845, pp. 587-9.

ment, which shows that there is really as good a foundation for Moral Science in the Psychological nature of Man, as there is for that of Music in the pleasure which he derives from certain combinations and successions of Sounds.

212. On the other hand, as we cannot attach any Moral character to the actions of Animals that are performed under the direction of a blind undiscerning Instinct, leaving them no choice between one course and another, neither can we attach it to those which are executed by Human beings, even when possessed of their full Intelligence, who are dominated by impulses which they have it not in their power to restrain (§ 264); nor, again, to those performed by individuals whose Moral sense has either been never awakened, or has been so completely misdirected by early education, that their standard of right and wrong is altogether opposite to that which the enlightened Conscience of Mankind agrees in adopting (§ 8). But, although there are doubtless many cases in which Criminal actions are committed under the impulse of passions (such as anger, lust, &c.) which the individual has not *at the moment* the power to control, so that he must be absolved from Moral responsibility *quoad* the immediate impulses to those particular actions, yet these impulses too frequently derive all their force from the habit of yielding to their promptings in lesser matters, which gradually gives them a "dominance," such as the Will (weakened by want of exercise in the habit of self-restraint) is unable to resist (§ 287). Hence the Criminal *action* is to be regarded as but the expression of a long previous course of Criminal *thought*, for which, in so far as he could have otherwise directed it, the individual may legitimately be held responsible,—just as he is for actions committed in the state of Intoxication, in which he has temporarily lost, by his own voluntary act, the power of self-control.

213. Closely connected with many of the foregoing Tendencies to Thought, and arising in most minds from some or other of them

by the very nature of our Psychological constitution, are those Ideas which relate to the Being and Attributes of the Deity. There is, in fact, no part of man's Psychological nature, which does not speak to him, when it is rightly questioned, of something beyond and above himself. The very perception of *finite* existence, whether in Time or Space, leads to the idea of the Infinite. The perception of *dependent* existence leads to the idea of the Self-existent. The perception of *change* in the Universe around leads to the idea of an unseen Power as its cause. The perception of the *order* and *constancy* underlying all those diversities which the surface of Nature presents, leads to the idea of the Unity of that power. The recognition of Intelligent Will as the source of the power we ourselves exert, leads to the idea of a like Will as operating in the Universe. And our own capacity for Reasoning, which we know not to have been obtained by our individual exertions, is a direct testimony to the Intelligence of the Being who implanted it.—So are we led from the very existence of our Moral feelings, to the conception of the existence of attributes, the same in kind, however exalted in degree, in the Divine Being. The sense of Truth implies its actual existence in a being who is Himself its source and centre ; and the longing for a yet higher measure of it, which is experienced in the greatest force by those who have already attained the truest and widest view, is the testimony of our own souls to the Truth of the Divine Nature. The perception of Right, in like manner, leads us to the Absolute lawgiver who implanted it in our constitution ; and, as has been well remarked, “ all the appeals of innocence against unrighteous force are appeals to eternal justice, and all the visions of moral purity are glimpses of the infinite excellence.” The aspirations of the more exalted Moral natures after a yet higher state of holiness and purity (§ 97), can only be satisfied by the contemplation of such perfection as no merely Human being has ever attained ; and it is only in the contemplation of the Divine Ideal that they meet their

appropriate object. And the sentiment of Beauty, especially as it rises from the *material* to the *spiritual*, passes beyond the noblest creations of Art and the most perfect realization of it in the outward life, and soars into the region of the Unseen, where alone the Imagination can freely expand itself in the contemplation of such beauty as no objective representation can embody.—And it is by combining, so far as our capacity will admit, the ideas which we thus derive from reflection upon the facts of our own consciousness, with those which we draw from the contemplation of the Universe around us, that we form the justest conception of the Divine Being of which our finite minds are capable. We are led to conceive of Him as the absolute, unchangeable, self-existent,—infinite in duration,—illimitable in space,—the highest ideal of Truth, Right, and Beauty,—the all-Powerful source of that agency which we recognize in the phenomena of Nature,—the all-Wise designer of that wondrous plan, whose original perfection is the real source of the uniformity and harmony which we recognise in its operation,—the all-Benevolent contriver of the happiness of His sentient creatures,—the all-Just disposer of events in the Moral world, for the evolution of the ultimate ends for which Man was called into existence. In proportion to the elevation of our own spiritual nature, and the harmonious development of its several tendencies, will be the elevation and harmoniousness of our conception of the Divine; and in proportion, more particularly, as we succeed in raising ourselves towards that ideal of perfection which has been graciously presented to us in the “well-beloved Son of God,” are the relations of the Divine Nature to our own *felt* to be more intimate. And it is from the consciousness of our relation to God, as His creatures, as His children, and as independent but responsible fellow-workers with Him in accomplishing His great purposes, that all those ideas and sentiments arise, which are designated as Religious, and which constitute that most exalted portion of our nature.

214. The pervading consciousness of that relation expresses itself in the notion of *Duty*; which attaches itself to every action as to which the Ego may believe that the Divine Will has been expressed. But the dictates of this sense will vary with the ideas entertained respecting the Divine character and requirements; and actions may be sincerely regarded as an acceptable sacrifice by one class of religionists, which are loathed as barbarous and detestable by another. Moreover, the difficulty which attends the determination of what is Morally right (§ 210), often occurs in regard to Religious duty; each of two or more possible modes of action being recommended by its conformity to the Divine law on certain points, whilst it seems opposed to it on others.

Thus if a man who might be urged to conceal a Political refugee in immediate danger of capture, were to refuse to do so merely on the fear of unpleasant consequences to himself, he would be justly branded with the character of a cold-hearted coward; but if his refusal should proceed from the conviction that the Divine Law requires the preference of rigid Truthfulness over every other motive, and that, by concealing the suppliant, he should be forced into a violation of that law, he cannot be blamed even by those who believe that the Law of Compassion "written upon our hearts" is at least equally imperative.—Similar difficulties beset the upholders of the non-resistance creed, which teaches that *love* is the all-powerful principle in the Moral world, and that it should entirely supersede all those lower impulses of our nature which lead us to oppose force to force, and to resist an unjust and unprovoked assault. Here, again, we might readily understand and sympathise-with those, who consider that the fear of personal suffering does not warrant our doing a severe injury to another in warding-off a threatened attack; but when the question comes to be, not of *self*-defence, but of protection to *others* who are helpless dependents upon our succour, and who are bound to us by the closest ties of natural affection, we feel that the comparative nobility of the latter motive warrants actions which our individual peril might scarcely justify.

215. But as in Morals, so in Religion, does it become increasingly

obvious, that the more elevated are the ideas of Mankind in regard to the character and will of the Deity, the more do they approach to a general accordance in regard to what constitutes Religious duty ; and the complete coincidence which is thus found to exist between the dictates of the Christian law and the highest principles of pure Morality, should prevent one set of motives from ever coming into antagonism with the other.—The *Conscience* of the religious man, indeed, may be said to be the *resultant* of the combination of his Moral sense with the idea of Duty which arises out of his sense of relation to the Deity. With the former are closely associated all those emotions and dispositions, which render him considerate of the welfare of his fellow-men, as of his own ; and with the notion of duty to God are closely united the desire of His favour, the fear of His displeasure, the aspiration after His perfection, all which act like other motives in deciding the Will. Their relative force on any occasion, as compared with that of the lower propensities and sensual desires, greatly depends on the degree in which they are *habitually* brought to influence the mind ; and it is in its power of fixing the attention on those higher considerations which ought to be paramount to all others, and of withdrawing it from the lower, that the Will has the chief influence in the direction of the conduct according to the dictates of virtue (Chap. IX.).

SECTION 2.—*Succession of Ideas :—Laws of Thought.*

216. The conscious Mind, when not engrossed in Sensational or Perceptive acts, is incessantly occupied in *thinking*, with or without the accompaniment of *feeling* ; its whole inner life being a *succession of ideas and emotions*, only suspended by Sleep and Death, or interrupted by the concentration of its attention on Sense-impressions. Now whatever difference of opinion there may be in regard to the degree in which the ordinary Laws of Causation are applicable to Mental phenomena (in other words, as to how far

each state of consciousness may be considered as *determined* by its antecedents), all are agreed that there *are* certain "Laws of Thought," expressive of the *uniformities of succession* which are observable in Mankind in general; whilst there are others which are characteristic of Races and Individuals; arising either from peculiarities in *original* constitution, or from the special direction which its congenital activities have acquired, or from both combined. It is not so much, however, the presence or absence of particular attributes, as their *proportional development*, that differentiate Minds from one another; and it is the habitual predominance (whether original or acquired) of particular *sequences of thought and feeling*, determined by that proportion, which constitutes the Character of each race or individual. Thus we find the *Intellectual* character to consist in the predominance of certain Faculties, which, as we shall presently see, are only designations of particular *modes* of intellectual activity; and a knowledge of these enables us to predicate, to a certain extent, the nature of the result at which any individual Mind will arrive, by its exercise upon a given subject previously thought-out by others. So, again, the *Moral* character will depend upon the relative predominance which may exist in the individual nature, of those Emotional tendencies, which not merely furnish a large share of the governing motives of the conduct, but which also contribute in a very important measure to the habitual direction of the thoughts: and in proportion to the completeness of our knowledge of the Moral character of any individual, will be our power of predicting the manner in which he will act under any particular contingency.

217. But these *uniformities of succession* are predicable only of the *automatic* activity of the Mind: and our own consciousness tells us that there is something in our Psychological nature, which is beyond and above this automatic exercise of our powers; and that the direction of our thoughts is placed, within certain limits, under

the control of the Will (§ 25). These limits, like those of the automatic activities, are partly universal, and partly peculiar to the individual. It is a universal fact that the Will *cannot originate* anything; but that it *has* a power of *selecting* any one out of several objects that present themselves either simultaneously or successively before the mental vision, and of so *limiting* and *intensifying* the impression which that particular object makes upon the consciousness, that all others shall be (for the time) non-existent to it. On the other hand, the *degree* in which this Volitional power is possessed by different individuals, is subject to wide variation. In some it is weak from the beginning, and no training seems effectual in developing it to a degree of full efficiency. In others it shows itself very early in a "masterful" disposition, which aims to bring *others* under subjection to itself; and here the aim of the Educator should be to cultivate *self-mastery*, by showing how much nobler is "he that ruleth his spirit, than he that taketh a city." It often happens, however, that strong *passions* are mistaken for strong *Will*; and that an entirely wrong method of discipline is adopted with a view to "break the Child's will," when what is really needed is to *direct* its Mental action aright (§ 120). Not unfrequently a strong Volitional power originally exists, but lies dormant for want of being called into exercise (§ 8); and here it is that judicious training can work its greatest wonders.

218. *Laws of Association*.—The most powerful agency in the automatic determination of the succession of our Mental states, is undoubtedly that tendency which exists in all minds that have attained the ideational stage of development, to the *association of ideas*; that is, to the formation of such a connection between two or more Ideas, that the presence of one tends to bring the other also before the consciousness,—or, in other words, that the one *suggests* the other. Certain Laws of Association, expressive of the conditions under which this connection is formed, and the

mode in which it acts, have been formularized by Psychologists ; * of these the most important will be now specified.

219. Two or more states of consciousness, habitually existing together or in immediate succession, tend to cohere, so that the future occurrence of any one of them restores or revives the other ; this is designated the *law of contiguity*. It is thus (to take a simple illustration) that the impressions made upon our Sensational consciousness by natural objects, which are usually received through two or more senses at once, become compacted into those composite notions, which, however simple they may appear, really result from the intimate combination of many distinct states of ideation. Thus our notion of the *form* of an object is made-up of separate notions derived from the visual and muscular senses respectively ; our notion of the character of its *surface*, from the combination of impressions received through the visual and tactile senses ; and with both of these our notion of *colour*, as in the case of an orange, may be so blended, that we do not readily conceive of its characteristic form and surface, without also having before our minds the hue with which these have been always associated in our experience. So, again, the external aspect of a body suggests to our minds its internal arrangement and qualities, such as we have before found them invariably to be ; thus, to use the preceding illustration, the shape and colour of the orange bring before our consciousness its fragrant odour and agreeable taste, as well as the internal structure of the fruit. And our idea of “an orange” must be considered as the aggregate of all the preceding notions.—Not only the different ideas excited by one object, but those called-up by objects entirely dissimilar, may thus come to be associated, provided that the mind has been accustomed

* In the writings of Prof. Bain will be found the fullest and ablest exposition yet given of the Laws of Association, with copious illustrations of their operation drawn from a great variety of Mental phenomena, by which the Writer has profited in the outline here given.

to the presentation of them in frequent contiguity one with the other. Such conjunctions may be natural, that is, they may arise out of the "order of nature;" or they may be artificial, being due to human arrangements; all that is requisite is, that they should have sufficient permanence and constancy to habituate our minds to the association.—Of this Law of Contiguity, moreover, we have a most important example in the association which the mind early learns to form between successive *events*, so that when the first has been followed by the second a sufficient number of times to form the association, the occurrence of the first suggests the *idea* of the second; if that idea be verified by its occurrence, a definite *expectation* is formed; and if that expectation be un-faillingly realized, the idea acquires the strength of a *belief*. And thus it is that we come to acquire that part of the notion of "cause and effect," which rests upon the "invariability of sequence;" and to form our fundamental conception of the "uniformity of nature" (§ 199, v). It is by the same kind of operation, again, that we come to employ Words as the symbols of ideas, for the convenience of intercommunication and reference (§ 198); a certain number of repetitions of the sound, concurrently with the sight of the object, or the suggestion of the notion of that object, being sufficient to establish the required relation in our minds.—Of the large share which this kind of action has in the operations of Memory and Recollection, evidence will be hereafter given (Chap. X).

220. But a not less important *tendency of thought*, and one whose operation is even more concerned in all the higher exercises of our Reason, is that which may be designated the *law of similarity*; and which expresses the general fact that any present state of consciousness tends to revive previous states which are *similar* to it. It is thus that we instinctively invest a new object with the attributes we have come to recognise in one we have previously examined, if the new object bears such a resemblance to it, that the sight of the second suggests those ideas which

our minds have connected with the first. Thus, we will suppose a man to have once seen and eaten an orange; when he sees an orange a second time, although it may be somewhat larger or smaller, somewhat rougher or smoother, somewhat lighter or darker in hue, he recognizes it as "an orange," and mentally assigns to it the fragrance and sweetish acidity of the one which he had previously eaten. But if, instead of being yellow, the fruit were green, he would doubt its being an orange; and if assured that it still was, but had not come to maturity, he would no longer expect to find it sweet; the notion of acidity being suggested to his mind by his previous experience of other green and unripe fruit.—It is in virtue of this kind of action, that we extend those elementary notions which are primarily excited by sensation, to new objects. Thus, the idea of roundness (like other notions of form) is originally based on the combination of the tactile and visual sensations, and must be first acquired by a process of considerable complexity; but when once derived from the examination of a single object, it is readily extended to other objects of the same character.—So, again, it is by the operation of this mental tendency, that we recognize similarity where it exists in the midst of difference, and separate the points of agreement from those of discordance; and this, again, not merely as regards objects which are before our consciousness at the same time or in close succession, but also with regard to all past states of consciousness. It is thus that we *identify* and *compare*, that we lay the foundations of classification, and that we recover all past impressions which have anything in common with our present state of consciousness.—The intensity of this tendency, and the habitual direction which it takes, vary extremely in different individuals. Some have so great an incapacity for recognizing *similarity*, that they can only perceive it when it is in marked prominence, their minds taking much stronger note of *differences*; whilst others have a strong bias for the detection of resemblances and analogies, and discover them

where ordinary minds cannot recognize them. Some, again, address themselves to the discovery of similarity among objects of sense, whilst others study only those ideas which are the objects of our internal consciousness; and it is in the detection of what is essentially similar among the latter, that all the higher operations of the Intellect essentially consist. Even here we find that some are contented with superficial analogies, whilst others are not satisfied until they have penetrated by analysis to the depths of the subject, and are able to compare its "fundamental idea" with others of like kind.—It may be remarked that this mode of action of the mind is in some degree opposed to the preceding; for whilst *contiguity* leads to the arranging of ideas as they happen to present themselves in actual juxtaposition, and thus to induce a routine which is often most unmeaning (§ 285), *similarity* breaks through juxtaposition, and brings together from all quarters objects which have an Ideational likeness.

221, It is this habit of mind, which is of essential value in all the sciences of *classification* and *induction*. Thus, in the formation of generic definitions to include the characters which a number of objects have in common, their subordinate or specific differences being for a time left out of view, we are entirely guided by the recognition of similarity between the objects we are arranging; and the same is the case in the formation of all the higher groups of Families, Orders, and Classes, the points of similarity becoming fewer and fewer as we proceed to the more comprehensive groups, whilst those of difference increase in corresponding proportion. The sagacity of the Naturalist is shown in the selection of the *best* points of resemblance, as the foundation of his Classification; the value of characters being determined, on the one hand by their constancy, and on the other by their degree of coincidence with important features of general organization or of physiological history.—In the determination of Physical laws by the process of Induction, the process is somewhat of the same kind; but the

similarities with which we have here to do, are not, as in the preceding case, objective resemblances, but exist only among our subjective ideas of the *nature* and *causes* of the phenomena brought under our consideration. Thus, there is no obvious relation between the fall of a stone to the Earth, and the motion of the Moon in an elliptical orbit around it ; but the penetrating mind of Newton detected a relation of *common causation* between these two phenomena, which enabled him to express them both under one Law. It was by a like Intellectual perception of similarity, that Franklin was led to determine the identity of lightning with the spark from an electrical machine. And it would be easy to show that it has been in their extraordinary development of this power of recognizing *causative* similarity, leading to a kind of intuitive perception of its existence, where no adequate ground could be assigned by the Reason for such a relationship, that those men have been eminent, who have done the most to advance Science by the process of inductive generalization.

222. The same kind of Mental activity is also exercised in the contrary direction : namely, in that application of general laws to particular instances, which constitutes *deductive reasoning* ; and in that extension of generic definitions to new objects, which takes place upon every discovery of a new species. We may trace it, again, even in the extension of the meaning of words so as to become applicable to new orders of ideas, in consequence of the resemblances felt to exist between the latter and the ideas of which the words were previously the symbols ;—as in the application of the word “head,” which primarily designated the most elevated part of the human body, in such phrases as the “head of a house,” the “head of a state,” the “head of an army,” the “head of a mob,” in each of which the idea of superiority and command is involved ;—or in the phrases the “heads of a discourse,” or the “heads of an argument,” in which we still trace the idea of authority or direction ;—or in the phrases the “head of a

table," the "head of a river," in which the idea of superiority or origin comes to be locally applied;—or in the "head of a bed," or "head of a coffin," in which we have the more distinct local association with the position of the head of Man. Of the foregoing applications (the presence of which in Languages of entirely different families indicates their origin in wide spread identities of *modes of thought*), those first cited belong to the nature of a *metaphor*, which has been defined to be "a simile comprised in a word;" and the judicious use of metaphors, which frequently adds force as well as ornamental variety to the diction, is most seen amongst those who possess a great power of bringing together the *like* in the midst of the *unlike*.

