PART II

GENERAL ANALYSES.
CHAPTER II

SYSTEMS AS DISTRIBUTED

Men attend, whilst 'wake they be
Ceaselessly and equably.

14.—ATTENTION AND INATTENTION.

It is winter time, and several of us are sitting around the blazing waiting-room fire. [Observe such an occasion.] While the others are busily talking, I am reading. The rumbling of trains penetrates from the depths beneath. Doors are being noisily opened and shut. Some persons are speaking loudly now and then in different parts of the spacious room while others may be heard crossing it. The street below sends its quota of noises. The place is haunted by sounds, if we but incline our ears. As with the sense of hearing, so with the sense of sight and with general sensibility. Yet, since the book I am interested in contains extremely hard passages, I am entirely absorbed in what I read. Consequently, so it seems, I hear nothing, I see nothing (except the page before me), I smell nothing, and I feel nothing. Or did I really hear and see and smell and feel, and have forgotten that I did so?

15.—SENSATIONS, IMAGES AND FEELINGS DO NOT EXIST APART FROM ATTENTION.

To test the likelihood of this conjecture, let us inquire into what is implied in following a conversation. In attending to speech we make good what is not pronounced, what is half-pronounced, or what we do not hear.† We put spaces between the words. We range them in sentences, and the sentences into paragraphs. Inwardly we track the path of thought. For

* I have assumed, what I feel to be indubitable, that at the present stage of scientific data of an advanced nature for the student of psychology.

† For convenience sake I have retained the term Attention, in spite of its vagueness and its misleading implication. My own opinions are given in sec. 33, and more especially in the last paragraph of that section.

† The conjectured trend of thought often helps us in interpreting what is only partly heard. Thus, having a headache, and some one saying to the "Are you going at eight?" I took that person to say "Have you a headache?"
the purpose of illuminating what is put forward, memories of all kinds are awakened, involving sometimes a considerable strain. On the other hand, what is irrelevant to the conversation is kept jealously apart. The rumbling of trains, the opening and shutting of doors, the movements of persons about the room, the chatter of other groups, the street noises, must not be intermingled with the conversation, or else all will be confusion. As with irrelevant sounds, so with what is irrelevant in general. Plainly, to follow a conversation argues a complex process. That process, in the case we are considering, implies a double direction. We must make sense of what is said, and we must banish what is irrelevant. If that be so, it becomes probable that I could not have followed the conversation while I was absorbed in reading. I was occupied with the book. Nothing else could I even have recognised as something or as a mass, unless the direction of the attention had changed. The sounds, sights, and other sensations—supposing, what is a contradiction, that there were such for me—jostled each other freely, and possessed precisely a like value. They were ranged in time, and not in order. The ordering is a distinct act.

A puzzle picture will help to elucidate the part which the sense of order plays. [The student should have a puzzle picture before him.] If we do not at once perceive the hidden figures, it is not because the outlines are not there. They are there just as much, or as little, as are the outlines of the figures first observed. It is only a certain form of education, leaving aside heredity, which forces us to see one set of lines to the exclusion of another set. Apart from educated activity of an advanced character there are only lines on the card, and the business of the attention is the formation of these lines into a distinct whole. When the attention is not directed to that task, we have no whole whatever. Indeed, the background, the lines, and the surrounding objects are one indifferent mass, or have passed away altogether, when the attention is withdrawn from them. To discern a single line, preventing fusion with the background and with the surroundings, to discern at all, implies attention.

Some geometrical patterns offer another convenient illustration. According as we direct our attention, so the lines form one whole or another,* X, W, M, V, □, ∆, etc.

Lastly, any bold sketch in black and white brings out strikingly the importance of regulative activity in forming an intelligible whole out of scattered lines and hints.

One may now with confidence answer in the negative the question which we asked at the end of sec. 14. Apart from acute attention, i.e., complex activity, there is no such thing as a conversation, and hence, as I did not busy myself with it, I could not have followed its windings. To

*The question of visual illusions is fully dealt with by Lipps, Raumästhetik, 1897. The reader may also consult Bolton, Illusions, 1898; James, Psychology, 1890; Jastrow, Illusions, 1892; Judd, A Study of Geometrical Illusions, 1899; Sully, Illusions, 1895; Thiéry, Über geometrisch-optische Täuschungen, 1895; Titchener, Experimental Psychology, 1901; and Wandt, Die geometrisch-optischen Täuschungen, 1898.
this must be added that the simplest sensation implies a complicated process. We are justified, therefore, in concluding that nothing intelligible—no total, no detail, no form—exists for us in the absence of attention. The whole outer world as given by the senses, as well as the whole inner world, is essentially dependent upon it. In walking along the street every object we meet with, however faintly perceived, is, qua perceived object, due to an intricate process.

16.—Attention is Dependent on Stimuli.

Ex nihilo nihil fit remains nevertheless true in psychology. Attention, at least physiologically considered, is powerless in the absence of extra-organic or organic stimuli, and is conditioned by their differences. Bent on attending, we may hear or we may see; but we cannot indifferently hear or see. Only certain light-waves or sound-waves, or what corresponds to them, lead to sight and hearing, while in their absence there will be neither visual nor auditory sensations. Yet it is still true that sensations and images, as such, are essentially connected with the action of the central nervous system. Open eyes and open ears, unless exploited, yield neither sight nor hearing. They offer faint modifications, void of tangible significance, which, if they are not instantly, or within a few seconds, utilised, remain lost for ever. They cannot, by any effort, be afterwards elaborated into a self-sufficing system of thought, e.g., the conversation which I missed I cannot build up afterwards by any effort of the will. [Test this.] It happens, though, occasionally that we have been told something very rapidly, and that we only decipher the word or the phrase after a moment or two. [Observe instances.] Here, however, there is something definite to work upon. * There is before us a distinct whole which, by re-attention, is transformed into another whole.*

We have advanced a step. Not only could I not have followed the conversation because of absence of attention; but to me, fully absorbed as I was, there came only doubtful impressions, and no sound or other sensation.