223. Every effort, in fact, to trace-out unity, consistency, and harmony, in the midst of the wonderful and (at first sight) perplexing variety of objects and phenomena amidst which we are placed, is a manifestation of this tendency of the Human mind: and, when conducted in accordance with the highest teachings of the intellect, or guided by that insight which in some minds supersedes and anticipates all reasoning, it enables us to rise towards the comprehension of that great Idea of the Universe, which we believe to exist in the Divine Mind in a majestic simplicity of which we can here but faintly conceive, and of which all the phenomena of Nature are but the manifestations to our consciousness.—With this purely Intellectual operation, there is frequently associated a peculiar feeling of *pleasure*, which constitutes a true Emotional state. There are few who devote themselves to the pursuit of Science, who do not experience this pleasure, either from the detection of new relations of similarity by their own perception of them, or in the recognition of them as developed by others. It is, however, much more intense in some minds than in others; and according to its intensity, will it act as a *motive* in the prosecution of the search for Truth amidst discouragements and difficulties. But *all* discoveries of identifica-

tion, where use and wont are suddenly broken through, and a common feature is discerned among objects previously looked-on as entirely different, produce a flash of agreeable *surprise*, and the kind of sparkling cheerfulness that arises from the sudden lightening of the burden. And it is in this, that our enjoyment of *wit* seems essentially to consist (§ 402).

224. Although the single relations established between ideas, either through Contiguity or through Similarity, may suffice for their mutual connection, yet that connection becomes much stronger when two or more such relations exist consentaneously. Thus, if there be present to our minds two states of consciousness, each of them associated, either by contiguity or similarity, with some third state that is past and "out of mind" at the time, the compound action is more effective than either action would be separately; that is, although the suggestions might be separately too weak to revive the past state of consciousness, they reproduce it by acting together. Of this, which has been termed the *law of compound association*, we have examples continually occurring to us in the phenomena of Memory; but it is especially brought into operation in the volitional act of Recollection (§ 372).

225. Another mode in which the Associative tendency operates, is in the formation of aggregate conceptions of things that have never been brought before our consciousness by sense-impressions. This faculty, which has been termed *constructive association*, is the foundation of Imagination (§ 396); and it is exercised in every other mental operation in which we pass from the *known* to the *unknown*. When we attempt to form a conception which shall differ from one that we have already experienced, as a matter of objective reality, by the introduction of only a single new element,—as when we imagine a brick building replaced by one of stone, in every respect similar as to size and form,—we substitute in our minds the idea of stone for that of brick, and associate it by the principle of contiguity with those other ideas,

of which that of the whole building is an aggregate. So, again, if we conceive a known building transferred from its actual site to some other already known to us, we dissociate the existing combinations, and keep-together the ideas which were previously separated, until their contiguity has so intimately united them, that the picture of the supposed combination may present itself to the mind exactly as if it had been a real scene which we had long and familiarly known. By a further extension of the same power, we may conceive the elements to be varied, as well as the mode of their combination; and thus we may bring before our consciousness a *representation* in which no particular has ever been present to our minds under any similar relations, and which is, therefore, entirely new to us *as a whole*, notwithstanding that, when we decompose it into its ultimate elements, we shall find that each of these has been previously before our consciousness. Such a representation, by being continually dwelt-on, may come to have all the force and vividness of one derived from an actual sensory impression; and we can scarcely conceive but that the actual state of the Sensorium itself must be the same in both cases, though this state is induced in the one case by an act of mind, and in the other by objective impressions (§ 100).—A very common *modus operandi* of this “constructive association,” is the realization of a landscape, a figure, or a countenance, from a pictorial representation of it. Every picture *must* be essentially defective in some of the attributes of the original, as, for example, in the representation of the *projection* of objects; and all, therefore, that the picture can do, is to *suggest* to the mind an idea, which it completes for itself by this constructive process, so as to form an aggregate which may or may not bear a resemblance to the original, according to the fidelity of the picture, and the mode in which it acts upon the mind of the individual. Thus, a mere sketch shall convey to one person a much more accurate notion of the object represented, than a more finished picture shall give to another; because from

practice in this kind of mental reconstruction, the former recognizes the true meaning of the sketch, and fills it up in his "mind's eye;" whilst the latter can see little but what is actually before his bodily vision, and interprets as a literal presentation that which was intended merely as a suggestion. And it is now generally admitted, that in all the higher forms of representative Art, the aim should be, *not* to call into exercise the faculty of mere objective *realization*, but to address that higher power of *idealization*, which invests the conception suggested by the representation with attributes more exalted than those actually possessed by the original, yet not inconsistent with them. It depends, however, as much on the mind of the individual addressed, as on that of the Artist himself, whether such conceptions shall be formed; since by those who do not possess this power, the highest work of Art is only appreciated, in so far as it enables them to realize the object which it may represent.

226. Having thus pointed out what may be considered the most elementary forms of Mental action, we shall briefly pass in review those more complex operations which may be regarded as in great part compounded of them. The capacity for performing these is known as the *Intellect* or the *reasoning power*; and the capacities for those various forms of intellectual activity, which it is convenient to distinguish for the sake of making ourselves more fully acquainted with them, are termed "intellectual faculties." It appears to the Writer, however, to be a fundamental error to suppose, that the entire Intellect can be split-up into a certain number of faculties; for each faculty that is distinguished by the Psychologist, expresses nothing else than a *mode of activity* in which the whole power of the Mind may be engaged at once,—just as the whole power of the locomotive steam-engine may be employed in carrying its load forwards or backwards, according to the *direction* given to its action. It is the direction of the attention to *external* objects, for example, that constitutes the "faculty" of obser-

vation ; which is simply that form of activity, in which the Mind is occupied by the Sense-impressions it is receiving, either from a number of sources at once, or from a more limited area, the impressions in the latter case being proportionally intensified (§ 123). On the other hand, it is the direction of our attention to what is passing *within* us,—not merely intensifying the Mental state, but separating and bringing it forward as an object of contemplation,—which is designated as *reflection*, but is more appropriately termed *introspection*. In each of these *the whole Mind* may be so completely engaged, that the two activities cannot go on simultaneously (§ 117). So, again, in that reproduction of past states of consciousness which we term *memory*, and, still more in that volitional recall of them which constitutes *recollection*, we have *the whole mind* at work in certain definite sequences expressed by the “laws of association.”

227. Upon the various Ideational states, which are either directly excited by Sense-impressions, or are reproduced by Memory, and are sequentially connected in “trains of thought” by suggestions arising out of pre-formed associations, all acts of *Reasoning* are founded. These consist, for the most part, in the aggregation and collocation of ideas, the decomposition of complex ideas into more simple ones, and the combination of simple ideas into general expressions ; in which processes are exercised the faculty of *comparison*, by which the relations and connections of ideas are perceived,—that of *abstraction*, by which we mentally isolate from the rest any particular quality of the object of our thought,—and that of *generalization*, by which we recognize the common properties we have abstracted, as composing a distinct notion, that of some *genus* in which the objects are comprehended. These operations, when carefully analyzed, seem capable of reduction to this one expression,—namely, the fixation of our Attention either on some particular *classes of ideas*, from among those which suggestion brings before our consciousness, or on some particular

relations of those ideas ; and this fixation may depend, as already shown, either on the peculiar attractiveness which these ideas or relations have for us (the constitution of individual minds varying greatly in this respect), or on the determination of our own Will. All these faculties are exercised in the act of *judgment* ; which is a summary expression of the entire process—how simple or how complex soever—by which we arrive at a decision either as to the absolute or probable truth or falsehood of any proposition, or as to the moral or prudential bearing of any course of action. —There is strong reason to believe that these processes may be performed *automatically* to a very considerable extent, without any other than a *permissive* act of Will. It is clearly by such automatic action, that the before-mentioned “fundamental axioms” or “secondary intuitions” (§ 199) are evolved ; and there is not one of the operations above described which may not be performed quite involuntarily, especially by an individual who is naturally disposed to it. Thus, to some persons, the tendency to *compare* any new object of consciousness with objects that have been previously before the mind, is so strong as to be almost irresistible ; and this, or any other original tendency, is strengthened by the habit of acting in conformity with it. So, again, the tendency to *abstract* is equally strong in the minds of others, who instinctively seek to separate what is fundamental and essential in the properties of objects, from what is superficial and accidental ; and their attention being most attracted by the former, they readily recognize the same characters elsewhere, and are thus as prone to combine and generalize, as others are to analyse and distinguish.

228. It is only, in fact, when we *intentionally* divert the current of thought from the direction in which it was previously running, —when we *determine* to put our minds in operation in some particular manner,—and make a *choice of means* adapted to our end (as in the act of recollection (§ 370), by *purposely* fixing our attention upon one class of objects to the exclusion of others,—that we can be

said to use the Will in our intellectual processes ; and this exercise of it is shown, by the analysis of our own consciousness, to be less constant than is commonly supposed. Thus we may imagine a man sitting-down at a fixed hour every day, to write a treatise upon a subject which he has previously thought-out : after that first effort of Will by which his determination was made, the daily continuance of his task becomes so habitual to him, that no fresh exertion of it is required to bring him to his desk ; and, unless he feel unfit for his work, or some other object of interest tempt him away from it, so that he is called-upon to decide between contending motives, his will cannot be fairly said to be brought into exercise. It may need, perhaps, some Volitional fixation of his attention upon the topics upon which he had been engaged when he last dropped the thread, to enable him to recover it, so as to commence his new labours in continuity with the preceding ; but when once his mind is fairly engrossed with the subject, this develops itself before his consciousness according to his previous habits of mental action ; ideas follow one another in rapid and continuous succession, clothe themselves in words, and prompt the movements by which those words are expressed in writing ; and this automatic action may continue uninterruptedly for hours (§ 236 a), without any tendency of the mind to wander from its subject, the Will being only called into play when the feeling of fatigue or the distraction of other objects renders it difficult to keep the attention fixed upon that which has previously held it by its own attractive power (§ 315).—The converse of this condition is experienced, when some powerful interest tends to draw-off the attention elsewhere, and the thoughts are found to wander continually from the subject in hand ; or when, from the undue protraction of mental exertion, the physical condition is such, that the thoughts no longer develop themselves consecutively, nor shape themselves into appropriate forms of expression. In either of these cases, the Intellectual powers can only be kept in action upon the

pre-determined subject, by a strong *effort* of the will : of this effort we are conscious at the time, and feel that we need to put forth even a greater power than that which would be required to generate a large amount of physical force through the muscular system ; and we subsequently experience the results of it, in the feeling of excessive *fatigue* which always follows any such exertion.

229. The more carefully the actions of early Childhood are observed, the more obvious does it become that they are solely prompted by ideas and feelings which *automatically* succeed one another, in uncontrolled accordance with the laws of suggestion. This principle has already been referred to (§ 120) ; but the following illustrations of it, which show that a Child very early comes to adapt the expression of its wants, or the communication of its ideas, to the receptivity of the person addressed,—and this not by intention, but in accordance with an *acquired intuition* based on its everyday experience,—may be here appropriately introduced :—

a. Dr. Kitto, whose experience of *entire loss* of the sense of Hearing has formed the subject of a very interesting Autobiography, tells us that his children, in their successive infancies, would begin to imitate the finger-language *whenever they saw him*, even whilst they were yet in arms, and could have had no true cognizance of his peculiar condition.—(*The Lost Senses*, vol. i., p. 97.)

b. The following case, originally recorded by Dr. C. B. Radcliffe, has been found by the subsequent enquiries of the Writer to be one of very common occurrence.—A child of English parents residing in Germany, being under the care of a German nurse, had acquired the power of speaking on ordinary matters either in German or English, without confusing the words or idioms ; but yet seemed invariably compelled to reply in the language used by the person he was addressing. Thus, in conveying a message to his German nurse, he delivered it in German, though he had received it the moment previously in English ; but on returning to the English family in the parlour, if asked what the maid had said, he answered in English as often as the question was proposed in English ; and even though

pressed to give the words he had heard in the nursery, he still continued to do the same, without seeming to be aware of the difference. But if the question was put to him in German, the answer was in German; there being the same inability to reply in English, as there had previously been to give a German answer to the English question.—(*Philosophy of Vital Motion*, p. 137).

c. In another instance known to the Writer, the child of a French father resident in England, and of an English-speaking mother, who was growing-up to speak to his father in French and to his mother in English, was taken by his father to spend the summer in Switzerland, where he never heard anything but French spoken, and for several weeks himself spoke French exclusively. One day, as the father and child were walking together, they met some English friends, who addressed the boy in English, but could get no reply from him, though he answered them at once in French when they spoke to him in that language. The father feared that the boy had already lost his *mother tongue*; but on returning home the lad at once found it again, telling his mother in English of all that had happened to him abroad.

These two cases, though in some respects dissimilar, are obviously referable to the same principle; for the result was determined in each by the automatic action of the Mind, in accordance with the laws of association. In the former case, the language of each answer was suggested by that in which the question was put; whilst in the latter, it was determined in the first instance by the *last acquired* habit, and in the second by the recurrence of the circumstances under which the *original* habit had been formed.

230. Even in the adult, the predominance of the *automatic* activity of the Mind over that which is regulated by the *will*, is often seen as a result of a want of balance between the two; arising either from the excessive *force* of the former, or from the unusual *weakness* of the latter. We have an example of it in the loose rambling talk of persons who have never schooled themselves to the maintenance of a coherent train of thought, but are perpetually "flying off in a tangent,"—sometimes at a mere sensorial suggestion (conveyed

by the sound or the visual conception of a word), sometimes at the prompting of an ideational association of a most irrelevant kind. A most truthful portraiture of a low type of this order of mind is presented in the "Mrs. Nickleby" of Dickens : while, in real life, we have had a most striking exemplification of its most exalted form in Coleridge, whose talk was just as disjointed as Mrs. Nickleby's, though relating to the highest instead of the most trivial subjects. His career, indeed, affords so remarkable a "study" to the Psychologist who takes as his guiding idea the relation between *automatic activity* and *volitional direction*, that the principal features of it will be here brought under review.

231. There was probably no man of his time, or perhaps of any time, who surpassed Coleridge in the combination of the reasoning powers of the Philosopher with the imagination of the Poet and the inspiration of the Seer ; and there was perhaps not one of the last generation, who has left so strong an impress of himself in the subsequent course of thought of reflective minds engaged in the highest subjects of human contemplation. And yet there was probably never a man endowed with such remarkable gifts, who accomplished so little that was worthy of them,—the great defect of his character being the want of Will to turn his gifts to account ; so that, with numerous gigantic projects constantly floating in his mind, he never brought himself even seriously to attempt to execute any one of them. It used to be said of him, that whenever either natural obligation or voluntary undertaking made it his *duty* to do anything, the fact seemed a sufficient reason for his *not* doing it. Thus, at the very outset of his career, when he had found a bookseller (Mr. Cottle) generous enough to promise him thirty guineas for poems which he recited to him, and might have received the whole sum immediately on delivering the manuscript, he went on, week after week, begging and borrowing for his daily needs in the most humiliating manner, until he had drawn from his patron the whole of the promised purchase-money, without supplying

him with a line of that poetry which he had only to *write down* to free himself from obligation.—The habit of recourse to nervine stimulants (alcohol and opium) which he early formed, and from which he never seemed able to free himself, doubtless still further weakened his power of Volitional self-control; so that it became necessary for his welfare, that he should yield himself to the control of others. The character of his Intellect was eminently *speculative*. He tells us, in his “*Biographia Literaria*,” that even before reaching his fifteenth year, he had bewildered himself in metaphysics and theological controversy; that nothing else pleased him; and that, in especial, *history and particular facts had no interest for him*. This complete isolation of his mind from all the *realities* of life, except the friendships to which he was held by personal sympathy, marked his character throughout; what he would himself have called its *subjective* side having so great a predominance, that he seldom seemed to care to bring his ideas to the test of conformity with *objective* facts. All accounts of Coleridge’s habits of thought, as manifested in his conversation (which was a sort of *thinking aloud*), agree in showing that his train of mental operations, once started, went on *of itself*,—sometimes for a long distance in the original direction, sometimes with a divergence into some other track, according to the consecutive suggestions of his own mind, or to new suggestions introduced into it from without.

a. The Writer once heard a very characteristic instance of this, from a gentleman who had obtained an introduction to him when he was domiciled with the Gillmans at Highgate. After presenting his credentials, his visitor expressed a hope that he was better, having heard that he had been ill. “Yes,” said Coleridge, “I am better, but I should be better still if I did not *dream* so much. These subjective states are very curious.” And then he discoursed for two hours continuously on “subject” and “object;” or, as Carlyle graphically tells us, on what “he sang and snuffled into ‘om—m—mject,’ and ‘sum—m—mject,’ with a kind of solemn shake or quaver as he rolled along.”

b. How little he thought of his listeners, when he was once fairly launched, is proved by the following account of his habits, narrated to the Writer by a friend who was a school-girl at Highgate at the time of Coleridge's residence there. Being accustomed to walk every day in the "Grove," at an hour when the girls were at play there, he would sometimes draw one of the children to him, and begin by caressing and coaxing her to talk to him; but very soon the conversation would pass into the accustomed monologue, altogether beyond the comprehension of the poor child, who was like the "wedding-guest" under the spell of the "ancient mariner," vainly endeavouring to free herself that she might resume her sport. Thus "old Coley," as the school-girls irreverently nicknamed him, became the terror of the children of the neighbourhood, who learned sedulously to keep out of his way.

c. Charles Lamb's story of his having cut off the button by which Coleridge was holding him one morning, when he was going in to London by the Enfield stage; of his leaving Coleridge in full talk, with the button in one hand, and sawing the air with the other; and of his finding him discoursing in exactly the same attitude when he came back to Enfield in the afternoon,—is, of course, a ludicrous exaggeration; but it conveys, like other "myths," a true idea of the degree in which Coleridge was habitually "possessed" by the train of thought that happened to be passing through his mind at the time.

In fact, Coleridge's whole life might almost be regarded as a sort of waking dream. The composition of the poetical fragment "Kubla Khan" *in his sleep*, as told in his "Biographia Literaria," is a typical example of automatic mental action.

d. He fell asleep whilst reading the passage in "Purchas's Pilgrimage" in which the "stately pleasure-house" is mentioned; and, on awaking, he felt as if he had composed from two to three hundred lines, which he had nothing to do but to write down, "the images rising up as things, with a parallel production of the correspondent expressions, without any sensation or consciousness of effort." The whole of this singular fragment, as it stands, consisting of fifty-four lines, was written as fast as his pen could trace the words; but having been interrupted by a person on business, who stayed with him above an

hour, he found, to his surprise and mortification, that, "though he still retained some vague and dim recollection of the general purport of the vision, yet, with the exception of some eight or ten scattered lines and images, all the rest had passed away, like the images on the surface of a stream into which a stone had been cast; but, alas! without the after-restoration of the latter."

In the wonderfully graphic description of Coleridge's appearance and style of discourse, given by Carlyle ("Life of John Sterling," Chap. VIII.), it is necessary to bear in mind the essential difference, one might almost say the contrariety, between the characters of the "subject" and his pourtrayer: the "history and particular facts" which had "no interest" for the one, being the favourite mental food for the other; while the purely speculative problems in which Coleridge delighted (parodied by his friend Charles Lamb, in the question "How many angels can dance on the point of one needle?"), would have been regarded by Carlyle as altogether futile.

e. "Coleridge's whole figure and air," says Carlyle, "good and amiable otherwise, might be called flabby and irresolute; expressive of weakness under possibility of strength. He hung loosely on his limbs, with knees bent, and stooping attitude. In walking he rather shuffled than decisively stepped; and a lady once remarked he never could fix which side of the garden-walk would suit him best, but continually shifted in corkscrew fashion, and kept trying both.

"Nothing could be more copious than his talk; and, furthermore, it was always virtually or literally of the nature of a monologue; suffering no interruption, however reverent; hastily putting aside all foreign additions, annotations, or most ingenuous desires for elucidation, as well-meant superfluities which would never do. Besides, it was talk not flowing any whither like a river, but spreading every whither in inextricable currents and regurgitations like a lake or sea; terribly deficient in definite goal or aim—nay, often in logical intelligibility; *what* you were to believe or do, on any earthly or heavenly thing, obstinately refusing to appear from it. So that, most times, you felt logically lost, swamped, near to

drowning, in this tide of ingenious vocables, spreading out boundless as if to submerge the world.

“He began anywhere. You put some question to him, made some suggestive observation; instead of answering this, or decidedly setting out towards answering it, he would accumulate formidable apparatus, logical-swim bladders, transcendental life-preservers, and other precautionary and vehiculatory gear, for setting out; perhaps did at last get under weigh, but was swiftly solicited, turned aside by the glance of some radiant new game on this hand or that, into new courses, and ever into new, and before long into all the universe, where it was uncertain what game you would catch, or whether any. His talk, alas! was distinguished, like himself, by irresolution; it disliked to be troubled with conditions, abstinences, definite fulfillments; loved to wander at its own sweet will, and make its auditor and his claims and humble wishes a mere passive bucket for itself.

“Glorious islets, too—balmy, sunny islets—islets of the blest and the intelligible! I have seen rise out of the haze, but they were few, and soon swallowed in the general element again.

“Eloquent, artistically expressive words you always had; piercing radiances of a most subtle insight came at intervals; tones of noble pious sympathy, recognisable as pious, though strangely coloured, were never wanting long; but, in general, you could not call this aimless, cloud-capt, cloud-based, lawlessly meandering human discourse of reason by the name of ‘excellent talk,’ but only of ‘surprising;’ and were reminded bitterly of Hazlitt’s account of it: ‘Excellent talker, very—if you let him start from no premises, and come to no conclusion.’”

It was by the brilliance and subtlety of those occasional flashes of thought which Carlyle designates as “islets of the blest and the intelligible,” and by the profound suggestiveness of those fragmentary writings which constitute all he ever executed of his colossal project of a system of Mental Philosophy in its widest meaning, that Coleridge exerted that influence over the thinkers of the succeeding generation, which no one acquainted with its Intellectual history can question.

232. So, again, the artistic life of Mozart, from his infancy to his

death, presents a typical example of the spontaneous or automatic production of Musical conceptions ; which, under the skilful training he received from his father, developed themselves into creations of the very highest order, whose number, considering the early age at which he died (less than thirty-six years) is nothing less than marvellous. In fact, whether we estimate Mozart by the spontaneity, the productiveness, or the variety of his inventive power, as attested by the multitude of those "things of beauty" he called into existence, every one of which will be "a joy for ever,"—or by that wonderful divining faculty which enabled him, as a *boy*, to anticipate almost everything that was then known in Music, and as a *man*, to advance, in every style he took up, far beyond his greatest predecessors in each department,—or by the permanent impress he has left upon his Art, not merely in furnishing the most perfect models for the study of those who especially cultivate it, but in elevating that general appreciation of the highest order of beauty, which only the works of a consummate Artist can call forth,—Mozart certainly stands alone among Musicians, and deserves to rank as a typical example of *genius*. Mozart, like Coleridge was a man whose Will was weak in proportion to the automatic activity of his mind ; and it is probable that if he had not been under the guidance, in the first instance, of a judicious father, and afterwards of an excellent wife, to both of whom he had the good sense to submit himself, his career would have been comparatively inglorious. For his lively sensibility made him the sport of every kind of impulse, so that he could neither keep firm to a resolution, nor resist a temptation : and hence he would never of his own accord have subjected himself to the discipline which his father imposed upon him, and without which he could not have been anything else than a "musical prodigy ;" nor would he have had the motive which his conjugal affection supplied, for the steady application that was required for the elaboration of his greatest works. Hence his life becomes a most interesting study to the

Psychologist, no less than to the Musician. Of the general features of his career, a sketch has already been given (§ 206); we shall now endeavour to trace-out the manner in which he worked; and of this we fortunately have a pretty full account from himself, in a letter to a friend:—

“ You say you should like to know my way of composing, and what method I follow in writing works of some extent. I can really say no more on the subject than the following, for I myself know no more about it, and cannot account for it. When I am, as it were, completely myself, entirely alone, and of good cheer, say, travelling in a carriage, or walking after a good meal, or during the night when I cannot sleep; it is on such occasions that my ideas flow best and most abundantly. *Whence* and *how* they come, I know not, nor can I force them. Those ideas that please me I retain in my memory, and am accustomed (as I have been told) to hum them to myself. If I continue in this way, it soon occurs to me how I may turn this or that *morceau* to account, so as to make a good dish of it, that is to say, agreeably to the rules of counterpoint, to the peculiarities of the various instruments, &c.

“ All this fires my soul, and, provided I am not disturbed, my subject enlarges itself, becomes methodised and defined, and the whole, though it be long, *stands almost complete and finished in my mind*, so that I can survey it like a fine picture, or a beautiful statue, at a glance. Nor do I hear in my imagination the parts *successively*, but I hear them, as it were, all at once (*gleich alles zusammen*). What a delight this is, I cannot tell! All this inventing, this pondering, takes place in a pleasing lively dream. Still the actual hearing of the *tout ensemble* is after all the best. What has been thus produced I do not easily forget, and this is perhaps the best gift I have my Divine Maker to thank for.

“ When I proceed to write down my ideas, I take out of the bag of my memory, if I may use that phrase, what has previously been collected into it in the way I have mentioned. For this reason, the committing to paper is done easily enough; for everything is, as I said before, already finished; and it rarely differs on paper from what it was in my imagination. At this occupation I can therefore suffer myself to be disturbed; for whatever may be going on around me, I

write and even talk, but only of fowls and geese, or of Gretel or Barbel or some such matters.* But why my productions take from my hand that particular form and style that makes them *Mozartish*, and different from the works of other composers, is probably owing to the same cause which renders my nose so, or so large, so aquiline, or in short, makes it Mozart's, and different from that of other people. For I really do not study or aim at any originality; I should in fact not be able to describe in what mine consists, though I think it quite natural that persons who have really an individual appearance of their own, are also differently organised from others, both externally and internally. At least I know that I have not constituted myself, either one way or the other."—(Holmes's *Life of Mozart*, p. 318.)

An interesting pendant to this remarkable self-analysis is supplied by Mozart's answer to the question asked him by a lad of twelve

* The story of the production of the Overture to "Don Giovanni" affords so admirable an illustration of the above description, that, though often told, it ought not to be omitted here:—On the very evening before the first performance of this Opera, not a note of the Overture had been written; and Mozart was giving himself up to social enjoyment at the house of Dussek, for whose wife (a finished singer) he had been that day composing a highly scientific scena, peculiarly suited to her style. About midnight he retired to his apartment, desiring his wife to make him some punch, and to stay with him to keep him awake while he wrote. She accordingly began to tell him fairy tales and odd stories, which made him laugh till the tears came. The punch, however, occasioned such a drowsiness, that he could only go on while his wife was talking; as soon as she ceased, he dropped asleep. The efforts which he made to keep himself awake, the continual alternation of sleep and watching, so fatigued him, that his wife persuaded him to take some rest, promising to awake him in an hour's time; but he slept so profoundly, that she suffered him to repose for two hours. At five in the morning she awoke him; and by seven o'clock, the hour at which he had appointed the music-copyists to come to him, the Overture was finished. The commencement of the evening performance was delayed, because the copyists had not completed their work; and the parts were brought into the orchestra with the notes still covered with the sand which had been used to dry up the ink.—Of course the Overture had to be performed without any rehearsal; and Mr. Holmes thinks it not unlikely that this *tour de force* was intended by Mozart as a compliment to the Prague Orchestra. It is clear that the Overture must have previously *evolved itself in all its completeness* in his creative imagination; since the mere writing it down must have engrossed the whole of the time within which it was committed to paper. As a mere feat of Memory, its production was therefore most marvellous; to say nothing of the transcendent merits of the work itself, which none but a Mozart could have produced.

years old, who already played the pianoforte very skilfully. "Herr Kapellmeister, I should very much like to compose something. How am I to begin?" "Pho-pho," said Mozart, "you must wait." "You," said the boy, "composed much earlier." "But," replied Mozart, "I asked nothing about it. If one has the spirit of a composer, *one writes because one cannot help it.*"—What can be a better description of the exuberant automatic activity of his Musical faculty? When he was "in the vein" for composition, it was difficult to tear him from his desk; and when he was in the mood to improvise upon the pianoforte, either alone or in the society of a friend, sitting down to the instrument in the evening, he commonly pursued the train of his musical thoughts till long after midnight.

That, notwithstanding the exuberance of his own creative power, Mozart constantly disciplined it by the most sedulous study, and that he could, without being chargeable with imitation, *assimilate* (so to speak) into his own Musical constitution all that he found suitable in the works of others as *pabulum* for his genius, is one of its most remarkable features. "It is a very great error," he wrote to a friend, "to suppose that my art has become so exceedingly easy to me. I assure you there is scarcely any one who has worked at the study of composition as I have. You could hardly mention any famous composer, whose writings I have not diligently and repeatedly studied throughout." And, in this self-education, as Mr. Holmes remarks, "whatever of striking, new, or beautiful he met with in the works of others, left its impression on him; and he often reproduced these effects, not servilely, but mingling his own nature and feeling with them, in a manner not less surprising than delightful." Thus no musician more thoroughly appreciated, than did Mozart, the surpassing greatness, in his own particular walk, of Handel. "Handel," he said, "understands effects better than any of us; when he chooses, he strikes like a thunderbolt." Mozart's "additional accompaniments" to the "Messiah" show how thoroughly impregnated he had become with the *feeling* which pervades that immortal work; so as to be able to fill up,—with the rich colouring of an instrumentation, and with the telling effects of harmonies, that Handel could not have devised,—the grand outlines traced by the Master's hand, in such a manner that none but a pedant could take exception to difference of style. Let any competent

listener compare the effect produced on his own Musical sense by that wonderful song, "The people that walked in darkness," as accompanied *with* and *without* the wind-instrument parts added by Mozart; and he must acknowledge how admirably they carry out the "groping" sentiment of the air itself, which in Handel's score is merely repeated in octaves by the stringed instruments. It would seem as if Mozart had made this air (as it were) *a part of himself*, and that these accompaniments then *evolved themselves* in what was to him its most natural form of complete expression.

Only second to Mozart's creative genius, was his *executive skill*; which enabled him to render his own Musical ideas, and to express his own feelings, on the pianoforte, in a way which, by the judgment of his ablest contemporaries, it would be impossible even now to surpass. The testimony of Haydn, in particular, who was a frequent guest at the parties at which Mozart was wont to introduce his new compositions to his friends, and who constantly showed the most cordial appreciation of the genius of one whom less disinterested men depreciated as a dangerous rival, is singularly emphatic. "Mozart's playing," he said, "I can never forget." Doubtless, this executive skill was partly due to the early and excellent training he received from his father; and was partly the result of the animating influence of the genius which thus found expression. But looking to the fact of no unfrequent occurrence in every department of invention, that genius has often to *struggle* for its expression, and looking also to the peculiar *mobility* of Mozart's physical constitution, which showed itself in a variety of ways, it can scarcely be doubted that his was a case in which there was that complete harmony between his bodily and his mental organisation, which enables each to minister in the highest degree to the requirements of the other.—If the self-discipline which Mozart so admirably exercised in the culture of his Musical gifts, had been carried into his Moral nature, so as to restrain the impulses of his ardent temperament within due bounds, and to prevent him from consuming the energy of his frail body in the

pursuit of exhausting pleasures, the world might have profited by a still higher development of his genius, and a still larger bequest of treasures of pure and elevated enjoyment.

233. It may be well to contrast with these examples, two others drawn from the careers of men by whom inferior endowments were turned to their best account, under the direction of a steady Will. Coleridge's brother-in-law, Southey, was as honourably distinguished by his strong sense of duty, and strict fidelity to his engagements and resolutions, as Coleridge himself was lamentably notorious for the reverse. Although few of Southey's poems may retain a lasting celebrity, yet his prose writings will always be models of excellence in composition ; and he had his powers under such complete command, that he never failed (save from physical incapacity) to perform those promises which are too often made by men of genius "only to be broken," and never shrank from what he felt to be a task of disagreeable drudgery, when once he had undertaken it. And it is specially worthy of note, that even his poetic faculty seemed to be so far under his command, that he could fix how many lines he should write per day, so as to complete a poem of a given length within a specified time. Though poetry of the *highest* eminence cannot be thus "made to order," few in Southey's day could have produced what would have equalled his, either in opulence of imagination, or in splendour and appropriateness of diction. "His mind," it has been said, "although a teeming, was not an inventive or creative one. It returned manifold the seed deposited in it, but communicated to it comparatively little of any new nature or quality." What his poetry wanted, was the true vitality of the *mens divini*or ; and this it was not in Southey's nature to impart.

234. The contrast between Haydn and Mozart, as regards both their artistic genius and their personal character, is scarcely less striking. Haydn's musical ability, like Mozart's, manifested itself in childhood ; but it received a far less complete training. Being

early thrown, however, in a great degree upon his own resources, he displayed that steadiness of purpose which mainly contributed to his subsequent distinction, in acquiring from books, and from such chance instruction as he could obtain, the theoretical knowledge which he felt that he needed for succeeding as a Composer. By giving a few lessons in music, and occasionally performing in the orchestra, he managed to supply himself with what, frugally husbanded, served to provide him with absolute necessaries, and to enable him to maintain a decent appearance; and having thus gradually acquired a reputation as an able Musician, at the age of twenty-nine (before attaining which Mozart had produced some of his master-pieces), he was appointed Maestro di Capella to Prince Esterhazy, in whose service he remained to the end of his long life of seventy-seven years.

a. Comfortably settled in the palace of Eisenstadt, in Hungary, enjoying in moderation his favourite diversions of hunting and fishing, and relieved from care for the future, Haydn there composed the long series of works in various styles which he produced before his visit to London at nearly sixty years of age; which visit was the immediate occasion of his bringing out his "Twelve Grand Symphonies," and indirectly (by the impression which his hearing of Handel's music made upon him) prompted the composition of the "Creation," which he produced in his sixty-fifth year. During the whole period of his residence with Prince Esterhazy, he may be said to have been educating himself, under peculiar advantages, for those great works of his advanced life, on which his reputation now chiefly rests. He had a full and choice band living under the same roof with him, at his command every hour in the day; he had only to order, and they were ready to try the effect of any piece, or even of any passage, which, quietly seated in his study, he might commit to paper. Thus at leisure he heard, corrected, and refined whatever he conceived; and never sent forth his compositions, until they were in a state to fearlessly challenge criticism.

There can be no question of Haydn's inferiority to Mozart in *creative* power; but the steadiness of his application to his art,

and the advantage he possessed in being constantly able to test his productions by actual trial, enabled him ultimately to attain a place among the first of modern Musicians, which Mozart had reached at a bound. He did not possess enough of the emotional temperament to succeed in dramatic composition ; and his Operas have been long forgotten. But his *forte* lay in the *development* of musical ideas, and in the *construction* of elaborate Orchestral combinations; so that he is commonly regarded as "the father of modern orchestral music." As already pointed out (§ 206), however, Mozart is fully entitled to share in this distinction; his marvellous *intuition* having directly led him to anticipate many of those effects, which Haydn was engaged in elaborating by successive steps. It is worthy of note, as showing the different temperaments of these two illustrious contemporaries, that while Mozart's musical ideas were almost always in free flow (§ 400)—their character changing with the mood in which he happened to be—those of Haydn seemed only to come when he *set himself* to compose, which he usually did at a fixed hour every day, in this respect strongly resembling Southey.

b. It is related of him that, when he sat down to compose, he always dressed himself with the utmost care, had his hair nicely powdered, and put on his best suit. Frederick II. had given him a diamond ring; and Haydn declared that, if he happened to begin without it, he could not summon a single idea. He could write only on the finest paper; and was as particular in forming his notes, as if he had been engraving them on copper-plate. After all these minute preparations, he began by choosing the theme of his subject, and fixing into what keys he wished to modulate it; and he varied, as it were, the action of his subject, by imagining to himself the incidents of some little adventure or romance.—Haydn had strong religious feeling; and when, in composing, he found his imagination at fault, or was stopped by some difficulty which appeared insurmountable, he rose from the pianoforte and began to run over his rosary, and was accustomed to say that he never found this method fail.

This last fact is a "pregnant instance" of the principle of action which we shall hereafter have to consider (Chap. XIII.);—that, namely, of the working of a mechanism *beneath the consciousness*, which, when once set going, runs on of itself; and which is more likely to evolve the desiderated result, when the *conscious* activity of the mind is exerted in a *direction altogether different*.

SECTION 3.—*Ideomotor Action.*

235. Although it has been usual to designate by the term *voluntary* all those muscular movements which take-place as the result of mental operations, save when they are the expression of *emotional* states, yet a careful analysis of the sources from which many of even our ordinary actions proceed, will show that the Will has no direct participation in producing them; and that they are, psychologically speaking, the direct manifestations of Ideational states excited to a certain measure of intensity, or, in physiological language, *reflex actions of the Cerebrum*. This mode of operation has been already shown (§§ 94—111) not only to be fully conformable to the general plan of the activity of the Nervous system, but even to complete or fill-up a part of it which would otherwise be left void; and we shall find that it takes account of a great number of phenomena which had not previously been included under any general category, and which, when thus combined and generalized, form a most interesting and remarkable group, well deserving of attentive study.—It is, of course, when the Intellect is in a state of exalted (though it may be aberrant) activity, but when the directing power of the Will is suspended or weakened, that we should expect to see the most remarkable manifestations of this "reflex" power of the Cerebrum; and such is the condition of the Somnambulist who *acts* his dreams (§ 492), and of the Biologized subject who *acts* his reverie (§ 451). In

each case, the mind is "possessed" by a succession of Ideas, which may either be spontaneously evolved by its own operations, or may be directly suggested through the senses, or may be the products of associative action called forth by the promptings which it receives from without. In whatever mode the Ideas have been generated, it is the essential characteristic of these states, that the mind is *entirely given-up* to whatever may happen to be before it at the time; which consequently exerts an uncontrolled directing power over the actions, there being no antagonistic agency to keep it in check.