17.—The Beginnings of Sensations.

Where, then, lies the threshold of a sensation? This must be cleared up before we proceed. Under normal circumstances the sounds of the conversation would have seemed of a certain pitch and strength. Corresponding to them we meet with air-waves of a certain size and frequency, and these condition hearing. Given equal attention and, within narrow limits, the sounds we hear vary with the air-waves which reach us from every direction whether we are pre-occupied or not. [Test this.] Does close attention to the book necessarily mean that these air-waves yield nothing, because they yield no sound, and that they leave no trace in the

*As to this last point, see Daniels, The Memory After-image and Attention, 1895; also Lotze, Psychologie, 1881, ch. 3, § 4.
brain? Inquiry negatives these suggestions. I know that if I had been reading the book in a room where all was still, the course of thought would have been in an appreciably different state from what it is when I am reading in a noisy railway station. [Test this.] I somehow continue to ignore the conversation. I hold the sounds back, as it were. I stave them off. I prevent their intrusion. That is to say, I attend, among other things, to something which, when more fully or differently attended to, is sound. At this lowest point we are confronted with a vague detailless feeling. As the air-waves are less impetuous, so is the feeling vaguer, until at last we detect neither sound nor feeling. Probably there is a point where minimal systems become differentiated, and that point must be for us the threshold of a particular system. The lowest element is, therefore, a very faint feeling,—a feeling so faint that it makes no perceptible stir, and is apparently not reproducible,—a feeling which is perhaps so unstable that it disappears immediately it is specially attended to.

States of this faint quality exist in abundance. A good example is the effect produced by a noisy clock in an otherwise quiet room. Ordinarily, when absorbed, we do not hear the ticking, except at intervals. [Is that so?] We seem oblivious of the acoustic waves. Yet when the clock stops, we frequently notice the fact. [Experiment in this direction.] If the air-waves have left no mark, then their cessation should have made no difference. We conclude, therefore, that the sounds from the clock leave a faint trace on the organism; and also that this trace is not a sound, not the monotonous tick-tick, but some residue. The same holds true under certain circumstances of the innumerable ‘possible’ sensations which we are ever ignoring, and of the silent working of the brain as a whole.

We often observe things indolently. In such cases, our attention no sooner turns away than we forget that we have been attending in those directions. The subject is frequently discussed among psycho-physicists. (Münsterberg, Intensifying Effect of Attention, 1894.)

Faint feelings are of considerable frequency. Systems which were at one time sharp in outline and could be easily developed and re-membered, gradually lose these properties without being essentially changed in their constitution. (Ch. 3.) In casual routine processes (or organised reaction)* the feelings are still there generally; but they are no longer lively. The gentle stimulus, under the changed conditions, preserves the motive force of the pronounced activity. The general organic life of the body, the general individual life, as well as the routine of life, swarm with these silent and impalpable presences. However, as organic adjustments to demands become closer and induce far-reaching changes, so feelings are more and more dispensed with; till, with total re-adjustment, they cease to exist. In less extreme cases, the feelings remain, but* become almost wholly unobtrusive.

I have said that the dimmest of these feelings form the first degree in

*To emphasise the process involved in habit, I shall generally speak of habitual process as organised process, organised trend, trend, and economisation.
the scale of sensations. At their faintest they probably cease to exert an influence individually. It may be asked, "Is it not possible that in routine of a pronounced kind the work is done apart from any feeling?" This is extremely improbable. Reflection, strengthened by observation and experiment, admits feeling wherever there has been feeling before, provided that there has not been a profound change in the form of the activity. Where feeling wholly or nearly ceases, with the attention not diverted, we have discontinuance of the accompanying activity. If any action is ever accompanied by feelings, it will be continued only so long as the feelings continue. If these abate, the action also abates. Common sensibility supplies us plentifully with partial proof. We often sit in a certain position brooding over some problem and apparently oblivious of organic stimuli. [Repeat this experimentally, recording the results.] Gradually, quite gradually, the fact obtrudes itself that a limb is tired. There is no reason to believe that in such an instance there has not been a feeling for some time previous; only the uneasiness was so faint that it made no appreciable difference to the organism. Very slowly that difference developed until it is recognised as a particular stimulus. Hence when we are strongly absorbed, it is necessary to increase a stimulus considerably before action or feeling ensues. One other instance. I go to my shelves to take down a volume. [Observe such instances.] I do not apparently think of my errand. Suddenly, in the midst of some thought, I come to a standstill, and ask myself where I am going. However faint the residue or whatever its form, we must yet assume that the notion of an errand normally persists, and that when the notion vanishes, we naturally stop. Considering such happenings as these, we are warranted in assuming that no felt process ever becomes a feelingless process unless, indeed, a change or growth supervenes which displaces such process. (Sec. 56.) [Examine.]

18.—The Area of Sensations and Images.

More difficult still than fixing the beginnings of sensations and images (or primary and secondary systems), is the determination of their sphere of influence.

It may be generally posited that wherever there are nerve-endings, or that wherever the influence of the cerebro-spinal system extends, there exists at least a possibility of connected feeling. Under ordinary circumstances, it is reasonable to suppose, the majority of the feelings are so void of detail that they do not affect the general development of systems, at least not individually. The same holds good of stimuli when we turn towards them only minimally. Exploiting our general sensibility, i.e., those sensations not derived from the five senses, we gather that various portions of the body yield sensory systems when attended to. [Carefully repeat the following experiment.] I feel that I possess toes and feet, though I cannot tell from my observations the number of toes, or the fact that they are imprisoned in wool and leather. The feelings are extremely
homogeneous, and it is very difficult to discover any details. Thus I observe feelings of the same simple nature throughout the length of the lower limbs, especially where they are crossed, as they sometimes are, in sitting. So the other portions of the body, more particularly where they touch an object or produce slight discomfort, give rise to feelings which are little differentiated. Ordinarily these do not develop; but now this portion becomes stiff, now that becomes tired; now this position is unsuitable, now that part is over-heated or too cool. For this reason, attention to the body is intermittent.