236. We may range under the same category all those actions performed by us in *our ordinary course of life*, which are rather the automatic expressions of the ideas that may be dominant in our minds at the time, than prompted by distinct volitional efforts (§ 228). Of this kind, the act of expressing the thoughts in Language, whether by speech or by writing, may be considered as a good example: for the attention may be so completely given-up to the choice of words and to the composition of the sentences, that the movements by which the words and sentences already conceived are uttered by the voice or traced on paper, no more partake of the truly Volitional character, than do those of our limbs when we walk through the streets in a state of abstraction (§ 16). And it is a curious evidence of the influence of Ideas, rather than of the agency of the Will, in producing them, that, as our conceptions are a little in advance of our speech or writing, it occasionally happens that we mis-pronounce or mis-spell a word, by introducing into it a letter or syllable of some other whose turn is shortly to come; or, it may be, the whole of the anticipated word is substituted for the one which ought to have been expressed. Now it is obvious that there could be neither any consciously-formed intention of breaking the regular sequence, nor any volitional effort to do so; and the result is evidently the automatic expression of the Idea represented by the anticipated word, which interferes with the working

out of that which we have previously given it in charge to our automaton to execute.—An interesting example of this familiar phenomenon (which, like many other mental phenomena, has not attracted the notice it merits, simply because it is so familiar) is given us by the amanuensis to whom Sir Walter Scott dictated his “Life of Napoleon Buonaparte” :—

a. “His thoughts flowed easily and felicitously, without any difficulty to lay hold of them or to find appropriate language ; which was evident by the absence of all solicitude (*miseria cogitandi*) from his countenance. He sat in his chair, from which he rose now and then, took a volume from the book-case, consulted it, and restored it to the shelf,—all without intermission in the current of ideas, which continued to be delivered with no less readiness than if his mind had been wholly occupied with the words he was uttering. It soon became apparent to me, however, that he was carrying on two distinct trains of thought, one of which was already arranged, and in the act of being spoken, while at the same time he was in advance, considering what was afterwards to be said. This I discovered by his sometimes introducing a word which was wholly out of place—*entertained* instead of *denied*, for example,—but which I presently found to belong to the next sentence, perhaps, four or five lines further on, which he had been preparing at the very moment that he gave me the words of the one that preceded it.”—(*Life of Sir Walter Scott*, Chap. lxxiii.)

237. It is the *Dominant Idea*, then, which really *determines* these movements, the Will simply *permitting* them ; and the more completely the volitional power is directed to other objects, the more completely automatic are the actions of this class. They may, indeed, come to be performed even without the consciousness, or at least without the *remembered* consciousness, of the agent ; as we see in the case of those who have the habit of “thinking aloud,” and who are subsequently quite surprised on learning what they have uttered. The one-sided conversation of some persons, who are far more attentive to their own trains of thought, than they are to what may be expressed by others, and who are

allowed to proceed with little or no interruption, is often a sort of "thinking aloud."—This was pre-eminently the habit of Coleridge, whose whole life was little else than a waking dream, and whose usual talk has been shown to have been the outpouring of his "dominant ideas." (See § 231.)—The following case, recently communicated to the Writer, shows how strongly the *mode of expression* of our ideas is influenced by habit; and how, after the chain would seem to have been completely broken, it may come to renew itself when the circumstances recur under which it had been formed:—

b. A Military Officer, who had seen much hard service at a time when a command was scarcely ever given without the accompaniment of an oath, and who had thus acquired the habit of continual swearing, determined, on retiring into private life, to do his best to forego this practice; and by keeping a constant check upon himself, with the assistance of the friendly monitions of others, he entirely succeeded. After the lapse of many years, however, he found himself called upon to perform some Military duty; and, in the discharge of it, he used much of the bad language to which he had formerly accustomed himself. A friend who happened to notice this, having afterwards expressed his regret that he should have relapsed into his old habit of swearing, the Officer assured him (and he was a man whose word could be implicitly relied on) that *he was not at the time in the least degree conscious of uttering an oath, and that he had not the slightest recollection of having done so.*

238. Much attention has recently been given to a set of Involuntary movements, which, however diverse the circumstances under which they occur, all have their source in one and the same mental condition,—that of *expectant attention*:—the whole Mind being "possessed" with the idea that a certain action will take place, and being eagerly directed (generally with more or less of emotional excitement) towards the indications of its occurrence. This is a very curious subject of inquiry, and one on which adequate scrutiny has scarcely yet been bestowed; the phenomena

which are referable to the principle of action here enunciated, having been very commonly explained by the agency of some other hypothetical Force.—Thus, if a button or ring be suspended from the end of the finger or thumb, in such a position that, when slightly oscillating, it shall strike against a glass tumbler, it has been affirmed by many who have made the experiment, that the button continues to swing with great regularity, striking the glass at tolerably-regular intervals, until it has sounded the hour of the day, after which it ceases for a time to swing far enough to make another stroke. This certainly does come to pass, in many instances, without any *intention* on the part of the performer; who may be really doing all in his power to keep his hand perfectly stationary. Now it is impossible, by any voluntary effort, to keep the hand absolutely still, for any length of time, in the position required; an involuntary tremulousness is always observable in the suspended body; and if the *attention* be fixed upon the part, with the *expectation* that the vibrations will take a determinate direction, they are very likely to do so.*—Their persistence in this direction, however, *only takes place so long as they are guided by the visual sensations*; a fact which at once points to the real spring of their performance. When the performer is impressed with the conviction that the hour *will* be thus indicated, the result is very likely to happen; and when it has once occurred, his confidence is sufficiently established to make its recurrence a matter of tolerable certainty. On the other hand, the experiment seldom succeeds with sceptical subjects; the “expectant idea” not having in them the requisite potency. That it is through the Mind that these movements are regulated, however involuntarily, appears evident from these two considerations:—first, that if the performer be

* This was long since pointed out by M. Chevreul, who investigated the subject in a truly philosophic spirit. See his letter to M. Ampère, in the “Revue des Deux-Mondes,” Mai 1833; and his more recent treatise “De la Baguette Divinatoire, du Pendule dit Explorateur, et des Tables Tournantes,” Paris, 1854.

entirely ignorant of the hour, the strokes on the glass do not indicate its number, except by a casual coincidence ;—and second, that the division of the entire period of the earth's rotation into twenty-four hours, and the very nomenclature of these hours, being entirely arbitrary and conventional, no other *modus operandi* can be imagined. For example, the button which strikes *eleven* at night in London, should strike *twenty-three* in Italy, where (as in the astronomer's Observatory) the cycle of hours is continued through the whole twenty-four ; and if an Act of Parliament were to introduce the Italian horary arrangement into this country, all the swinging buttons in her Majesty's dominions would have to add twelve to their number of post-meridien strokes ; all which would doubtless come to pass, if the experimenters' *expectation* of the result were sufficiently strong. These phenomena, in which no hypothetical "odylic" or other "occult" agency can be reasonably supposed to operate, are here alluded-to only for the sake of illustrating those next to be described, which have been imagined to prove the existence of a new Force in Nature.

239. If "a fragment of anything, of any shape," be suspended from the end of the fore-finger or thumb, and the Attention be intently fixed upon it, regular oscillations will be frequently seen to take place in it ; and if changes of various kinds be made in the conditions of the experiment, corresponding changes in the direction of the movements will very commonly follow.

a. The public mind was directed to these facts, about the year 1850, by Dr. Herbert Mayo ; who, having brought himself to accept Baron Reichenbach's "Odyle" as a "new force in Nature," accepted these oscillations as a manifestation of it, and gave to this suspended body the designation of "odometer." After varying his experiments in a great variety of modes, Dr. Mayo came to the conclusion that the direction and extent of the oscillations were capable of being altered, either by a change in the nature of the substances placed beneath the odometer, or by the contact of the

hand of a person of the opposite sex, or even of the experimenter's other hand, with that from which the odometer was suspended, or by various other changes of the like nature. And he gradually reduced his results to a series of definite Laws, to which he seems to have imagined them to be as amenable, as are the motions of the heavenly bodies to the law of Gravitation.—(*The Truths contained in Popular Superstitions*, 3rd edition, 1851, Letter XII.)

b. Other observers, however, who were induced by Dr. Mayo's earlier experiments to take-up the subject, and who worked it out with like perseverance and good faith, framed a very different code; so that it at once became apparent to those who knew the influence which "expectant attention" exerts in determining involuntary muscular movements, that this was only another case of the same kind; and that the cause of the change of direction in each case lay in the Idea that some such change would result from a certain variation in the conditions of the experiment. Hence the general conclusions which each experimenter works out for himself, so far from being entitled to rank as "laws of Odylic force," are merely expressions of what has been passing (though perhaps almost unconsciously to himself) *in his own mind*.—The truth of this *rationale* was proved by the results of a few very simple variations in the conditions of the experiment. When it was tried upon *new* subjects, who were entirely devoid of any expectant idea of their own, and who received no intimation, by word, sign, or look, of what was anticipated by others, the results were found to have no uniformity whatever. And even those who had previously been most successful in this line of performance, *found all their success vanish, from the moment that they withdrew their eyes from the oscillating body*, its movements thenceforth presenting no regularity whatever.—Thus it became obvious that the definite direction which the oscillations previously possessed, was due, not to any Magnetic, Electric, or Odylic force of which the operator was the medium, but to the influence directly exercised by his Ideas over his muscles, under the guidance of his visual sense.

240. Now this will occur, notwithstanding the strong Volitional determination of the experimenter to maintain a complete immobility in the suspending finger. And it is very easily proved that, as

in the preceding case, the movements are guided by his Visual sensations, and that the impulse to them is entirely derived from his *expectation* of a given result. For if he be ignorant of the change which is made in the conditions of the experiment, and should *expect or guess something different from that which really exists*, the movement will be in accordance with his Idea, not with the reality :—

a. Rather more than twenty years ago, when no inconsiderable portion of the British public was amusing itself with swinging buttons and rings from its finger-ends, the attention of Scientific men was invited by Mr. Rutter of Brighton to the fact, that a very definite series of movements of a like kind was exhibited by a ball suspended from a metallic frame *which was itself considered a fixture*, when the finger was kept for a short time in contact with it; and that these movements varied in direction and intensity, according as the operator touched other individuals with his disengaged hand, laid hold with it of bodies of various kinds, or altered his condition in various other modes. These experiments appeared to many persons of great general intelligence, to indicate some new and mysterious agency not hitherto recognised in our philosophy; for even among those who might be disposed to attribute the oscillations of a button suspended from the *finger*, to the involuntary movements of the hand itself, some were slow to believe that the simple *contact* of the finger with a frame of *solid metal* could produce the like vibrations through such a medium. Yet there were certain troublesome sceptics, who persisted in asserting that this was but pro another case of “expectant attention;” and such it was soon proved to be.

b. The mode in which the *dénouement* took place, however, was not a little curious. Among Mr. Rutter's disciples was a Homœopathic Physician at Brighton, Dr. H. Madden; who conceived the notable idea of testing the value of the indications of the Magnetometer (as it was called), by questioning it as to the characters of his remedies, in regard to which he was of course himself “possessed” with certain foregone conclusions. Globules in hand, therefore, he consulted its oscillations, and found that they corresponded exactly with his idea of what they *ought* to be; a medicine of one class producing *longi-*

tudinal movements, which were at once exchanged for *transverse* when a medicine of opposite virtues was substituted for it. In this way Dr. Madden was systematically going through the whole Homœopathic Pharmacopœia; when circumstances led him to investigate the subject *de novo*, with a precaution which had never occurred to him as requisite in the first instance, but of which the importance is obvious to every one who holds the real clue to the mystery;—namely, that he *should not know* what were the substances on which he was experimenting, the globules being placed in his hand by another party, who should give him no indication whatever of their nature. From the moment that he began to work upon this plan, the whole aspect of affairs was altered. *The results ceased altogether to present any constancy.* Oscillations at one time *transverse*, at other times *longitudinal*, were produced by the very same globules; whilst remedies of the most opposite kinds frequently gave no sign of difference. And thus, in a very short time, Dr. Madden was led to the conviction, which he avowed with a candour that was very creditable to him, that the whole system which he had built-up had no better foundation than *his own anticipation of what the results should be.*—(*Lancet*, Nov. 15, 1851.)

241. This case—which seems so easily disposed of by the phrase “all humbug,” or “all imagination,”—is, in truth, neither the one nor the other; but a singularly complete and satisfactory example of the general principle, that, in certain individuals, and in a certain state of mental concentration, the *expectation* of a result is sufficient to determine,—without any voluntary effort, and even in opposition to the Will (for this may be honestly exerted in the attempt to keep the hand perfectly unmoved),—the Muscular movements by which it is produced. It is obvious, too, that the unconscious rhythmical motion of the hand constituted the *vera causa* of the vibrations of the magnetometer: a fact which will not surprise any one who knows how difficult it is to prevent the tremors of a Telescope or a Microscope, by the most careful construction of its supporting frame-work; or who bears in mind that the form of the great speculum of Lord Rosse's telescope, weighing

five tons, having a thickness of eight inches, and composed of the hardest known combination of metals, is perceptibly altered (as is demonstrated by the immediate impairment of the distinctness of its reflection) by a moderate pressure of the hand against its back. Moreover, as Dr. Madden justly remarked, the arrangement of Mr. Rutter's apparatus was such as to admit of the greatest sensible effect being produced by the smallest amount of imparted motion; and every modification of it which increased its immobility, decreased in the same proportion its apparent sensibility to the so-called "magnetic currents." It was further ascertained that no definite vibrations took place, unless the pendulum was *watched*; showing that, as in the preceding cases, the guidance of the visual sense was required to determine their direction. It is a curious example, however, of the hold which the belief in the "occult" has upon the Imagination, that, notwithstanding the complete proof thus given of the dependence of these vibrations upon the unconscious movements of the operator himself, the vague hypothesis of "human electricity" long continued to be entertained by Mr. Rutter and his disciples; just as the Spiritualists of the present day will not accept Faraday's demonstration (§ 245) that tables are really "turned" and "tilted" by the pressure of the hands placed on them,—refusing to submit the question to the test of Physical experiment, because (as they say) it *cannot* negative *their own conviction* that they are exerting no pressure whatever.

242. It is clearly on the very same Physiological principle, that we are to explain the mysterious phenomena of the "Divining rod;" which have been accepted as true, or rejected as altogether fabulous, according to the previous habits of thought of those who have given their attention to the subject.—That the end of a hazel-fork, whose limbs are grasped firmly in the hands of a person whose good faith can scarcely be doubted, frequently points upwards or downwards without any *intentional* direction on his own

part, and often thus moves when there is *metal* or *water* beneath the surface of the ground at or near the spot, is a fact which is vouched-for by such testimony that we have scarcely a right to reject it ; and when we come to examine into the conditions of the occurrence, we shall find that they are such as justify us in attributing it to a state of *expectant attention*, which (as we have seen) is fully competent to induce muscular movement. For, in the first place, as not above one individual in forty, even in the localities where the virtues of the divining-rod are still held as an article of faith, is found to succeed in the performance of this experiment, it is obvious that the agency which produces the deflection—whatever be its nature—must operate by affecting the *holder* of the rod, and not by attracting or repelling the *rod* itself. And when experiments are carefully made with the view of determining the nature of this agency, they are found to indicate most clearly that the state of expectant attention, induced by the *anticipation* of certain results, is fully competent to produce them. For the mere act of holding the rod for some time in the required position, and of attending to its indications, is sufficient to produce a tendency to spasmodic contraction in the grasping muscles, notwithstanding a strong effort of the Will to the contrary ; and when, by such contractions, the limbs of the fork are made to approximate-towards or to separate-from each other, the point of the fork will be caused to move either upwards or downwards, according to the position in which it is held. If, when the muscles have this tendency to contract, occasioned by their continued restraint in one position, the mind be possessed with the expectation that a certain movement will ensue, that movement will actually take-place, even though a strong effort may be made by the Will to prevent any change in the condition of the muscles. And a sufficient ground for such expectation exists, on the part of those who are “possessed” by the idea of the peculiar powers of the divining-rod, in the belief, or even in the surmise, that *water* or.

metal may lie beneath particular points of the surface over which they pass.

a. Thus Dr. H. Mayo, notwithstanding his belief in the existence of an "Od-force" governing the movements of the divining-rod, admitted that he found in the course of his experiments, that when his "diviner" knew which way he expected the fork to move, it invariably answered his expectations; but when he had the man blindfolded, the results were uncertain and contradictory. Hence he became certain that several of those in whose hands the divining-rod moves, set it in motion, and direct its motion (however unintentionally and unconsciously) by the pressure of their fingers, and by carrying their hands near-to or apart-from each other.—(*Op. cit.*, Letter I.)

b. The following statement of the results obtained by a very intelligent friend of the Writer, who took up the inquiry some years ago, with a strong prepossession (derived from the assurances of men of high scientific note) in favour of the reality of the supposed influence, but yet with a desire to investigate the whole matter carefully and philosophically for himself, will serve as a complete illustration of the doctrine enunciated above:—Having duly provided himself with a hazel-fork, he set out upon a survey of the neighbourhood in which he happened to be staying on a visit; this district was one known to be traversed by Mineral Veins, with the direction of some of which he was acquainted. With his "divining-rod" in his hand, and with his attention closely fixed upon his instrument of research, he walked forth upon his experimental tour; and it was not long before, to his great satisfaction, he observed the point of the fork to be in motion, at the very spot where he knew that he was crossing a metallic lode. For many less cautious investigators, this would have been enough; but it served only to satisfy this gentleman that he was a favourable subject for the trial, and to stimulate him to further inquiry. Proceeding in his walk, and still holding his fork *secundum artem*, he frequently noticed its point in motion, and made a record of the localities in which this occurred. He repeated these trials on several consecutive days, until he had pretty thoroughly examined the neighbourhood, going over some parts of it several times. When he came to compare and analyse the results, he found that there was by

no means a satisfactory accordance amongst them ; for there were many spots over which the rod had moved on one occasion, at which it had been obstinately stationary on others, and *vice versa* ; so that the constancy of a physical agency seemed altogether wanting. Further, he found that whilst some of the spots over which the rod had moved, were those *known* to be traversed by Mineral Veins, there were many others in which its indications had been no less positive, but in which those familiar with the Mining Geology of the neighbourhood were well assured that no veins existed. On the other hand, the rod had remained motionless at many points where it *ought* to have moved, if its direction had been affected by any kind of terrestrial emanation.—These facts led the experimenter to a strong suspicion that the cause existed in *himself* alone ; and by carrying out his experiments still further, he ascertained that he could not hold the fork in his hand for many minutes consecutively, concentrating his attention fixedly upon it, without an alteration in the direction of its point, in consequence of an involuntary though almost imperceptible movement of his hands ; so that in the greater number of instances in which the rod exhibited motion, the phenomenon was clearly attributable to this cause ; and it was a matter of pure accident whether the movement took place over a Mineral Vein, or over a blank spot. But further, he ascertained on a comparison of his results, that the movement took-place more frequently where he knew or suspected the existence of mineral veins, than in other situations ; and thus he came, without any knowledge of the theory of *expectant attention*, to the practical conclusion that the motions of the Rod were produced by his own Muscles, and that their actions were in great degree regulated automatically by the Ideas which possessed his mind.

The same instrument appears to have been used, even from a very early period, by those who were supposed to possess “ a spirit of divination,” for the purpose of giving replies to questions by its movements, precisely after the fashion of the “ talking tables ” of our own day ; the hands of the operators (where they really believed in their power, and were not impostors) being automatically impelled to execute the appropriate movements of the rod,

either by their consciously-formed idea of what the answer should be,* or by Cerebral changes which excite reflex movements that give expression to them, without themselves rising into the "sphere of consciousness" (§§ 424, 425).

243. No difficulty can be felt by any one who has been led by the preceding considerations to recognize the principle of *Ideomotor action*, in applying this principle to the phenomena of "Table-turning" and "Table-talking;" which, when rightly analysed, prove to be among the very best examples of the "reflex action of the Cerebrum," that are exhibited by individuals whose state of mind can scarcely be considered as abnormal. The *facts*, when stripped of the investment of the marvellous with which they have too commonly been clothed, are simply as follows:—A number of individuals seat themselves round a table, on which they place their hands, with the *idea* impressed on their minds that the table will move in a rotatory direction; the direction of the movement, to the right or to the left, being generally arranged at the commencement of the experiment. The party sits, often for a considerable time, in a state of expectation, with the whole attention fixed upon the table, and looking eagerly for the first sign of the anticipated motion. Generally one or two slight changes in its place herald the approaching revolution; these tend still more to excite the eager attention of the performers, and then the actual "turning" begins. If the parties retain their seats, the revolution only continues as far as the length of their arms will allow; but not unfrequently they all rise, feeling themselves obliged (as they assert) to *follow* the table; and from a walk, their pace may be accelerated to a run, until the table actually spins-round so fast that they can no longer keep-up with it. All this is done, not merely without the least consciousness on the part of the performers that they are exercising any force of their

* See Chevreul, *Op. cit.*, première partie.

own, but for the most part under the full conviction that they are not.

244. Now the *rationale* of these and other phenomena of a like kind, is simply as follows. The continued concentration of Attention upon a certain idea gives it a *dominant* power, not only over the mind, but over the body; and the muscles become the involuntary instruments whereby it is carried into operation. In this case, too, as in that of the divining-rod, the movement is favoured by the state of muscular tension, which ensues when the hands have been kept for some time in a fixed position. And just as in the case of the victims of the Dancing Mania (§ 259), it is by the continued influence of the "dominant idea" that the performers are impelled to *follow* (as they believe) the revolution of the table, which they really *maintain* by their continued propulsion. However conscientiously they may believe that the "attraction of the table" carries them along with it, instead of the table being propelled by an impulse which originates in themselves, yet no one feels the least difficulty in withdrawing his hand, if he really *wills* to do so. But it is the characteristic of the state of mind from which these Ideo-motor actions proceed, that the Volitional power is for the time in abeyance; the whole mental power being absorbed (as it were) in the high state of tension to which the Ideational consciousness has been wrought-up.

245. The demonstration that the table is really moved by the hands placed upon it, notwithstanding the positive conviction of the performers to the contrary, was first afforded by the very ingenious "indicator," devised by Professor Faraday, which is constructed as follows :—

A couple of boards of the size of a quarto sheet of paper, a couple of small rulers or cedar-pencils, a couple of india-rubber bands, a couple of pins, and a strip of light wood or cardboard eight or ten inches long, constituted its materials. The rulers being laid on one of the boards, each at a little distance from one of its sides and

parallel to it, the other board was laid upon the rulers, so that it would roll on them from side to side; and its movements were restrained, without being prevented, by stretching the india-rubber bands over both boards, so as to pass above and beneath the rulers. One of the pins was fixed upright into the lower board close to the middle of its farther edge, the corresponding part of the upper being cut away at that part, so that the pin should not bear against it; the second pin was fixed into the upper board, about an inch back from the first; and the strip of wood or cardboard was so fixed on these pins, as to constitute a lever of which the pin on the lower board was the fulcrum, while motion was imparted to the short arm of it by the pin on the upper board. Any lateral motion given to the upper board by the hands laid upon it, would thus cause the index-point of the long arm of the lever to move through a long arc in the opposite direction; the amount of that motion being dependent on the ratio between the long and the short arms of the lever.

The first point tested by Faraday, in the spirit of the true Philosopher, was whether the interposition of his "indicators" between the hands of the operators and the table in any way interfered with the movements of the latter; and he found, by tying the boards together, and taking off the index, that no such interference was observable, the table then going round as before. When, however, the upper board was free to move, and each performer fixed his (or her) eyes upon the index, so as to be made cognizant by its movement of the slightest lateral pressure of the hands, any communication of motion to the table was usually kept in check; but if the table did go round under this condition, its motion was always preceded by a very decided movement of the index in the opposite direction. And the same indication was given when the index was hidden from the operator, but was watched by another person; any movement shown by the table under that condition being always preceded by a considerable motion of the index in the opposite direction. And thus it may be considered as demonstrated that as the table

never went round unless the "indicator" showed that lateral muscular pressure had been exerted in the direction of its movement, and as it always did go round when the "indicator" showed that such lateral pressure was adequately exerted, *its motion was solely due to the unconscious muscular action of the performers.**

246. A sufficient explanation of these wonders, then, being found in the known principles of Mental Physiology, it is against all the rules of Philosophy to assume that any other force is concerned in their production. Yet experience has shown that when the Common Sense of the public once allows itself to be led away by the *love of the marvellous*, there is nothing too monstrous for its credulity. And the greatest difficulty in this case was to convince the performers that the movement of the table was really due to the impulse which it received from their hands: their conviction being generally most positive, that *as they were not conscious* of any effort, the table *must* have been propelled by some other agency, and that their hands were drawn along by its attraction. So resolutely was this believed, that when the table was intentionally prevented from moving by the determined pressure of the hands of one of the parties, so that those of another—automatically moving in the expected direction—slid over its surface, instead of carrying the table with them, the fact, instead of being received as evidence that the hands *would* have moved the table had it been free to turn, was set down to a "repulsive" influence exerted by the table on the hands! It might have been thought that Common Sense would teach, that, if half-a-dozen persons lay their hands on a table, any movements which it executes are to be fairly attributed to muscular force communicated by them, until proof shall have been

* See his memorable letter on Table Turning, in the "Athenæum," of July 2, 1853.—It would be well that experimenters on "Psychic Force" should profit by the admirable models set before them in this Letter, and in the Treatise "De la Baguette Divinatoire" of M. Chevreul, by two of the greatest Masters of Experimental Science.

given to the contrary; and that the *absence of conscious effort* on the part of the performers is no valid proof to the contrary, since it is within the experience of every one that *muscular movements are continually being executed without such effort*,—as in the case of a man who continues to walk, to read aloud, or to play on a musical instrument, whilst his whole Attention is given to some train of thought which deeply interests him. But the table-turners would seldom listen to Common Sense, so completely were they engrossed by their dominant idea. And even when Professor Faraday's "indicator" had supplied the most unequivocal proof that the movement of the table, instead of anticipating and producing that of the hands, is *consequent* upon the pressure which *they* impart, this proof was disposed of by the simple assertion that it had nothing to do with the case; inasmuch as it only showed that Professor Faraday's performers moved the tables with their hands, whereas "*we know that we do not.*" Those who make this assertion are (of course) scientifically bound to demonstrate it, by showing that in *their* case the table *does* go round without any deflection of the "index" by lateral pressure; but they have uniformly refused to apply this test to their own performance, though repeatedly challenged to do so,—in the very spirit of the opponents of Galileo, who would not look through his telescope at the satellites of Jupiter, because they supplied evidence in favour of the Copernican theory.

247. In the investigation of these phenomena, moreover, it was found necessary to treat with complete disregard all the testimony of such as had given themselves up to the "domination" of the table-turning "idea;" for it continually became apparent that—no doubt, quite unintentionally and unconsciously—they would omit from their narrative the point most essential to the elucidation of the mystery:—

Thus, the Writer's scepticism was on one occasion gravely rebuked by a lady, who assured him that, in *her* house, a table had moved round

and round, *without being touched*. On inquiring into the circumstances, he found that a hat had been placed upon the table, which was very small and light, and the hands of the performers upon the hat; but the narrator was as sure that the hat could not have carried the table along with it, as she was that the hat moved round without any mechanical force communicated from the hands!—In another case, again, the Writer was seriously informed that a table had been moved round by the *will of a gentleman sitting at a distance from it*; but it came out, upon cross-examination, that a number of hands were laid upon it in the usual way, and that after the performers had sat for some time in silent expectation, the operator called upon the spirit of “Samson” to move the table, which obediently went round:—the rationale being obvious enough to any one who reflects upon the analogy of the whole group with an Electro-biological “operator” and his “subjects” (§ 452).

A long list might be given of similar absurdities; the Writer's experience of which most fully confirmed the conclusions he had previously been led to form, in regard to the want of credibility which attaches to all *testimony* borne by the champions of Mesmerism to the wonders which they declare themselves (doubtless most honestly) to have witnessed; while it prepared him for finding exactly the same sources of fallacy, in the testimony on which the scientific inquirer is called on to accept the marvels of “Spiritualism” (§§ 365, 366).

248. The application of the same principle to the ordinary phenomena of “Table-talking,” is no less obvious. There can be no reasonable doubt that these phenomena are manifested in a large number of instances, through the agency of individuals who would not wilfully be parties to deception of any kind; and that the movements which they *involuntarily* and *unconsciously* gave to the tables, are the expressions of the Ideas with which their own Minds are “possessed,” as to what the answers should be to the questions propounded. Thus when, in 1853, “Table-talking” first grew out of “Table-turning,” several Clergymen, strongly impressed with the belief that it was a manifestation of

Satanic agency, put to the tables a series of what they regarded as test-questions, or performed test-experiments, the responses to which would (as they supposed) afford convincing proof of their hypothesis.

In his *Table-moving tested*, the Rev. N. S. Godfrey began by "tracing the existence of Satanic influence from the time of Moses to the time of Jesus; connecting the 'witch,' the 'familiar spirit,' the spirit of Python, with the Evil Spirit in its actual and separate existence:" and asserted without the least hesitation, that although "so long as the supernatural gifts of the Spirit remained among men, so long the evil spirits were cast out and their presence detected," yet that when those miraculous powers were withdrawn, they could no longer be discerned, but have continued to exist to the present time, and make themselves known in these "latter times" as the "wandering (seducing) spirits," whose appearance was predicted by St. Paul (1 Tim., iv., 10). That the answers to the "test questions" were exactly contrary to Mr. Godfrey's ideas of truth, was, in his judgment, peculiarly convincing; "for if indeed these tables do become possessed by some of the 'wandering spirits' at the command of the Devil, it would be most impolitic, and quite at variance with the subtlety of his character, to scare people at the very outset." The following answers, therefore, are obviously what Mr. G. expected:—

"I spoke to the table, and said, 'If you move by electricity, stop.' It stopped instantly! I commanded it to go on again, and said, while it was moving, 'If an evil spirit cause you to move, stop.' It moved round without stopping! I again said, 'If there be any evil agency in this, stop.' It went on as before. I was now prepared with an experiment of a far more solemn character. I whispered to the schoolmaster to bring a small Bible, and to lay it on the table when I should tell him. I then caused the table to revolve rapidly, and gave the signal. *The Bible was gently laid on the table, and it instantly stopped.* We were horror-struck. However, I determined to persevere. I had other books in succession laid on the table, to see whether the fact of a book lying upon it altered any of the conditions under which it revolved. It went round with them without making any difference. I then tried with the Bible four different times, and each time with the same result: *it would not move so long as that precious volume lay upon it.* * * I

now said, 'If there be a hell, I command you to knock on the floor with this leg (the one next me) twice.' It was motionless. 'If there be *not* a hell, knock twice;' no answer. 'If there be a devil, knock twice;' no motion. 'If there be *not* a devil, knock twice;' *to our horror the leg slowly rose and knocked twice!* I then said, 'In the name of the Lord Jesus Christ, if there be *no* devil, knock twice;' it was motionless. This I tried four several times, and each time with the same result."

249. It is clear that Mr. Godfrey and his associates, if they had not distinctly *anticipated* these results, were fully *prepared* for them. Thus although he assures his readers that, when the Bible was placed on the table, the emotion in the minds of all the parties was *curiosity*, and that, if they *had* a bias, it was *against* the table stopping, the very fact of the experiment being tried by a man imbued with his prepossessions on the subject of Evil Spirits, Witchcraft, &c., sufficiently indicates what his *real* state of mind was, although he may not have been himself aware of it (§ 252 c). His *involuntary* muscular actions responded to this, although no *voluntary* movement would have done so, because he had not *consciously* accepted the Idea which had been shaping itself in the under-stratum. The experience of every one must have convinced him that there is often a contrariety between our *beliefs* as to our own states of mind, and the *facts* of that state as they afterwards come to be *self-revealed* to us (§ 439); and it is a very marked peculiarity of these movements, that they often express more truly what is buried (as it were) in the vaults of our store-house, than what is displayed in the ware-rooms above.—The Rev. E. Gillson, M.A., a Clergyman of Bath, fully partaking of his predecessor's convictions on the subject of Satanic Agency, and also in the excitement prevailing in many circles at that time on the subject of "Papal aggression," gave the following *inter alia* as his experiences (*Table-Talking: Satanic Wonders and Prophetic Signs*, 1853):—

“ I placed my hand upon the table, and put a variety of questions, all of which were instantly and correctly answered. Various ages were asked, and all correctly told. In reply to trifling questions, possessing no particular interest, the table answered by quietly lifting up the leg and rapping. But in answer to questions of a more exciting character, it would become violently agitated, and sometimes to such a degree that I can only describe the motion by the word *frantic*. I inquired, ‘ Are you a departed spirit ? ’ The answer was ‘ Yes, ’ indicated by a rap. ‘ Are you unhappy ? ’ The table answered by a sort of writhing motion (!), which no natural power over it could imitate. It was then asked, ‘ Shall you be for ever unhappy ? ’ The same kind of writhing motion was returned. ‘ Do you know Satan ? ’ ‘ Yes. ’ ‘ Is he the Prince of Devils ? ’ ‘ Yes. ’ ‘ Will he be bound ? ’ ‘ Yes. ’ ‘ Will he be cast into the abyss ? ’ ‘ Yes. ’ ‘ Will you be cast in with him ? ’ ‘ Yes. ’ ‘ How long will it be before he is cast out ? ’ He rapped *ten*. ‘ Will wars and commotions intervene ? ’ The table rocked and reeled backwards and forwards for a length of time, as if it intended a pantomimic acting of the prophet’s predictions (Isaiah xxiv., 20). I then asked ‘ Where are Satan’s head-quarters ? Are they in England ? ’ There was a slight movement. ‘ Are they in France ? ’ A violent movement. ‘ Are they in Spain ? ’ Similar agitation. ‘ Are they at Rome ? ’ *The table literally seemed frantic*. At the close of these experiments, which occupied about two hours, the invisible agent, in answer to some questions about himself, did not agree with what had been said before. I therefore asked, ‘ Are you the same spirit that was in the table when we began ? ’ ‘ No. ’ ‘ How many spirits have been in the table this evening ? ’ ‘ Four. ’ This spirit informed us that he had been an infidel, and had embraced Popery about five years before his death. Amongst other questions, he was asked, ‘ Do you know the Pope ? ’ The table was violently agitated. I asked, ‘ How long will Popery continue ? ’ He rapped *ten*; exactly coinciding with the other spirits’ account of the binding of Satan. Many questions were asked, and experiments tried, in order to ascertain whether the results would agree with Mr. Godfrey’s; and on every occasion they did, especially that of stopping the movement of the table with the Bible. As we proceeded with our questions, we found an indescribable facility in the conversation, from the extraordinary intelligence and ingenuity

displayed in the table (!) E. g.—I inquired if many devils were posted in Bath. He replied by the most extraordinary and rapid knocking of the three feet in succession, round and round, for some time, as if to intimate that they were innumerable ! ”

250. A third Clergyman, the Rev. R. W. Dibdin, M.A.,—who communicated to the public the results of his experiences in a Lecture at the Store Street Music Hall, Nov. 8, 1853,—while agreeing with his predecessors in the belief that the movements of the tables are the result of Satanic (or diabolic) agency, differed from them in maintaining “that devils alone (not departed spirits) are the agents in these cases ; and being *lying* spirits, it is quite credible that, for purposes of their own, they might *assume* the names of departed men and women.” Of course he got the answers he expected on this hypothesis. The following is his set of ‘test-questions,’ the answers to which—being entirely *opposed* to his own notions of truth—satisfied *him*, and were expected to satisfy his partners in the experiment, of the *diabolical* character of the respondent :—

“ ‘Are we justified by works ?’ ‘Yes.’—‘By faith alone ?’ ‘No.’—‘Is the whole Bible true ?’ ‘No.’—‘Were the miracles of the New Testament wrought by supernatural power ?’ ‘No.’—‘By some hidden law of Nature ?’ ‘Yes.’—‘Was Oliver Cromwell good ?’ ‘No.’—‘Was Charles I. a good man ?’ ‘Yes.’—‘Is it right to pray to the Virgin ?’ ‘Yes.’—‘Is Christ God ?’ ‘No.’—‘Is he a man ?’ ‘No.’—‘Is he something between God and man, a sort of angel ?’ ‘Yes.’—‘Is he in heaven ?’ ‘No.’—‘Where is he ?’ It spelt slowly H E L L.—As the last letter was indicated, the girl drew her hands quickly off the table, much as a person would do who was drawing them off a hot iron. Her brother-in-law turned very pale, and took his hands off the table also. ”

251. These phenomena have been cited in fuller detail than may seem requisite ; because the character, position, and obvious sincerity of the actors and narrators place them beyond suspicion of intentional deception ; and because they afford a singularly

apposite illustration of the principle which the Writer desires to enforce. But that such obvious products of the questioners' own mental states should have been accepted by men of education, occupying the position of religious teachers in the National Church, as the lying responses of *evil* spirits, sent expressly to delude them, can only be deemed—by such, at least, as are prepared to accept a scientific *rationale* of the phenomena—a pitiable instance of the readiness with which minds of a certain type may allow themselves to become “possessed” by dominant ideas.