19.—The Sense Problem.*

Five senses are generally allowed for, to wit, sight, hearing, touch, smell and taste. Inquirers have not been slow to add to this list. Among the additions proposed are the muscular sense, the temperature sense, the organic sense, the sense of equilibration, as also the pleasure-pain sense, and others. A strictly psychological investigation is not satisfied with these classifications; for they are based primarily on the circumstance that certain easily definable happenings go with certain sensations, e.g., the feeling of heat goes with frequently observed wax-melting weather, and that of cold with weather which sets the teeth chattering. Reasoning along this line, an event only needs to repeat itself often enough and it is assumed that a new sense is created. Leaving aside, however, the sources of the sensations, we come to the conclusion that there appears no good reason why all the sensory shocks we are liable to, with the provisional exception of sight, hearing and smell, should not be regarded as one sense. Cold, heat, pains, organic and muscular feelings, may well be thrown together for scientific purposes. So with the sense of contact. Touching a light object of similar temperature to my hand, it soon becomes doubtful whether I am touching anything at all, and, similarly, I believe I can feel the pencil behind my ear, though I have removed it some time previously. The various sensory systems connected with touch, such as contact, pressure, softness, hardness, smoothness, roughness, are, therefore, essentially organic sensations, only to be differentiated for practical purposes or for purposes of restricted classification. The sense of smell falls into the same category of feelings as the other senses we have mentioned. * It is so evident that we connect the sense of smell with our breathing through the nostrils [Experiment] and that the reference to an object of sight or touch outside the body, e.g., to a seen flower, is an after-thought. The sense of taste naturally forms no exception, for here also the thing tasted may be ignored. Objective reference is, however, seemingly unavoidable in thought when the sense of hearing is in question. I have not been able hitherto to localise my hearing in the ear or in any other portion of the body, except when the sounds were shown to proceed from parts of the

*The known facts as regards the sensations are well marshalled in the second chapter of Külpe’s Psychologie, 1893.
body. To naive observation it is as easy to imagine that the auditory nerves are placed on the finger-tips as in the ear, a fact which separates hearing from the sensations previously referred to. This unlocalisability is almost as strongly marked in the sense of sight. These two most highly developed senses, employed as they are incessantly, constitute at present in the adult—not in the child—a group which is clearly distinguishable from the dependent senses which are referred to some portion of the body. Another difference between the two groups remains to be noted: in the dependent group the sensations show little detail, while the senses of sight and hearing display much detail. However, I will assume here that the two groups appear as one in the final analysis; and I would suggest also that the secondary or memory group may profitably be assimilated with the first two groups.*

We may approach the sense problem from another direction. Finding that a sensation, say between the shoulders or in the mouth, is imperfectly localised, i.e., unaccompanied by another class of sensation, we learn, on reflection, that localisation is itself a matter of growth. Thus the infant, omitting hereditary tendencies, is readily thought of as having sensations which are not connected with other sensations, and which become so only in process of time, e.g., the feeling of cold is only gradually connected with the visual and other sensory and motor constituents of the bodily parts which suffer. The adult's sensory field, in this respect, may be, therefore, regarded as a highly developed complex.

Attempts at unifying the senses have been chiefly made in two quarters. Spencer (Psychology, 1890, i, pp. 148-52) assumes a primitive shock as the origin of all sense systems; while Horwicz (Analyse, 1872-8, passim) traces every primary or secondary system back to the primitive sense of pain.

Sensations are regarded as possessing several properties in common. Each sensation is supposed to possess (1) intensity,† (2) quality, (3) feeling tone or pleasure-pain tone, and (4) extensity or local sign, besides (5) duration.

(1) The existence of intensity is not an easily demonstrable fact. We speak readily of a sensation being intensely painful, as a toothache, for instance. Yet if we compare different painful sensations, we find in the sensations themselves no obvious marks which can serve as a basis of division. One of two pains may be judged much more intense, yet an analysis scarcely discloses a difference as regards sensations. In other cases, again, the so-called intensity must be connected with an increase in

* See for further discussion the end of this section and ch. 8.

† "All our ideas of intensity, when traced to their origin, refer to the degrees of our feelings. We speak of intense heat and cold, intense pressure, intense pleasure and pain, intense passion, intense bitterness and sourness, intense irritation; in all of which cases we speak of feelings in respect to their degree." (Spencer, Psychology, 1890, p. 266.) See also Sully, Human Mind, i, pp. 86-90; Preyer, Elemente der reinen Empfindungslehre, 1877; Preyer, Uber die Grenzen des Empfindungsvermogens, 1868; Preyer, Die Grenzen der Tonwahrnehmung, 1876.
the painful area affected. Strictly speaking, it would be impossible to tell from a pain sensation whether it is intense or not, e.g., a bad attack of neuralgia did not reveal to me sensations of any intensity. We tell (ch. 6) the difference by the varied manner in which the central nervous system reacts.

When we consider the question of heat and cold, the same facts meet us. As we become hotter, a host of changes are engendered: the heat spreads; comfort is felt; the heat becomes uncomfortable, and, at last, intolerable and burning. Indeed, when we touch unawares something ice-cold, we may think that we have touched something hot. In the evolution of felt cold, non-cold sensations indicate what is called the intensity. The stiffness and unmanageableness of the limbs, the smoothness of the palms, and the reactions generally, are the principal indications of cold. A very cold hand yields a wealth of sensations for the classification of which I should not like to be responsible. Organic changes of an extensive order destroy in this way the notion of simple intensity.

Experimenting with pressures, no more satisfactory result is obtained. Lifting an ounce is accompanied by passing sensations in the finger tips; in lifting a heavy book, sensory changes supervene right up the arm; and in lifting a heavy piece of metal, the whole body—head, trunk, extremities—seems to become alive with sensations. On the other hand, putting these different weights in a balance, no such multitude of changes is traceable. Hence "intensely heavy" has here again reference to complex organic changes which are of secondary importance as far as the feeling of pressure is concerned. We conclude, therefore, that increase or decrease of weight or pressure, is marked by changes which defy mathematical statement.