252. Absurd as their belief may now seem, however, it is in no respect more destitute of foundation than that which is entertained at the present time, by multitudes of persons of high culture and great general intelligence, in the genuineness of messages supposed to be transmitted by *good* “spirits” of departed relatives and friends, to those whom they have left behind them on Earth. These communications always take place through *human agency* of some kind; the individual who is the supposed recipient of them being termed a “medium.” The mode of intercourse with “spirits” afforded by the turning and tilting of tables, has now for the most part given place to others of a much simpler and more direct character. Some “mediums” use a small wooden platform, only large enough for the hands to be laid on it, and running easily on castors. This *planchette* was in the first instance furnished with a pointer, which directed itself in succession to the letters or figures of an alphabet-card placed on the table over which it rolled; and thus spelled out words, or indicated numbers. But a simpler process than this has since come into vogue; for if a pencil be attached to the under side of the “planchette,” with its point downwards, it will write on a piece of paper placed beneath it, in accordance with the movement of the *planchette* under the hands of the “medium” laid upon it. In each case, the “mediums” declare that the movements of the *planchette* are not produced by any manual exertion of their own, but that they are guided by

some agency external to themselves, their hands being simply passive. But other "mediums" take the pencil into their own hands, and write (in the ordinary way) what they conceive to be the messages dictated to them by the "spirits" with which they are in communication. And some, again, carry on supposed conversations with the "spirits;" not only asking questions of them by word of mouth, but giving forth through the same direct channel, the answers which they affirm that they receive.—Now there can be no reasonable doubt that a great many of these phenomena are *genuine* to this extent, that the "mediums" are honest, and believe themselves to be the vehicles of "spiritual" communications. Putting intentional deceit out of the question for the present (§ 254), it is perfectly obvious to such as have had adequate opportunities of studying the *natural* conditions of Reverie and Abstraction (§§ 443—447), and the *artificially-induced* states known as "Electro-biological" and "Hypnotic" (§§ 448, 493), that the condition of the Spiritualistic "mediums" is exactly parallel to that of the "subjects" in these states; and that the supposed communications are nothing else than products of their own automatic mental operations, guided by the principle of suggestion, and expressing themselves in accordance with a certain preformed conception of the mode in which the message is to be made known. Of the influence of such conceptions on the course of thought and action in these curious states, ample evidence will be given hereafter (§ 451, *et seq.*). At present it will be sufficient to cite—as illustrations of the action of dominant ideas of a totally different order from those which brought out the terrifying responses obtained by the clerical seers,—two cases more recently recorded as having occurred within his own experience, by the author of an article on "Spiritualism and its Recent Converts."

a. "Several years ago we were invited, with two medical friends, to a very select *séance*, to witness the performance of a lady, the Hon.

Miss N——, who was described to us as a peculiarly gifted 'medium;' not merely being the vehicle of 'spiritual' revelations of the most elevating character, but being able to convince incredulous philosophers like ourselves of the reality of her 'spiritual' gifts, by 'physical' manifestations of the most unmistakeable kind. Unfortunately, however, the Hon. Miss N—— was not in great force on the occasion of our visit; and nothing would go right. It was suggested that she might be exhausted by a most successful performance which had taken place on the previous evening; and that 'the spirits' should be asked whether she stood in need of refreshment. The question was put by our host (a wine-merchant, be it observed), who repeated the alphabet *rapidly* until he came to N, and then went on *slowly*; the table tilted at P. The same process was repeated, until the letters successively indicated were P, O, R, T. But this was not enough. The spirits might prescribe either *port* or *porter*; and the alphabet was then repeated *slowly from the beginning*, a prolonged pause being made at E; as the table did *not* tilt, a bumper of port was administered 'as directed.' It did not, however, produce the expected effect; and with the exception of a 'manifestation' we shall hereafter notice under another head (§ 530), the *séance* was an entire failure.

b. "On another occasion, we happened to be on a visit at a house at which two ladies were staying, who worked the *planchette* on the original method (that of attaching to it a pointer, which indicated letters and figures on a card), and our long previous knowledge of whom placed them beyond all suspicion of anything but *self-deception*. One of them was a firm believer in the reality of her intercourse with the spirit-world; and her 'planchette' was continually at work beneath her hands, its index pointing to successive letters and figures on the card before it, just as if it had been that of a telegraph-dial acted on by galvanic communication. After having watched the operation for some time, and assured ourselves that the answers she obtained to the questions she put to her 'spiritual' visitants were just what her own simple and devout nature would suggest, we addressed her thus:—'You believe that your replies are dictated to you by your 'spiritual' friends, and that your hands are the passive vehicles of the 'spiritual' agency by which the *planchette* is directed in spelling them out. We believe, on the other hand, that

the answers are the products of your own Brain, and that the planchette is moved by your own Muscles. Now we can test, by a very simple experiment, whether *your* view or *ours* is the correct one. Will you be kind enough to *shut your eyes* when you ask your question, and to let *us* watch what the planchette spells out? If 'the spirits' guide it, there is no reason why they should not do so as well when your eyes are shut, as when they are open. If the table is moved by your own hands, it will not give definite replies except under the guidance of your own vision.' To this appeal our friend replied that she could not think of making such an experiment, as 'it would show a want of faith;' and all our arguments and persuasions could only bring her to the point of *asking the spirits* whether she *might* comply with our request. The reply was, 'No.' She then, at our continued urgency, asked 'Why not?' The reply was, 'Want of faith.' Putting a still stronger pressure upon her, we induced her to ask, 'Faith in what?' The reply was, 'In God.'

c. "Of course, any further appeal in that quarter would have been useless; and we consequently addressed ourselves to our other fair friend, whose high culture and great general intelligence had prepared her for our own rationalistic explanation of marvels which had seriously perplexed her. For having been engaged a short time before in promoting a public movement, which had brought her into contact with a number of persons who had previously been strangers to her, she had asked questions respecting them, which elicited replies that were in many instances such as she declared to be quite unexpected by herself,—specially tending to inculcate some of her coadjutors as influenced by unworthy motives. After a little questioning, however, she admitted to us that she had previously entertained *lurking suspicions on this point*, which she had scarcely even *acknowledged to herself*, far less made known to others; and was much relieved when we pointed out that the planchette merely revealed what was going on in *the under-stratum of her own mind*. Her conversion to our view was complete, when, on her trying the working of the planchette with her eyes shut, its pointer *went astray altogether*."—(*Quarterly Review*, Oct. 1871, p. 315.)

253. It is often cited as a proof that the performers are *not* expressing by involuntary muscular actions what is passing in

their own minds, that the answers given by the tables are *not known to any of themselves, though known to some other person in the room*. Of this an instance was early recorded by Mr. Godfrey, which corresponds in all essential particulars with cases repeatedly described to the Writer by persons in whose veracity he could place confidence :—

a. "I procured an alphabet on a board, such as is used in a National School; this board I laid down on the floor at some little distance from the table, and I lay down on the ground beside it. I then requested one of the three persons at the table to command it to spell the Christian names of Mr. L——, of B——, by lifting up the leg next him as I pointed to the letters of the alphabet in succession. He did so, and I began to point, keeping the pointer about three seconds on each letter in succession (I must say, that neither of the three persons at the table had ever heard of Mr. L——; and B—— is 150 miles from this place). When I arrived at G, they said, "That's it; the table is lifting its leg." When I came to E, it rose again; and in this way it spelt "George Peter," which was quite correct.

b. So, again, the late Dr. Hare, an American Chemist and Physicist of some reputation, thought that he had obtained a *precise experimental proof of the immortality of the soul* (!) by means of an apparatus by which the answers communicated through the "medium" were spelled out by a hand pointing to an alphabet-dial which was hidden from her eyes. But it is clear from his narrative of the experiment, that her eyes were fixed upon the person to whom the expected answer was known, and that her movements were guided by the indications she received from *his* Involuntary movements.

254. Such "movements of expression" constitute another very curious illustration of the general principle of Ideo-motor action. For the state of expectant attention from which they proceed is almost always mixed up with some degree of *emotional* excitement (§ 265); and there are many persons who *cannot*, by the strongest exercise of Volitional control, refrain from showing what

is the letter or figure they expect, when the pointer comes to it. Still more is this likely to be the case, when the questioner is not on his guard against this source of fallacy ; so that, unless a screen be interposed between the "medium" and the person to whom the answer is known, there is no proof whatever of its being derived from any other source than *his* mind. This source of fallacy was very early found out by a sagacious observer, when "spirit rapping" was first introduced into this country by Mrs. Hayden :—

a. Mr. G. H. Lewes, having formed his own conclusions on the matter, from the accounts he had heard of Mrs. Hayden's performances from those who had witnessed them, took an opportunity of personally testing their correctness, with the most satisfactory result. He considered that Mrs. Hayden probably derived her indications as to the times at which to "rap," from some involuntary sign given by the questioner, when his pointer had arrived at the letter which should form the next component of the expected answer; this sign being either an unusual delay in passing to the next letter, or some slight look or gesture which would be perceived by an observer habitually on the watch for such indications. Accordingly, by *purposely* giving such indications, he caused Mrs. Hayden to *rap out* answers of the most absurdly erroneous character, to a series of questions which he had previously written down, and which he had also communicated to another member of the party, for the sake of negating any subsequent charge of unfairness that might be raised against him; the only *true* reply being the one given to the final question—"Is Mrs. Hayden an impostor?" to which the answer was given by unhesitating raps, as his pointer came upon the letters Y, E, S.

b. The truth of this view of the case was soon confirmed by the results of many similar experiments; and a long series of ludicrous replies could be given, which were spelled-out on various occasions by the direction of waggish questioners. It thus became clear that the raps were made by the "medium" herself (it having been proved that the sounds *can* be produced by a movement in the foot, which shall not be perceptible even to those who are watching it),

and that she derived her indications from the promptings supplied by the questioners themselves, however unintentionally and even unconsciously on their own parts. And this conclusion was fully borne out by a comparison of the conditions under which Mrs. Hayden was most successful, with those under which her failures (for many failures there were) took place. It was uniformly found that those whose questions had been most accurately and completely answered, were persons of excitable temperament and demonstrative habits, who were accustomed to signify more or less of what was passing in their minds by the automatic movements of gesture, expression, &c. On the other hand, those to whom "the spirits" would give no information, were persons of comparatively imperturbable nature, possessing considerable command over their muscles, and habitually yielding very little to those influences which so strongly manifest themselves in individuals of the opposite temperament. And on one occasion, an eminent man of science, who belongs to the former category, but also possesses a very strong will,—having been at first much surprised at the accuracy of the replies to certain questions which he had put (not being at that time cognizant of the *rationale* of the operation), but having observed that none could be furnished to a gentleman whose temperament was of the opposite kind,—made a second trial, with the strong determination to prevent any indication escaping him of the times at which he expected the "raps;" which trial was as complete a failure on Mrs. Hayden's part, as the first had been a success.

255. The following is a more recent case of the same kind, relating to another American professional "medium," whose gifts (like those of Mrs. Hayden) chiefly lay in playing on the credulity of such as lent themselves to his clever deceptions:—

a. "We were requested by a lady who had known Mr. Foster in America, to accompany her and her son-in-law (an eminent London Physician) on a visit to Mr. Foster, who had arrived in London only a few days previously. We were not introduced to him by name, and we do not think that he could have had any opportunity of knowing our person. Nevertheless, he not only answered, in a variety of modes, the questions we put to him respecting the time and cause of the death of several of our departed friends and relatives, whose names

we had written down on slips of paper which had been folded-up and crumpled into pellets before being placed in his hands; but he brought out names and dates correctly, in large red letters, on his bare arm, the redness being produced by the turgescence of the minute vessels of the skin, and passing away after a few minutes, like a blush. We must own to have been strongly impressed at the time by this performance; but on subsequently thinking it over, we could see that Mr. Foster's divining power was probably derived from his having acquired the faculty of interpreting the movements of the *top* of a pen or pencil, though the *point* and what was written by it was hid from his sight, with the aid of an observing power sharpened by practice,* which enabled him to guide his own movements by the indications unconsciously given by ourselves of the answers we expected. For though we were fully armed with the knowledge which had been acquired of the source from which Mrs. Hayden drew her inspiration, and did our utmost to repress every sign of anticipation, we came, on reflection, to an assured conviction that Mr. Foster *had* been keensighted enough to detect such signs, notwithstanding our attempt to baffle him. For, having asked him the *month* of the death of a friend, whose name had previously appeared in red letters on his arm, and the *year* of whose death had also been correctly indicated in another way, he desired us to take up the alphabet-card and to point to the successive letters. This we did, *as we believed*, with pendulum-like regularity; nevertheless, distinct raps were heard at the letters J, U. When, however, on the next repetition, we came to L, M, N, Mr. Foster was obviously baffled. He directed us to "try back" two or three times, and at last confessed that he could not certainly tell whether the month was *June* or *July*. The secret of this was, that *we did not ourselves recollect*.

b. "Wishing to clear up the matter further, we called on Mr. Foster, revealed ourselves to him *in propria persona*, and asked him if he would object to meet a few scientific investigators, who should be allowed to subject his powers to fair tests. As he professed his readiness to do so, we brought together such a meeting at our own house; and previously to Mr. Foster's arrival, we explained to our friends the arrangements we proposed. One of these was, that one

* To what a pitch of keenness and rapidity this *discerning power* may be brought by the special education of it has been already shown (§ 185).

of the party should sit outside the "circle," and should devote himself to observing and recording all that passed, without taking any part whatever in the performance. Another was, that instead of writing down names on slips of paper, whilst sitting at the table within Mr. Foster's view, we should write them at a side-table, with our backs turned to him. On explaining these arrangements to Mr. Foster, he immediately said that the first could not be permitted, for that every person present *must* form part of the circle. To the second he made no objection. After handing him our slips of paper carefully folded-up, we took our seats at the table, and waited for the announcement of spiritual visitors. The only one, however, who presented himself during an hour's *séance*, was the spirit of our own old master, whose name Mr. Foster might very readily have learned previously, but about whom he could give no particulars whatever. *Not one of the names written on the papers was revealed.*

c. "The patience of our friends being exhausted, they took their leave; but as Mr. Foster's carriage had been ordered for a later hour, we requested him to sit down again with the members of our own family. 'Now,' we said, 'that these incredulous philosophers are gone, perhaps the spirits will favour us with a visit.' We purposely followed *his* lead, as on our first interview, and everything went on as successfully as on that occasion; until, whilst the name of a relative we had recently lost was being spelled out on our alphabet-card, *the raps suddenly ceased* on the interposition of a large music-book, which was set-up at a preconcerted signal so as to hide the *top* as well as the bottom of our pointer from Mr. Foster's eyes.—Nothing could more conclusively prove that Mr. Foster's knowledge was derived from observation of the movements of the pointer, although he could only see the portion of it not hidden by the card, which was so held as to conceal the lower part of it; and nothing could be a better illustration of the principle of 'unconscious ideomotor action,' than the fact, that *whilst we were most carefully abstaining from any pause or look from which he might derive guidance, we had enabled him to divine the answer we expected.*—The trick by which the red letters were produced was discovered by the inquiries of our medical friends."—(*Quarterly Review*, October, 1871, p. 332.)

256. It is further asserted, however, that the tables or planchettes

often give true answers to questions proposed to them as to matters of fact, though *none of the parties present* may have any knowledge of what the answers should be ; but this, if it be really so, is not only far from being opposed to the Physiological doctrines here advanced, but affords a curious illustration and extension of them. For, as there is no doubt that impressions of which we were once conscious, though we have entirely lost our recollection of them, may direct our trains of thought in Delirium and Dreaming, or may even, as in Somnambulism, govern our actions ; so does it seem quite reasonable to attribute the movements by which the table gives its answers, to impressions left by *past* ideas upon the Cerebrum, which may express themselves through the muscular system, without any consciousness of their existence on the part of the operator (§ 425).

257. To this same category are doubtless to be referred a large number of those actions of Mesmeric "subjects," which have been considered by some as most unequivocal indications of the existence of an agency *sui generis*, whilst by others they have been regarded as the results of intentional deception. Many of them are of a kind which the Will *could* not feign, being violent convulsive movements, such as no voluntary effort could produce : but the Mesmeric "subject" being previously "possessed" with the expectation that certain results will follow certain actions (as, for instance, that convulsive movements will be brought on by touching a piece of "mesmerized" metal), and the whole nervous power being concentrated, as it were, upon the performance, the movements follow when the "subject" *believes* the conditions to have been fulfilled, whether they *have* been or *not* (§ 518).—These facts were most completely established by the Commission appointed to investigate the pretensions of Mesmer himself ; and whilst they demonstrate the unreality of the supposed "mesmeric" influence (so far, at least, as this class of phenomena is concerned), they also prove the position here contended for ; namely, the

sufficiency of the state of *expectant attention*, in those whose Minds can be completely "possessed" by it, to produce effects of the same nature with those which are induced in Hysterical subjects by Emotional excitement (§ 270).

258. Under the same head may be ranked a variety of still more aberrant actions, bordering on Insanity, of which the History of Mankind in successive ages furnishes us with abundant examples:— what is common to all being the entire "possession" of those who perform them by some strongly-excited *dominant idea*, the intensity of which blinds the Common Sense and subjugates the Will, so that it expresses itself in bodily action without the least restraint. The notion may, or may not, be in itself an absurd one. It may be confined to a single individual, or it may spread epidemically through a multitude. It may be one that interests the feelings; or it may be (though seldom) of a nature purely intellectual. The wild but transient vagaries of religious enthusiasm in all ages,—as shown in the Pythonic inspiration of the Delphic priestesses; the ecstatic revelations of Catholic and Protestant visionaries; the Flagellant processions of the 13th and 14th centuries; the Preaching epidemic among the Huguenots in France, and more recently in Lutheran Sweden; the strange performances of the "convulsionnaires" of St. Médard, which have been since almost paralleled at "revivals" and "camp-meetings;" the Dancing Mania of the Middle Ages, the Tarentism of southern Italy, the Tigretier of Abyssinia, and the Leaping-ague of Scotland in later times,*—are all, like the "table-turning" and "table-talking" epidemic, which spread through almost the whole civilized world in 1852-3, to be ranged under the same category.