If we examine the other senses, the same state of things repeats itself. An intense light is one that hurts our eyes or one that illuminates well. In the first case we have a special non-light effect, for pain is not a fact of light. In the second case we also ignore the light, and study its illuminative effects. An intense light is also better seen, shows more details, and is more easily attended to; but these properties refer to the nature of the attention process. A dull light has after all a different quality from a bright light.

A similar analysis holds of the other senses. [Test.]

We may hence conclude generally that while certain definite and easily calculable changes are observable in the non-organic world, these are, roughly speaking, accompanied in the organic world by indefinite and only indirectly calculable effects. It is one thing to register the fact that a change is felt; it is quite another to determine the nature of that change. For this reason the word intensity is scarcely used in the following pages, the words aggressiveness, obviousness and warmth of feeling taking its place. However, I have no intention of declaring that the question is settled.*

*See Heinrich, Die moderne physiologische Psychologie, 1899, pp. 43-58.
(2) The quality of a sensation is more evident. * Blue is different from red and red is different from green.

The difficulty arises when we wish to determine the limits of qualities, and for this reason it would perhaps be safest to say that every appreciable sense change is a change in sense-quality. Thus two reds which impressed us alike would be the same in quality; while absence of identity would imply difference in quality.

It is not easy to discover sharp divisions in the qualities. * If a certain shade of bright scarlet and a certain shade of dark green were the only two shades known to us, we should have two defined colour qualities; but this is far from being the case. The sea at which I was looking yesterday, showed, if I mistake not, distinct traces of all shades of grey—from white to nearly black, all shades of green, all shades of blue—from greenish blue to purple, all shades of yellow, and traces of red in the purple. And these variations melted one into the other †. What is true of the colour sense, seems generally true of each of the higher senses. [Test.]

The graver question now arises as to whether one sense shades into the other, whether, for instance, hearing shades into seeing. We have learnt already in this section that the inferior senses apparently do so. If I now gradually lower the eyelids till they are almost closed and look at an inverted picture, I notice the following. [Experiment.] Through loss in detail the sense of depth is entirely gone, and from the same cause, things are located nowhere, or, as we should say, in the eye. The blur which excludes colours, forms and spatial relations, suggests something felt rather than seen. • At all events, this blur seems to me distinctly of the nature of a confused feeling, almost void of all optical suggestion, certainly free from shapes or lines. In this manner it is possible that we may bridge the widest gulf between the senses. Again, a low hum, when it is a question of the sense of hearing, is equally suggestive of feelings like touches or temperatures ‡.

(3) The nature of feeling tone or sense-feeling, is amply discussed in ch 6.

(4) According to Prof. Ward and others the feeling of extensity is the basis of extension. Thus he reasons that if we paste one postage stamp on the back of the hand and then one next to it, we obtain a sense of difference which lies at the basis of the sense of extension. [Test.] I have tried the experiment, but with most disappointing effect; for the sensations themselves gave no notion of the space covered; strictly speaking, indeed, they did not tell that any space was covered. The sensation was

* As to the nature of quality, see Sully, *Human Mind*, 1892, i, pp. 90-4.
† Magnus, *Die Entwicklung des Farbenunnahmes*, 1877.
‡ For a fuller discussion, see sec. 189.
only connected, and that at first alone, presumably through fore-knowledge, with a particular portion of the known hand. From this Prof. Ward and others argue that every point of the body's surface yields sensations of its own, and that from these differences, from these local signs, we develop the notion of extension. Hence, even in sight the points affected by stimuli are supposed to yield us the material for spatial judgment. The fact that the bodily surfaces are part of an organic structure, should make us diffident in too readily adopting Prof. Ward's view. Besides, the cases cited are far from convincing. I may have a piece of something in a tooth, and yet not know which tooth, whether upper or lower, whether to the right or to the left. Thus perhaps, generally speaking, localisation is the result of organisation of sensations into systems with the constitution of which we have become familiar.

Prof. James has a long chapter on Space, in which he contends, unfortunately without referring to the facts, that extensity is a primitive quality of sensations. As Ward, equally with James, says little concerning the actual cutaneous systems, I shall here insert a few words on the subject. (1) I pass the tip of a finger across a basket chair. Here we have alternating feelings of pressure, warmth, smoothness, softness and strain, besides the feelings connected with the other portions of the hand and arm affected; and in addition, there are feeling-less intervals, and the skin feelings are connected with sights, movements, etc. (2) Instead of passing the finger tip over the object, I pass the object over the finger tip, with similar results. (3) Instead now of using one finger tip, I experiment with various portions of the body, with like results. (4) Much practice has made us experts in interpreting touch systems, e.g., the bridge of the nose feels hard and smooth; the lips feel soft, warm and rounded; the back of the hands feels hairy, irregular; and so forth. Since, then, movements and sensory systems are familiar to us, we interpret what happens by means of a number of signs which remain almost the same with every portion of the body usually employed in touching. This is the easier to understand when, as we shall learn further on, we find that change or movement is essential to tactile divination, and that absence of attention leads to tactile insensibility. Our first conclusion, therefore, is that as localised cutaneous feelings are largely due to touch, they are interpreted in the same way; the relative softness, warmth, irregularity and strain being our guide. The whole body would in this way come to be known, and the cutaneous feelings would be connected with sights, touches, notions, etc., forming an easily interpreted system of knowledge. Further, the most intimate cutaneous feelings are only exemplifications of the factors met with in touch. Hence a variety of factors and not specialised feelings, will indicate the locality of a hurt or a single touch.

It would be dangerous to dogmatise as to whether there are any essential differences in the different feelings derivable from various parts of the cutaneous surface. What I do hold is that there are no appreciable differences. There may be more diffused strains, more pricks, more changes; but these cannot be called sensory qualities. Consider the complexity of the problem. A small piece of paper is allowed to touch the back of the hand, and is then removed. Now touch fibres are not very closely placed, and therefore only some points of the surface are touched; the surface is very irregular, and hence not every fibre has been touched; the effect extends to other parts and to deeper lying parts of the hand; strains diffuse the effect of the contact; and constant attentional and organic re-adaptation produces other rapid changes. If we carefully attend to the feelings, nothing but casual pricks or dim changeable feelings are noticeable, while where a feeling is only vaguely localised, there the feelings connected with it and already known hint at its position. Thus the data in any instance warrant no conclusion as to size of any part affected or as to its position or shape. To put it differently, any
of the various cutaneous feelings, however extensive in fact, are easily imagined as being connected with a spot of 1 mm. in circumference in any portion of the body.*

Hence our general conclusion is that sensations have no primitive quality of extensity or volume, and that such qualities are due to complex developments.†

A special study of the nature of touch suggests conclusions of wide bearing and cardinal importance. Placing the fingers, hands, arms, limbs, head and other portions of the body, in different positions, and resting them in that position for some little time, it is found that the customary sensations connected with such acts of contact disappear. Especially is this the case when the eyes are diverted or closed, or better still when the position is not uncomfortable and is not chosen. Hence the first conclusion, generalised, runs: Total rest excludes all sensations.‡ [Text.] This proposition explains various points of interest. It obviates the strained assumption that there is a hidden field of attention in which all that would be detected by the live senses within and without the body, has a place and leaves an effect. It implies rather that absence of normal attention argues a deadness or slumber as regards feelings in those directions. It explains how that which is monotonous makes men drowsy, tends to hypnotise them, and how quiet sleep, and life immediately after birth, is sensationless. Hence, naturally, when falling asleep or awaking, we cannot easily tell how the different portions of the body are disposed.

Sensations, then, imply change or movement. If, accordingly, after careful conjecture, with eyes closed, I calculate that a finger lies in such and such a position, I have only to move if I wish to make certain of whether I am right or wrong. Consequently, we reach our second conclusion that sensations only exist where there is change and where such change is not monotonous or repetitive. [Text.] This conclusion completes the first one, for we find that any monotonous system of changes leaves as little of a sensory residue as monotonous rest; that, indeed, the two, if closely considered, are one.

These two conclusions fail apparently to explain how we can, for instance, apprehend a series of touches simultaneously; and, in fact, by themselves the two conclusions leave the problem just raised unsolved. What we find, however, is that all normal sensing or integrating implies after-sensations. For example, trying to read a newspaper poster at some little distance in a very busy thoroughfare, I find that, owing to the many intervening passers-by, I can only catch a few letters at a time. This suggests that though after the reading, and as we read, we may see a con-

* Stricker (Das Bewusstsein, 1879) reasons, incorrectly in my opinion, that we instinctively know where a sensation is to be located. He says, for instance: "Persons who have not the slightest notion of the position of their internal organs, can tell immediately where the pain is felt when an internal organ becomes diseased and pains them" (p. 33).

† The question of extensity is ably and almost exhaustively discussed by Lotze, Medizinische Psychologie, 1852, bk. 2, ch. 4.

‡ Preyer (Die fünf Sinne, 1870, pp. 26-7) mentions that in sitting quite still, all sense of position is lost, and he explains that active touch and sight are necessary to determine position. See also Sternberg, Die Lage unserer Glieder, 1885.
siderable portion at a glance, we really observe but a minimum at a time, the other portion being the effect of the retarded death or slow vanishing of minimal sensations. Hence we reach the third conclusion that without after-sensations, there are no sensations proper. [Test.]

A difficulty which was met with in the course of arriving at the first conclusion, brings us to our fourth conclusion. I had frequently noted that I interpreted any particular sensation or position by the many others that were combined with it, e.g., I connected the sensations in the fingers with the sensations in hand, arm and trunk. Following the hint, I arrived, after some experimenting, at the result that we very seldom observe a sensation by itself; but that we generally deduce its place from its known position in a considerable system of sensations. In any case of doubt, due to whatever causes, as we have seen when speaking of extensity, we, therefore, to some extent, arrive deductively at the nature and the place of any sensation. For this reason, to the adult, and this is our fourth conclusion, sensations are given in an organised system. [Test.] An organised system implies a preceding chaos, and accordingly we learn that to the infant, sensations appear, as it were, in the air. Unfamiliar and unconnected as the infant's sensations are, he neither places them nor needs them much. Only with more of life, do the tactile feelings become connected with each other and with other classes of feelings and sensations. Hence touching, like seeing, is meaningless to the infant, and only grows to have a meaning for him as the course of events welds together similar sensations into different systems. At least, the infant of four months whom I had under observation since birth, fully illustrates what has been said above. Two problems are involved, among others, in the conclusion reached in this paragraph. The first one is that all uniformity as expressed in character, general thought, special thought, primary and secondary existence, action, movement, space, time, order, and the like, are but an exemplification of organised complications, of precisely the same weight fundamentally. My observations on infants, and the experiments which form the basis of these conclusions, also suggest that, in the human being at least, there is steady development along all the lines, and not full-blown inheritance. The second problem refers to dreams specially, and illustrates incidentally some of the problems of the imagination and the memory. Mr. Bradley (On the Failure of Movement in Dreams, 1894) has raised the question of how far we feel whilst asleep, and here I may venture on an answer to his query. As dream-life implies considerable disorganisation, so it implies disorganisation among the sensations, aggravated by disorganised movement. Hence I have more than once satisfied myself that in dream-life touch (and other) sensations are freely ignored and freely placed into any kind of fanciful system, the reason being that fundamentally the value of the parts has no defined meaning apart from a larger whole.