259. The following account given by Dr. Hecker of the prin-

* On the greater number of the foregoing subjects, much curious information will be found in Dr. Hecker's account of the "Dancing Mania," forming part of his Treatise "On the Epidemics of the Middle Ages," translated for the Sydenham Society by Dr. Babington.

cipal features of the Dancing Mania which spread through a large part of Middle Europe in the 14th and 15th centuries, will serve to illustrate those forms of *ideo-motor* action which are intensified by *emotional* excitement :—

a. “ In the year 1374, assemblages of men and women were seen at Aix-la-Chapelle, who had come out of Germany, and who, united by one common delusion, exhibited to the public, both in the streets and in the churches, the following strange spectacle:—They formed circles hand in hand, and appearing to have lost all control over their senses, continued dancing, regardless of the bystanders, for hours together, in wild delirium, until at length they fell to the ground in a state of exhaustion. They then complained of extreme oppression, and groaned as if in the agonies of death, until they were swathed in clothes bound tightly round their waists; upon which they again recovered, and remained free from complaint until the next attack. This practice of swathing was resorted to, on account of the tympany which followed these spasmodic ravings; but the bystanders frequently relieved patients in a less artificial manner, by thumping and trampling upon the parts affected. While dancing they neither saw nor heard, being insensible to external impressions through the senses; but were haunted by visions, their fancies conjuring up spirits, whose names they shrieked out; and some of them afterwards asserted that they felt as if they had been immersed in a stream of blood, which obliged them to leap so high. Others, during the paroxysm, saw the heavens open, and the Saviour enthroned with the Virgin Mary; according as the religious notions of the age were strangely and variously reflected in their imaginations.

“ Where the disease was completely developed, the attack commenced with epileptic convulsions. Those affected fell to the ground senseless, panting and labouring for breath. They foamed at the mouth, and suddenly springing up began their dance amidst strange contortions.—A few months after this dancing malady had made its appearance at Aix-la-Chapelle, it broke out at Cologne, where the number of those possessed amounted to more than five hundred; and about the same time at Metz, the streets of which place are said to have been filled with eleven hundred dancers. Peasants left their ploughs, mechanics their workshops, housewives their domestic

duties, to join the wild revels; and this rich commercial city became the scene of the most ruinous disorder.

“The St. Vitus’s dance attacked people of all stations, especially those who led a sedentary life, such as shoemakers and tailors; but even the most robust peasants abandoned their labours in their fields, as if they were possessed by evil spirits; and those affected were seen assembling indiscriminately, from time to time, at certain appointed places, and, unless prevented by the lookers-on, continued to dance without intermission, until their very last breath was expended. Their fury and extravagance of demeanour so completely deprived them of their senses, that many of them dashed their brains out against the walls and corners of buildings, or rushed headlong into rapid rivers, where they found a watery grave. Roaring and foaming as they were, the bystanders could only succeed in restraining them by placing benches and chairs in their way, so that, by the high leaps they were thus tempted to take, their strength might be exhausted. As soon as this was the case, they fell, as it were, lifeless to the ground, and, by very slow degrees, recovered their strength. Many there were, who, even with all this exertion, had not expended the violence of the tempest which raged within them; but awoke with newly revived powers, and again and again mixed with the crowd of dancers; until at length the violent excitement of their disordered nerves was allayed by the great involuntary exertion of their limbs; and the mental disorder was calmed by the exhaustion of the body. The cure effected by these stormy attacks was in many cases so perfect, that some patients returned to the factory or the plough, as if nothing had happened. Others, on the contrary, paid the penalty of their folly by so total a loss of power, that they could not regain their former health, even by the employment of the most strengthening remedies.”—(*Epidemics of the Middle Ages*, pp. 87-104.)

In this case we see a notable manifestation of the tendency to *imitation*, which is, in fact, the result of the “hold” taken of the Mind by an idea *suggested* to it (§ 550); that hold being the stronger, in proportion to the want of other sources of healthful activity, as in the two following cases related by Zimmerman:—

b. A Nun, in a very large convent in France, began to mew like a

cat; shortly afterwards other nuns also mewed. At last all the nuns began to mew together every day at a certain time, and continued mewing for several hours together. This daily cat-concert continued, until the nuns were informed that a company of soldiers was placed by the police before the entrance of the convent, and that the soldiers were provided with rods with which they would whip the nuns until they promised not to mew any more.

c. In the 15th Century, a Nun in a German nunnery fell to biting all her companions. In the course of a short time, all the nuns of this convent began biting each other. The news of this infatuation among the nuns soon spread, and excited the same elsewhere; the biting mania passing from convent to convent through a great part of Germany. It afterwards visited the nunneries of Holland, and even spread as far as Rome.—(*On Solitude*, Vol. ii).

Such “dominant ideas,” like emotions, very commonly decline in intensity, when they expend their force in action (§ 265), and the Mind spontaneously returns to its previous condition: and thus it is that we generally find these epidemic delusions passing-away of themselves, without any ostensible cause for their cessation. Sometimes, however, such an Idea may continue to exert a dominant influence over the whole of life; and if the conduct which it dictates should pass the bounds of enthusiasm or eccentricity, we say that the individual is the subject of Monomania.—The nature of this state will be more fully considered hereafter (§ 559).

CHAPTER VII.

OF THE EMOTIONS.

260. ALTHOUGH, as we have seen (§§ 189, 190), there are various forms of Emotional sensibility which are directly called into activity by Sense-perceptions, yet those Emotional states of Mind which directly or indirectly determine a great part of our conduct, belong to the level of the Ideational consciousness ; being, in fact, the result of the attachment of the *feelings* of pleasure and pain, and of other forms of emotional sensibility, to certain classes of *ideas*. Thus the Cerebrum and the Sensorium would seem jointly concerned in their production ; for whilst the Cerebral hemispheres furnish the *ideational* part of the material, the Sensory ganglia not only give us the consciousness of their result, but invest that result with the peculiar *feeling* which renders it capable of actively influencing our conduct as a *motive* power. This we see clearly, when the Emotional state takes the form of a true *desire* ; for when this is felt, even as regards the gratification of a bodily appetite, it involves the existence of an *idea of the object* of desire ; but it is only when this idea is associated with the contemplation of enjoyment in the act to which it relates, or of discomfort in the abstinence from that act, that it becomes an impelling force towards the performance of it.—All the higher forms of Emotional consciousness may be decomposed (as it seems to the Writer) in a similar manner. Thus, Benevolence is the pleasurable contemplation of the happiness or welfare of others ; and shows itself alike in the habitual entertainment of the abstract or general idea, and in the direction of the conduct with a view to promote this result in any particular instance on which the bene-

volent desire may be fixed. So there is a positive pleasure, in some ill-constituted minds, in the contemplation of the unhappiness of others ; and this (of which Dickens's Quilp is an impersonation) we designate as Malevolence. Combativeness, again, in so far as it is a Psychological attribute, is the pleasurable idea of setting one's self in antagonism with others.

There are individuals who never manifest the least degree of *physical* Combativeness, who yet show a remarkable love of opposition in all their *psychical* relations with others. That objections will be raised by such persons to *any* plan that may be proposed, we can always feel sure, though we may not have the remotest idea as to what the objection may be in each particular case. Persons in whom this tendency exists in a less prominent degree, are apt to see objections and difficulties *first*, although their good sense may subsequently lead them to consider these as of less account, or to be outweighed by the advantages of the scheme. Such was the case with the late Sir Robert Peel. On the other hand, those who are spoken-of as of *sanguine* temperament, are apt to lose sight of the intervening difficulties, in the pleasurable anticipation of the *result*.

So, Pride (or self-esteem) consists in the pleasurable contemplation of our own superior excellencies ; whilst the essence of Vanity (or love of approbation) lies in the pleasurable idea of the applause of others. Again, in Conscientiousness we have the love of right, that is, the association of pleasure with the idea of right ; Veneration may be defined as the pleasurable contemplation of rank or perfections superior to our own ; and the source of Ambition, which is in some degree the antagonistic tendency, lies in the pleasurable idea of self-exaltation. In like manner, Hope is the pleasurable contemplation of future enjoyment ; Fear is the painful contemplation of future evil ; and Cautiousness is the combination of the desire to avoid anticipated pain, with the pleasurable contemplation (an extremely strong feeling in many individuals) of precautions adapted to ward it off. — The same view may be applied to the love of Order, of Possessions, of Country, of Wit, of

Humour, &c., and to many conditions usually considered as purely Intellectual. And, in fact, the association of any kind of that *emotional sensibility* (§ 157) of which pleasure and pain afford the simplest type, with *any idea*, or *class of ideas*, gives to it an Emotional character; so that emotional states are not by any means limited within the categories under which Psychologists have attempted to range them,—these being, for the most part, *generic terms*, which comprehend certain groups of ideas bearing more or less similarity to each other, but not by any means including all possible combinations.

The truth of this statement must be apparent to all who are familiar with the manifestations of eccentricity and insanity; for we frequently see pleasurable feelings associating themselves with Ideas, which to ordinary minds appear *indifferent*, or are even regarded with pain; and thus are engendered Motives which exert a most powerful influence over the conduct, and which, if not kept in restraint by the Will, render the whole being their slave. Thus one weak-minded youth was driven to commit a murder, by a passion for living where he could see a wind-mill; and another by a passion for possessing himself of every shoe of a particular kind which he chanced to see.—It may be also remarked, in this place, that the impossibility of classing all the Emotional states of mind under a limited number of categories constitutes a most serious and fundamental objection to any system which professes to mark-out in the Cerebrum distinct seats for the animal propensities, moral feelings, &c.

261. By those who regard the Propensities, Moral Feelings, &c., as *simple* states of mind, it is usually said that their indulgence or exercise is attended with pleasure, and the restraint of them with pain. But, if the view here taken be correct, it is the very co-existence of pleasurable or painful *feelings* with the *idea* of a given object, that causes *desire* or *aversion* as regards that object; since the mind instinctively pursues what is pleasurable, and avoids what is painful. And thus, according to the readiness with which these different classes of Ideas are excited in different minds (partly

depending upon original constitution, and partly upon the habitual direction of the thoughts), and to the respective degrees in which they respectively call-forth the different kinds of Emotional sensibility (as to which there is obviously an inherent difference amongst individuals, analogous to that which exists with regard to the feelings of pleasure or pain excited by external sensations,—sights, sounds, tastes, odours, or contacts), will be the tendency of the mind to entertain them, the frequency with which they will present themselves before the mental view, and the influence they will exert in the determination of our conduct.

262. The influence of Emotional conditions, when strongly excited, in directly producing involuntary movements, is readily explained on the idea that the Sensory Ganglia act as the centre of all consciousness, and that the Axial Cord is the real source of all movement. For the excitement of peculiar states of the sensorial centres through the instrumentality of the Cerebrum, will just as readily give rise to automatic movements, as the excitement of similar states by impressions made upon the organs of Sense. And the correspondence is seen to be very close, when the idea distinctly reproduces the sensorial state. Thus, the laughter excited by the act of tickling is a purely consensual movement (§ 79); but, in a very "ticklish" person, the mere *idea* of tickling, suggested by pointing a finger at him, is sufficient to provoke it.—So, again, as laughter may be excited by odd sights or sounds which do not in themselves excite any ideational state, but which act at once upon the "sense of the ludicrous," the same action may be called-forth by the vivid *recollection* of these occurrences; which, being attended with a state of the Sensorium corresponding to that originally produced by the sensation, gives rise to the same involuntary cachinnation. But laughter may also be excited by ideas that are much more removed from actual sensations; as, for example, by those unexpected combinations of ideas of a purely intellectual nature, which we designate as

“witty;” and here, too, we may recognize the very same *modus operandi*. For the mere sound or sight of the *words* excites no feeling of the ludicrous; the *sensation* must develop an *ideational* change; and it is the latter alone, which, reacting downwards upon the Sensorium, and there becoming associated with the Emotional sensibility, excites the impulse to laugh.—The same might be shown to be the case with regard to the act of crying; which may be either purely consensual, being excited by painful sensations; or may be induced by the vivid recollection of past or the anticipation of future sensations; or may be excited by ideas which have no direct relation to sensational states.—Again, the movements which take place under the violent excitement of the passion of anger, are of the same involuntary character; being directly prompted by feelings which may be called-up either by external sensations, or by internal ideas that have a like power of exciting them. Thus the passionate man who receives a blow, instinctively makes another blow in the direction from which it seemed to him to come, without any thought of whether the blow was accidental or intentional; while the idea of an insult, which is a source of mental disturbance, may excite the very same movement, although no bodily suffering had been experienced. There are many of the movements of Expression that are referable in like manner to sensorial states, whether pleasurable or painful, which may arise from ideational as well as from sensational conditions. Thus, as we have seen (§ 156), the cheerful aspect of some individuals is due to a sense of general *physical* well-being, and is altogether discomposed by anything which disturbs this; whilst in others, it may proceed from a happy frame of mind (which may be partly the result of original constitution, and partly of habitual self-direction), disposing them to take the cheerful view of everything that affects themselves or others, notwithstanding (it may be) great bodily discomfort. And the reverse aspect of gloom may in like manner proceed alike from bodily or from mental uneasiness.—All

these facts point, therefore, to the conclusion, that whether the elementary states of Emotional sensibility associate themselves with Sensations, with Perceptions, or with Ideas, they are simple *modes of consciousness*, the organic seat of which must be in the Sensorial centres ; and this corresponds well with the character of the purely Emotional movements, which, as we have seen, are closely allied to the Sensori-motor in the directness with which they respond to the stimuli that excite them.

263. That the Emotional and Volitional movements differ as to their primal sources, is obvious, not merely from the fact that they are frequently in antagonism with each other,—the Will endeavouring to restrain the Emotional impulse, and either succeeding in doing so, or being vanquished by the superior force of the latter,—but also from the curious fact which Pathological observation has brought to light, that muscles which will still act in obedience to emotional impulses, may be paralysed to volitional, and *vice versa*. Thus, for example, the arm of a man affected with paralysis, which no effort of his will could move, has been seen to be violently jerked under the influence of the emotional agitation consequent upon the sight of a friend. And in a case of softening of the Spinal cord, the jerking movements which were brought-on by the mere approach of any one to the patient's bed, and still more strongly by putting a question to him, were most violent in the lower limbs, over which he had not the least voluntary power.—It is in the different forms of paralysis of the Facial nerve, however, which is the one most peculiarly subservient to the movements of Expression (§ 195), that we have the best evidence of this distinctness. For it sometimes happens that the muscles supplied by this nerve are paralysed so far as regards the will, and yet are still affected by emotional states of mind, and take their usual part in the automatic actions of respiration, &c. ; retaining also their usual tension, so that no distortion is apparent unless voluntary movements be attempted. Thus, to select an action

which may be performed either consensually, emotionally, or voluntarily, a patient affected with this form of paralysis cannot close the eyelid by an act of his Will, although he winks when he feels the uneasy sensation that excites the action, and shuts the lids when the sudden approach of an object to the eye excites the fear of injury to that organ. On the other hand, the paralysed condition may exist in regard to the Automatic and Emotional actions only, so that the muscles lose their tension, the mouth is drawn to one side, the movements of expression are not performed, and there is no involuntary winking: yet the Will may still exert its accustomed control, and may produce that closure of the lids which does not take place in response to any other impulse.*

264. The Emotions are concerned in Man, however, in many actions, which are in themselves strictly voluntary. Unless they be so strongly excited as to get the better of the Will, they do not operate downwards upon the Automatic centres, but upwards upon the Cerebral; supplying the *motives* by which the course of thought and of action is habitually determined (§ 331). Thus, of two individuals with differently-constituted minds, one shall judge of everything through the medium of a gloomy morose temper, which, like a darkened glass, represents to his judgment the whole world in league to injure him; and his determinations being all based upon this erroneous view, its indications are exhibited in his actions, which are themselves, nevertheless, of an entirely voluntary character. On the other hand, a person of a cheerful, benevolent disposition, looks at the world around as through a Claude-Lorraine-glass, seeing everything in its brightest and sunniest aspect; and, with intellectual faculties (it may be) precisely similar to those of the former individual, he would come to opposite conclusions; because the materials which form the

* See the detailed accounts of such cases in Sir C. Bell's work on "The Nervous System of the Human Body;" also "Brit. and For. Med. Rev.," vol. iv. p. 500, and vol. xiii. p. 553.

basis of his judgment, are submitted to it in a very different condition.—Various forms of Moral Insanity exhibit the same contrast in a yet more striking light (§ 556); and the distinction between the *sane* and the *insane* is far more difficult to draw in this form of mental disorder, than when Intellectual perversion manifests itself. For we not unfrequently meet with individuals still holding their place in society, who are accustomed to act so much on *impulse*, and to be so little guided by the *rational will*, that they can scarcely be regarded as sane; and a very little exaggeration of such impulses causes the actions to be so injurious to the individual himself or to those around him, that restraint is required, although the intellect is in no way disordered, nor are any of the feelings perverted. We may often observe similar inconsistencies, resulting from the habitual indulgence of one particular feeling, or from a morbid exaggeration of it. The mother who, through weakness of will, yields to her instinctive fondness for her offspring, in allowing it gratifications which she knows to be injurious to it, is placing herself below the level of many less gifted beings. The habit of yielding to a natural infirmity of temper often leads into paroxysms of ungovernable rage, which, in their turn, pass into a state of maniacal excitement. The poor girl who drowns herself after a quarrel with her lover, or the nursemaid who cuts the throat of a child to whom she is tenderly attached, because her mistress has rebuked her for wearing too fine a bonnet, may be really labouring under a “temporary insanity” which drives her irresistibly to a great crime; yet, just as the man who commits a murder in a state of drunken frenzy is *responsible for his irresponsibility* (§ 545), so is the suicide or the murderess, in so far as she has habitually neglected to control the wayward feelings whose strong excitement has impelled her to the commission of her crime.—It not unfrequently occurs, moreover, that a delusion of the *intellect* (constituting what is commonly known as Monomania), has had its source in a disordered state of the *feelings*, which have represented

every occurrence in a wrong light to the mind of the individual (§ 559). All such conditions are of extreme interest, when compared with those which are met-with amongst Idiots, and in animals enjoying a much lower degree of intelligence: for the result is much the same in whatever way the balance between the feelings and the rational will (which is so beautifully adjusted in the well-ordered mind of Man) is disturbed; whether by a diminution of the Volitional control, or by an undue exaltation of the Emotions and Passions.