In some experiments upon effort, with the attention diverted, I found to my surprise that while the effort—say, of freely holding some heavy object—continued, all "sense" of effort, together with the many connected arm
and other sensations, were lacking. This confirms our second conclusion that sensations only exist where there is change. I have since observed in many instances that habitual action—and most action is habitual—is only accompanied by sensations when a certain maximum share of attention is turned towards it. So in all kinds of aches, as neuralgia, minimal concern with the ache, excludes sensations. Hence we reach the fifth conclusion, that sensation and muscular activity are not necessarily connected. This becomes obvious when studying the development of an infant: the incessant movements (still fitful and clumsy) of every limb and every portion of it, are evidently something quite apart from the accompanying sensations. As we shall see in ch. 6, the bare feelings in aches suggest no pleasure-pain value and no action; and what holds good of the adult, holds good, of course, with increased force of the infant. Strictly speaking, the sensations are one thing, and the movements another. The feelings—as distinct from movements—connected with fears, joys, pleasures and pains, are something separate and develop to a large degree separately and differently, and to some extent remain always separate.

Finally, our special study of touch sensations suggests a sixth conclusion, namely, that all sensations and sensation complexes, all movements and movement complexes, as they appear in the life of an adult, are close repetitions of previous sensory and motor complexes. [Text.] I found that, however I varied or found varied the postures in sitting or standing, or whatever varied movements of a large or a small range I made, it was always some movement which I had previously practised. The only exceptions were such as occurred in accidents or in learning a movement. Infant life makes this conclusion intelligible. The child, as if it had in view a deliberate purpose and one well-conceived, is constantly performing fitful movements of endless variety; and it keeps performing these till, to all intents and purposes, it has run the gamut of possible movements and their combinations. An adult, therefore, re-members and performs the overwhelming majority of his actions. And what is true of movement, is true of percepts and ideas, of primary and secondary compounds. By the time the infant has been transformed into the adult, the thoughts and the classes of thoughts combine according to habits that have become no less unbending than the laws of the Medes and Persians. Petty shifts, undiscriminating habits and piercing thoughts, are all equally the result of growing organisation, determined by natural selection within the life-time of the individual. As we shall see in chs. 3 and 4, our whole life, at every stage of development—including the simplest sensations and movements—reflects systems of organised complexes, and all change is produced by a further differentiation in such systems under the pressure of needs.

20.—Classification of Systems.

The classification of systems, after what has been stated, becomes a comparatively unimportant matter. Perhaps neurology will, in time, draw for us distinctions which we do not now admit. Still, such conclusions as we
have reached shall be exhibited here. Under the heading of *feelings*
should be ranged sensory systems which are indefinite and not easily definable in their nature. (1) Those feelings which generally accompany
pleasure-pain belong to the class we are considering. They cannot be
defined from each other or from other feelings. The connection between
them and pleasure-pain is accidental. (Ch. 6.) (2) The feeling of effort or
self-assertion must be ranged with the above. Were it not for the physical
effects which we note, we should never think of distinguishing between it
and other feelings. In itself it has no power, no more than a visual system.
It is a servant and not a master. It is in attendance and not in command.
(Ch. 7.) (3) To the same series belong the emotions. Their importance
is fictitious, and is only derived from their association with activities more
or less violent. They have no more power to move us than the other
feelings. (Ch. 7.) (4) The passions, desires and appetites belong to the
same category, their complexity being constituted by their many known
relations. (5) So also do the feelings of touch; those connected with
temperat re, pressure and the muscles; and intra-organic feelings generally.
(6) Those feelings which constitute the general impression which an object
makes on us, and which we shall call summary feelings, belong to the above
order. (7) Combination feelings must be similarly placed; they embrace
those feelings of doubt, certainty, reminiscence, oblivion, etc., etc., which
can be traced in the course of thought. With a more detailed study of
sensibility these are destined to gather more and more meaning; but at
present they are unattached, like the infant’s bodily sensations. With
psychological progress will come localisation in a system. The above
enumerated feelings should be looked upon as elementary systems or
feelings.

Nearest to the above feelings is the sense of taste and that of
smell. These, especially the latter, have a stronger individuality than
the feelings we have enumerated. Let us call these *semi-advanced sensations*, as representing a transitional form between feelings and advanced
sensations.

The *sensations* of the first order are seeing and hearing. In these
alone, if we omit physical exercise, is a synthesis possible. There is no
counterpart to a melody or a picture in either feelings or semi-advanced
sensations. However, sight and hearing do not occupy the same position,
for sound has considerable affinity with feelings. The sensation of hearing,
except for its synthetic and objective character, is hard to distinguish from
feelings proper. A noise in the head, a jarring sound, reminds us of the
latter. In sight, on the other hand, the synthetic character is prominently
marked; the features can be distinctly defined; and passivity of effect is
almost absolute.

The life of action, inclusive of memory, falls under the headings of
primary and secondary feelings, feelings or elementary systems, semi-
advanced systems, and advanced systems. In the secondary series there
are no new elements discernible: we see and hear and feel as in normal
outward life, only the springs are central rather than outward or afferent (ch. 5); but that in itself constitutes no striking difference. If sight is best re-produced, that is because it is the king of senses; and if smells are hard to re-integrate, that is probably because smell is so seldom resorted to. With varying evolution any of the other senses or feelings might occupy the place of sight (sec. 189.)

Systems are thus divided into (1) feelings or elementary systems; (2) semi-advanced systems; and (3) advanced systems. The three together may be called Systems.

The mechanism of thought is as yet only traceable on the neural side.

21.—Keen, Normal and Lax Attention.

We have seen that the endeavour to understand difficult paragraphs was inconsistent with following a conversation. What is the fact which explains this inconsistency? Why should keen activity in some directions exclude keen activity in other directions? Further investigation will, I hope, supply the explanation. Meanwhile we may here profitably investigate the degrees of attention.

The book which I read I found, at best, troublesome to follow. To secure adequate comprehension, intricate passages, with their windings and interconnections, had to be grasped simultaneously. In trying to assimilate what I was reading, the attention had to be more and more restricted to the elucidation of some detail, and had to be kept fixed on that. [Challenge the preceding statement.] I had to be oblivious of everything that passed about me. Such keenness, such prolonged preference, is, however, not common. It more frequently happens that we are interrupted by a conversation going on near us, or by any striking sound, sight or other sensation. [Observe normal occasions.] Usually we should find it difficult not to listen to at least parts of the conversation, and commonly we should also notice various trifles. In this normal condition the field of attention is not determined for any length of time by one thought, and we are not so absorbed that we could not be easily aroused. We still ignore the majority of objects around us; but these are not of a nature to appeal to us strongly. Advancing another step, in the opposite direction to that of being absorbed, the attention becomes lax, and we find ourselves rambling in thought, following everything in turn, but nothing long. We are, in fact, in a state of reverie: more open to overtures, while the field of activity is changing repeatedly. [Examine such cases.] Hence we see that (1) in keen attention we are almost wholly oblivious of our surroundings (inner and outer); (2) in normal attention we are to some extent oblivious of our surroundings; and (3) in lax attention we are guided almost solely by casual impressions derived from our surroundings (inner and outer).

To conclude. Looking about me carelessly I notice little in each of a large number of objects. Looking closely I apprehend about as much in one of
those objects.* The amount observed has remained the same in both instances.† Whether attention is keen, normal or lax, entails no difference as to the quantity dealt with. \[Try to disprove this\]

22.—Attention, in the Normal Waking State, is Quantitatively Alike with All Men at All Times.

It appears from the above that the total quantity of attention or mental activity is always the same, or nearly so, increased activity in one direction being at the expense of decreased activity in another. Attention, in any being transformation or expenditure of energy—on the physiological side—we can understand how it is that, if our fund is limited, employing labour in one direction, as in concentrating our forces on the niceties of one problem, we are debarred from employing the same part of the fund in another direction. If we, therefore, wish to attend to many details at once, the activity must be judiciously distributed over a large area, i.e., we notice little in each of several objects. Hence keenness of attention will vary inversely with the quantity which we wish distinctly to observe or understand. This we find is actually the case, e.g., we can sharply fix a whole landscape; but then its bare form alone can be apprehended. \[Exceed the limits of fixation.\] We are not surprised, therefore, that under ordinary circumstances we meet with an amount of attention, or neural activity, of almost equal degree in every human being.

Lips roughy agrees with the tenor of this section. “When the vital conditions remain uniform, and during short periods, psychic force may be considered as at least approximately constant, and this constancy may be applied to explain conscious facts” (Grundätzichen des Seelenlebens, 1883, p. 174). Here the agreement ends. Ladd makes primary fixation to cover the whole field of consciousness. He says: “Primary attention, essentially considered, is the variously related degrees of psychic energy expended upon the different aspects, elements, and objects, in the one field of consciousness.” (Psychology, 1894, pp. 74-5). Here, if I am not mistaken, Ladd fails to recognize that the “aspects, elements, and objects,” are themselves complexes. Kohn (Zur Theorie der Aufmerksamkeit, 1893) holds opinions similar to those of Ladd. Excepting these three writers I recall no others who do not very considerably limit the

* “The greater the number of objects to which our consciousness is simultaneously extended, the smaller is the intensity with which it is able to consider each.” So writes H. Milton (Metaphysis, ed. 1877, i, p. 237). From the point of view of attention, the distribution, and not the intensity, is changed. We notice a dozen points in a grain of sand, instead of a dozen points in a sea-shore where the grain lay. So also I see the fanciful wall-paper as well as a picture on the wall. Instead, I may lessen the wallpaper detail, and increase the picture detail, and further increase the details as to one figure of the picture at the expense of all other details. Lastly, I may attend principally to the fan in the picture or to a flower on that fan, which flower I had not at first noticed at all. The quantity of detail in all these cases, as can be easily verified, remains the same. Intensity has only regard to the feelings observable in keen attention.

† Stewart (Elements, 1808, ch. 2) holds that only the minimum visible can be observed at a time. He thus reduces the field of attention to a point. So Peyer, Naturwissenschaftliche Thatsachen, 1880, p. 111: “Only one sensation can be felt at one moment, and that because the attention cannot be divided.” See also Wundt, Messung des Bewusstseinsumfanges, 1890. and Zum Prüfe des Bewusstseinsumfanges, 1891.
range of attention. For instance, Ribot (Psychologie de l'Attention, 1889, p. 175) contends that if we take men in the mass, "spontaneous and especially voluntary attention represent exceptional states."

So Dr Stout, Manual of Psychology, 1898, p. 65.

"Attention is simply cessation in so far as it finds satisfaction in the fuller presentation of its object, without actual change in the object."

23—Ill Strain, Desire to Attend, etc.

When we speak of effort, or strain, from the strictly psychological point of view, we mean a feeling or set of feelings that indicate the presence of a need which persists in seeking satisfaction in the face of solid obstacles.

The feeling of effort is almost imperceptible in lax attention, and, largely so, in normal attention, because, in these cases, solid obstacles to needs do not exist or are avoided. Also, when neural functioning is more vigorous, as on account of a spell of extra good health or spirits, we think with less difficulty, and there appears at such times a feeling as if a strain had been removed. When health is precarious, the contrary effect is commonly observed, our thinking being accompanied by a decided feeling of effort. When attention is keen, as in pronounced deliberation, this feeling is also noticeable. The act of intentionally ignoring the surroundings, of turning from the conversation to the book, is accompanied by a distinct feeling of this nature. [Add to this list.]