265. This double mode of action of the Emotions—*downwards* through the nerve-trunks upon the Muscular apparatus, and also upon many of the Organic functions (Chap. XIX.),—and *upwards* upon those Cerebral actions which give rise to the higher states of Mental consciousness,—affords a satisfactory explanation of a fact which is practically familiar to most observers of Human nature; namely, that violent excitement of the Feelings most speedily subsides, when these unrestrainedly expend themselves (so to speak) in their natural expressions. Thus it may be commonly noticed that those who are termed *demonstrative* persons are less firm and deep in their attachments, than those who manifest their feelings less: for, without any real insincerity or intentional fickleness, the strongly-excited feelings of the former are rapidly calmed-down by the expenditure of the impulse to bodily action which they have generated; whilst in the latter the very same feelings, acting internally, acquire a permanent place in the Psychical nature, and habitually operate as motives to the conduct. So, again, persons who are “quick-tempered,” manifesting great irascibility upon small provocations, real or supposed, are usually soon appeased, and speedily forget the affront; whilst many who make little or no display of anger, are very apt to brood-over and cherish their feelings of indignation, and may visit them upon the unfortunate object of them on some favourable opportunity, long after he had supposed that the occurrence which had given rise to them was

forgotten. There is an instinctive restlessness, or tendency to general bodily movement, in some individuals, when they are suffering under Emotional excitement; the indulgence of which appears to be a sort of safety-valve for the excess of Nerve-force, whilst the attempt at its repression is attended with an increase in the excitement. Most persons are conscious of the difficulty of sitting still when they are labouring under violent agitation, and of the relief which is afforded by active exercise; and this is particularly the case when the movements are such as naturally express the passion that is excited. Thus the combative propensities of the Irish peasant commonly evaporate speedily with the free play of his shillelagh, many irascible persons find great relief in a hearty explosion of oaths, others in a violent slamming of the door, and others (whose excitement is more moderate but less transient) in a prolonged fit of grumbling.

a. This view is most fully confirmed by certain phenomena of Insanity. It is a doctrine now generally received among practical men, that paroxysms of violent Emotional excitement are much more likely to subside, when they are allowed to "work themselves off" freely, without any attempt at mechanical restraint; and maniacal patients are now placed, in all well-managed Asylums, in padded rooms, in which their movements can do no injury to themselves or others.—The following case was related to the Writer by his friend Dr. Howe, of Boston, N.E., the instructor of Laura Bridgman. A half-idiotic youth in the Lunatic Asylum of that place, was the subject (like many in his condition) of frequent and violent paroxysms of anger; and with the view of moderating these, it was suggested that he should be kept for some time every day in rather fatiguing exercise. Accordingly he was employed for two or three hours daily in sawing wood, to which task he made no objection; and the paroxysms of rage never displayed themselves, except on Sundays, when his employment was intermitted. As it was considered, however, to be better for him to spend a part of that day in sawing wood, than to be irascible during the whole of it, his occupation was continued through the entire week, when

he became completely tamed-down, and never gave any more trouble by his passionate displays.

So, again, if a ludicrous idea be suggested to our consciousness, occasioning an impulse to laugh, a hearty "guffaw" generally works-off the excitement, and we may be surprised a short time afterwards that such an absurdity should have provoked our risibility; but if we restrain the explosion, the idea continues to "haunt" us, and is continually perturbing our trains of thought until we have given free vent to the expression of it.—Again, it is well known that the depressing emotions are often worked-off by a fit of crying and sobbing; and the "relief of tears" seems manifestly due to the expenditure of the pent-up nerve-force, in the production of an increased secretion. It is noticed in this case, too, that the absence of any such external manifestations of the depressing emotions, gives them a much greater influence upon the course of thought, and upon the bodily state of the individual. Those who really "die of grief," are not those who are loud and vehement in their lamentations, for *their* sorrow is commonly transient, however vehement and sincere while it lasts; but they are those who have either designedly repressed any such manifestations, or who have experienced no tendency to their display; and their deep-seated sorrow seems to exert the same kind of anti-vital influence upon the Organic functions, that is exercised more violently by "shock" (§ 41); producing their entire cessation without any structural lesion.

b. The Writer once heard the following singular case of this kind:—One of two sisters, orphans, who were strongly attached to each other, became the subject of consumption; she was most tenderly nursed by her sister during a long illness; but on her death, the latter, instead of giving way to grief in the manner that might have been anticipated, appeared perfectly unmoved, and acted almost as if nothing had happened. About a fortnight after her sister's death, however, she was found dead in her bed; yet neither had there been

any symptoms during life, nor was there any post-mortem appearance, which in the least degree accounted for this event,—of which no explanation seems admissible, except the depressing influence of her pent-up grief upon her frame generally, through the Nervous system.

266. The influence of Emotional excitement may operate upon the Muscles, however, not only in giving-rise to the movements which it directly calls forth, but also in affecting the power of the Will over the muscular system, by intensifying or weakening its action. For there can be no doubt that, under the strong influence of one class of feelings, the Will can effect results such as the individual would scarcely even attempt in his calmer moments; whilst the influence of another class of feelings is exercised in precisely the opposite direction, weakening or even paralysing the force which was previously in full activity.

It must be within the knowledge of every one, that, when *first* attempting to perform some new kind of action, the power we feel capable of exerting depends in great measure upon the degree of our *assurance of success*. Of this we have a good example in the process of learning to swim; which is greatly facilitated, as Dr. Franklin pointed-out, by our first taking means to satisfy ourselves of the buoyancy of our bodies in the water, by attempting to pick up an object from the bottom. And every one is aware of the assistance derived from the encouragement of others, when we are ourselves doubtful of our powers; and of the detrimental influence of discouragement or suggested doubt, even when we previously felt a considerable confidence of success. Of the almost superhuman strength and agility with which the body seems endowed, when the whole energy is concentrated upon some Nervo-muscular effort, especially under the influence of an overpowering emotion, the following remarkable example has been communicated to the Writer by a gentleman on whom he can place full reliance, and who was personally cognizant of the fact:—An old cook-maid, tottering with age, having heard an alarm of fire, seized an enormous box containing her whole property, and ran down stairs with it, as easily as she would have carried a dish of meat. After the fire had been

extinguished, she could not lift the box a hair's breadth from the ground, and it required two men to convey it upstairs again.

267. But the same Emotion does not always act in the same mode: thus, the fear of danger may nerve one man to the most daring and vigorous efforts to avert it, whilst another is rendered powerless, and gives-way to unavailing lamentations; and the ardent anticipation of success may so unsettle the determinative energy of one aspirant, as to prevent him from attaining his object, whilst another may only be sustained by it in the toilsome struggle of which it is the final reward. Now in order that this variety may be explained, and the *modus operandi* of the Emotions on strictly Volitional actions may be duly comprehended, we must here state two of the essential conditions of the latter: one of which is, that there should be not merely a distinct conception of the purpose *to be* attained, but also a belief that the purpose *will* or at least *may* be attained; whilst the other is, that the attention should be to a great extent withdrawn from other objects, and should be concentrated upon that towards which the Will is directed. The following cases illustrate these principles:—

a. The Writer well remembers being among those, who, forty years ago, tested the validity of the statement put-forth in Sir D. Brewster's "Natural Magic," that four persons can lift a full-sized individual from the ground, high into the air, with the greatest facility, provided they all take-in a full breath previously to the effort, the person lifted doing the same. He could readily understand upon Physiological principles, that a full inspiration on the part of the *lifters* would have a certain degree of efficacy in augmenting their Nervomuscular power; but he could not perceive how the performance of the same act by the *person lifted* could have any appreciable effect; and while many of his acquaintances assured him that, when all the conditions were duly observed, the body went up "like a feather," and that they felt satisfied of being able to support it upon the points of their fingers, he found his own experience quite different. Hence he came to the conclusion, after much observation, that the facility

afforded by this method entirely depended upon the degree in which it fulfilled the above-mentioned conditions, namely, the *fixation of the attention* upon the effort, and the *conviction of the success* of the method. Whenever the attention was distracted, and confidence weakened by scepticism as to the result, the promised assistance was not experienced.

b. The following little circumstance, communicated to the Writer by a friend, is a very characteristic illustration of the same principle. This gentleman related that, having been accustomed in his boyhood to play at bagatelle with other juniors of his family, the party was occasionally joined by a relative who was noted for her success at the game, and who was consequently much dreaded as an opponent; and that, on one occasion, when she was about to take her turn against him, he roguishly exclaimed, "Now, aunty, you will not be able to make a hit;" the effect of which suggestion was, that she missed every stroke,—and not only at that turn, but through the remainder of the evening.

268. Since, then, there is nothing which tends so much to the success of a Volitional effort as a *confident expectation* of its success, whilst nothing is so likely to induce failure as the apprehension of it, and since the tendency of the cheerful or joyous Emotions is to suggest and keep-alive the favourable anticipations, whilst that of the depressing emotions is to bring before the view all the chances of failure, the former will increase the power of the Volitional effort, and the latter will diminish it. And they exert also a direct influence on the Physical powers, through the organs of circulation and respiration; the heart's impulses being more vigorous and regular, and the aeration of the blood being more effectually performed, in the former of these conditions than in the latter.—But an altogether contrary effect may be produced by the operation of these two classes of Emotions on the concentrative power. For the more completely the mental energy can be brought into one focus, and all distracting objects excluded, the more powerful will be the Volitional effort; and the effect of emotional excitement will thus in a great degree depend upon the Intellectual constitution

which the individual may happen to possess. For if he have a considerable power of Abstraction and Concentration, and a full conviction that he has selected the best or the only means to accomplish his end, the intensest fear of the consequences of failure will only *increase* the force of the motive which prompts the effort; and the whole energy of which his nature is capable, will be put forth in the attempt. In a man of this temperament, the most joyous anticipation of success will produce no abatement of his efforts, no distraction of his attention, but will rather tend to keep him steady to his purpose until it shall have been accomplished. But the mind which is deficient in concentrative power is lamentably deranged by any kind of Emotional excitement, in the performance of any Volitional effort. For the fear of failure is constantly suggesting to him new distresses, weakens his confidence in any method suggested for his action, and makes him direct his attention, not to some fixed plan as the best or the only feasible one, but to any and every means that may present a chance of success, or may even serve to avert his thoughts from the dreaded catastrophe; whilst, on the other hand, the joyous anticipation of success leads him to allow his thoughts to direct themselves towards all its agreeable *consequences*, instead of fixing his Intellectual and Volitional energy upon the *means* by which that success is to be attained.

269. We have now to inquire into the influence which the *Will* has upon the Emotions;—a subject of the highest importance in regard to the *direction of the current of thought* and the *determination of our actions*. That the Will has such a power, is recognised in those common forms of admonition, “Control your passions,” “Govern your temper,” and the like. But the success of its exertion will mainly depend upon the judiciousness of the *mode* in which it is attempted; and here, as it seems to the Writer, much assistance is gained from the Physiological method of study

which it has been his aim to develop.—In the *first* place, it may be unhesitatingly affirmed that the Will has no direct power over the emotional Sensibility. We can no more avoid feeling *mental* “hurt,” than we can avoid feeling *bodily* “hurt.” But we have exactly the same power of *withdrawing the attention* from the mental “hurt,” that we have of withdrawing it from bodily pain (§ 124), by *determinately fixing it upon some other object*; and this is the mode in which (as all experience shows) the passions of Children, which are often excited to a degree that is out of all proportion to the exciting cause, and are but little dependent upon Ideational states, are most readily controlled.

The difference between a judicious and an injudicious Mother or Nurse is strikingly shown in the ways in which they respectively deal with the most familiar incident of Child-life. When the little one falls down and hurts itself, and sets up the loud cry of pain and alarm, there are (as Sir Robert Peel used to say), three courses open,—to soothe and ‘coddle,’ to rebuke and frighten, and to *distract the attention* by the interposition of some new object attractive enough to engage it. Now, the first method, however kindly meant, has the disadvantage of making the Child *attend* to its hurt, and of thus intensifying the feelings connected with it; which, being the very thing to be avoided, should never be had recourse to unless the injury is really serious. The second no doubt gives a motive to self-control; but that motive is inappropriate to the occasion, adding a sense of injustice to the smart of the injury. Whilst the third, by leading the Child to transfer its attention to a more vivid and pleasurable impression, affords time for the smart to die away, and makes the child feel that even when fresh it *can* be disregarded.—As age advances, the judicious Parent no longer trusts to mere sensory impressions for the diversion of the emotional excitement; but calls up in the mind of the Child such ideas and feelings as it is capable of appreciating, and endeavours to keep the attention fixed upon these until its violence has subsided. And recourse is to be had to the same process, whenever it is desired to check any tendency to action which depends upon the *selfish propensities*; appeal being always made to the highest motives which the Child is capable

of recognising, and recourse being had to punishment only for the purpose of supplying *an additional set of motives* when all others fail. For a time this process of external Suggestion may need to be continually repeated, especially where there are strong impulses whose unworthy character calls for repression; but if it be judiciously adapted and constantly persevered-in, a very slight suggestion serves to recall the superior motives to the conflict. And in a yet more advanced stage, the Child comes to feel that he has *himself* the power of recalling them, and of controlling his urgent impulses to immediate action.

270. In the *second* place, the Will can exert itself, as already shown, in preventing the *expression* of the excited feelings in action; by determinately bringing the Volitional control over the muscles to antagonize the Emotional impulse,—as in the cases already cited. It seems to the Writer, however, quite a mistake to suppose that the suppression of the muscular expression of an emotion, represses the emotion itself; on the contrary, as he has already shown (§ 265), the emotional state is more likely to last, if it does *not* vent itself in action,—unless, as sometimes happens when persons intentionally “work themselves up into a passion,” the muscular movements themselves operate *suggestively* on the mind, so as to augment, instead of relieving, the excitement (§ 494). This reaction is very manifest in persons of the *Hysterical* temperament, who, either from an injudicious system of education, or from habitual want of self-control, or from bodily disorder, give way to the most exaggerated and inconsistent expressions of their feelings,—smiles and tears, laughter and sobbing, being strangely intermingled, and being excited by the most trivial cause. That the deficiency here lies rather in the power of controlling the *thoughts* and *feelings*, rather than in that of directing the action of the *muscles*, appears from the fact that an Hysterical paroxysm may often be kept off by the threat of severe discipline; whilst, by judicious guidance, the patient may be led to cultivate her own power of repressing the first risings of the Emotional excitement,

by the determinate direction of her attention to some other object than her own feelings.

271. But where, *thirdly*, the Emotion is not a mere *passion*, but is a state of *feeling* connected with some definite *idea*, the power of the Will is most effectually exerted in withdrawing the mind from the influence of that idea, by *fixing the attention upon some other*. The power of *self-control*, usually acquired in the first instance in regard to those Emotional *impulses* which directly prompt to action (§ 262), thus gradually extends itself to the habitual *succession of the thoughts*; which, directed to the acquirement of knowledge in the first instance by the dominating Will of the instructor, who uses his pupil's love of praise or fear of punishment as a motive power, comes in time to be so regulated by the Ego himself, as to give him a great *indirect* power over the emotional sensibilities connected with them. For just as, by a determined effort, we restrain ourselves from laughing when laughing would be unseemly, so can a strong Volition keep out of view the idea that excites risibility, by a determined direction of the thoughts into another channel; as when, for example, in a place of worship, it fixes on the prayer or the discourse the attention which had been distracted by some ludicrous interruption. And this *determinate transference of the attention* affords the surest means of escape from the domination of thoughts and feelings which we feel it wrong to entertain. We cannot prevent the rise of these in our minds. As Archbishop Manning has truly said—"The memory of insults or great wrongs *will* arise in the mind, or brain, if you will, at the sight of the person who has outraged us; or by associations of time, place, or any one of endless circumstances; or, again, by the direct suggestion of others. So far, the thoughts [and, it may be added, the feelings prompted by them] may be spontaneous or involuntary on our part. Their presence in the mind is neither good nor evil. Their first impression on the mind, even though it become a fascination or an attraction to

an immoral act, is not immoral, because, as yet, though the Thought has conceived them, the Will has not accepted them."* It is the *acceptance of them by the permission of the Will*, that makes them Voluntary, and brings them within the sphere of Moral control; whilst it is the *intentional direction of the Attention to them* which gives them their Volitional character, and makes the *Ego* fully responsible for whatever he may do at their prompting.—The experience of the Physician here comes in to the aid of the Psychologist, in showing how Volitional control over Emotional states is best maintained :

We will take the case of a Man who has sustained a great shock by the loss of a dearly-loved wife, child, or friend, a disappointed affection, or commercial ruin. His Physical condition is lowered, the power of his Will is weakened, the painful impression seems branded into his innermost nature, he *cannot help* feeling it most acutely, he seems powerless to withdraw himself from it. He may be exhorted to "rouse himself;" every conceivable motive may be suggested to him for doing so; but all in vain. What is needed is the complete *distraction of his attention* from brooding over his misfortune; and the force which the weakened Will cannot of itself exert, must be supplied by the attractive influence of new scenes and persons, and the complete severance from painful associations. He yields himself passively to his advisers; at first "all seems barren, from Dan to Beersheba"; he looks up into the dome of St. Peter's, or down into the crater of Vesuvius, and finds "nothing in it." But gradually his bodily health improves; he begins to show some interest in what he sees and hears; and a judicious companion, like a good nurse, watches for every sign, and encourages every movement in the right direction, noticing what proves most attractive, and secretly planning to bring its attractions into play. At first, the patient seems ashamed of being cheerful, and falls back into his moodiness, as if he felt it a duty to hug the memory of his lost happiness; but these relapses, after a time, become less and less frequent. He begins to find that it is really much pleasanter to

* *Contemporary Review*, Feb. 1871, p 475.

forget himself, and to make himself agreeable to others, than it is to brood morosely over his troubles. With the re-invigoration of his bodily health, his Volitional power gradually returns; and he comes to feel that *he can resist the tendency to revert to them, by determinately* giving his attention to the objects around him. The resisting power required becomes less and less, the more frequently it is exerted; and at length the Mental health is completely restored,—the brooding tendency, however, being apt to recur, either when the Will is weakened by physical fatigue, or when old associations are revived with peculiar force and vividness.

272. A valuable lesson may be drawn from these familiar experiences, in regard to the mode of dealing with those unrighteous Thoughts and Feelings, which furnish temptations to immoral action of any kind. The Will may put forth its utmost strength in the way of *direct repression*, and may entirely fail; whilst by exerting the same amount of force in *changing the direction*, complete success may be attained. When the question is not of restraining some sudden impulse of excited passion, but of keeping down an *habitual tendency* to evil thoughts of some particular class, and of preventing them from gaining a dominant influence, it does not answer to be continually repeating to oneself, "I will not allow myself to think of this;" for the repetition, *by fixing the attention* on the very thought or feeling from which we desire to escape, gives it an additional and even overpowering intensity, as many a poor misguided but well-intentioned sufferer has found to his cost. The real remedy is to be found in *the determined effort to think of something else*, and to turn into a wholesome and useful pursuit the energy which, wrongly directed, is injurious to the individual and to society; just as, in "The Caxtons," the Poacher whose love of sport no fear of punishment could restrain, becomes a most valuable Bushman when persuaded to accompany Pisistratus to Australia.—Whilst, then, the Intellectual faculties are exercised in the acquirement of Knowledge and in the pursuit of Truth, by the Volitional direction of their own spontaneous and automatic

activity, the Moral character is formed, and the Conduct mainly determined, by the direction we determinately give to those Motive powers which give *energy* to all our work in life. And there is a strong Physiological probability that the effect of such habitual self-discipline does not end with the Individual, but is exerted upon the Race ; the Emotional tendencies having so much of the character of Instincts, that the Hereditary transmission of the form they have *acquired* may be expected in the one case as in the other (§ 84).



A handwritten signature or mark in the bottom right corner, consisting of a vertical line with a horizontal stroke at the top and a horizontal stroke at the bottom, resembling a stylized 'H' or 'K'.