When we try hard to remember something, when we wish to rid ourselves of a thought which resists disintegration, when we follow a closely reasoned argument, when we wrestle with a difficult problem; when we think about a subject in the face of distractions; or when we are dead to the solicitations of sense, or, in short, when a need persists in seeking satisfaction in spite of discouragement, this feeling is present in a marked form. We are at such times that we are making an effort, that there is a feeling of strain, that the mind is active, and the like. The feeling itself belongs to the class of central or thought feelings, and derives whatever significance it boasts of from the changes which it accompanies. This feeling is by no means a measure of work done. When interest is deep, or when excitement or a strong motive is swaying us, we quickly lose sight of the world around us without noticing any considerable strain. On the other hand, in the absence of interest, or when in bad health, there is little work done, while strenuous endeavours of a need to satisfy itself under those conditions are yet unprofitable and fatiguing.

Sometimes, again, we are unable to make a sensible effort, the need being balked as when we wish to stay a torrent of irrelevant thoughts which nevertheless hurries on undisturbed, as if in mockery. We will decidedly, and there exists a determination, which is unchallenged and persists, yet there is no perceptible feeling of effort nor any effect as the result of our volition. Effort and change are not related as invariable antecedent and resultant. *Change in what is immediately given may proceed in spite of effort to the contrary—one need being easily vicer over another; effort may be unable to effect a change, and there may be decided...*
willing without any felt effort. Corresponding with this feeling, but not proportionately, we have on the physical side work attempted or done. After a good night’s rest, we are fresh and full of energy. After a holiday, we return to town reinvigorated. After a bad night’s sleep, we feel tired, and the attention has its point blunted. After prolonged exertion we are exhausted. [Test the above statements.]

Some Opinions.—Bailey, Letters, First Series, 1855, p. 85: “Attention, when not the result of strong feeling, . . . is only purposely directing our observation or thoughts to a particular object.” Bain, Emotions and the Will, 1875: “What the will can do is to fix the attention” (p. 370); “in mental attention we can fix one idea firmly in the view, while others are coming and going unheeded” (p. 370). Baldwin, Senses and Intellect, 1890: “Attention intensifies a mental state” (p. 72); “the most essential peculiarity of attention is a feeling of expenditure which its exercise occasions in mental life” (p. 69). Beneke, Neue Psychologie, 1845, p. 142: “What we commonly call the degree of attention bestowed on a sensory content, is nothing else but the relation between the totality of existing traces [or developed dispositions, p. 219], and the number of those which actually enter into the present content.” Bradley, Is there any special Activity of Attention? 1886: “Attention (whatever it may be besides) at any rate means predominance in consciousness. . . . That which we attend to is said to engross us. . . . We may compare it to the . . . area of distinct vision in the retinal field” (p. 306); “the machinery [of attention] consists of an idea which is able to dominate and so fix an object connected with itself” (p. 312). Cappie, Some Points in the Physiology of Attention, Belief and Will, 1886, p. 201: “Attention is the bringing of the consciousness to the focus in some special direction.” Dewey, Psychology, 1887, p. 133: “The essential characteristic of attention is activity directed towards some end.” Éponillé, in Brain, 1890, p. 351: “Attention rather makes [sensations] more distinct, qualitatively more differentiated by isolating and protracting them in consciousness.” Iherhart, Psychologie, 1825, § 128: “In its essence attention is nothing but the power of producing an intensification of perception.” Hodgson, Metaphysic of Experience, 1898, iii, pp. 124-5: “Attention is a reaction called forth or determined by new, prominent, or comparatively vivid feelings, or changes in feeling, and is the note we take of them as features in the current of consciousness as it occurs. It is more than the reaction by which we simply perceive; it is a heightened reaction which is forced upon us by certain perceptions, which we then perceive either in contrast with, or to the exclusion of, others.” Heinrich, Die Aufmerksamkeit, 1896, p. 384: “Where the physiological conditions favor the reception of the stimulus, there men say that the impression has been attended to, or has become clear; where the same conditions diminish the effect of the stimulus there men say that the impression has not been attended to, or has been vaguely apprehended.” Hofding, Psychology, 1891, p. 315: “It is precisely the gathering of energy round some one idea as the centre of association, that constitutes attention.” James, Psychology, 1890, i: “Everyone knows what attention is. It is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought. Focalisation, concentration of consciousness, are of its essence” (pp. 403-4). “We never make an effort to attend to an object except for the sake of some remote interest which the effort will serve” (p. 415). Keirig, Die Aufmerksamkeit, 1897, p. 2: “Attention is an act of will directed towards making an outer impression or a reproduced idea, or parts of these, clear and distinct.” Kulpe (Psychologie, 1893, p. 9) holds the regulation views. Ladd, Psychology, 1894, p. 81: “The distribution of attention depends upon intensity of feeling.” Lips, Grundzüge, 1883, p. 620: “Attention is no special psychic force, but reproductive activity itself, concentrating, and by means of concentration more able to overcome obstacles.” Madsley, Physiology of Mind, 1876, p. 308: “Attention is the arrest of the transformation of energy for a moment—the maintenance of a particular tension.”
James Mill, *Analytic*, ed. 1869, ii, p. 364: "Having a pleasurable or painful sensation, and attending to it, seem not to be two things, but one and the same thing." Lloyd Morgan, *Comparative Psychology*, 1894, p. 189: "We may describe attention as the bringing of something to the focus of consciousness, and the holding it there." Shand (*An Analysis of Attention*, 1894) holds, in opposition to some current views, that attention implies not predominant or clear ideas, but predominant or clearer awareness of ideas. Stout, *Psychology*, 1896, i, p. 181: "What characterizes attention proper as opposed to inattention is the singling out of special contents so as to discriminate special objects." Stumpf, *Psychologie*, 1883, i, p. 68: "The essential function of the attention... lies in the prolonged maintenance of an idea in consciousness." Sulky, *Human Mind*, 1892, ii, p. 77: "Attention... secures increase of vividness and of definition or distinctness." (p. 77) "It can be dispensed with in proportion as the psychical process grows habitual by repetition." (p. 78) It is to be defined on its subjective side as "mental activity immediately resulting in a raising in point of intensity, completeness, and definiteness of certain sensations or other psychical phenomena, and a corresponding lowering of any other simultaneously presented sensations," etc. (p. 142) "It is a narrowing or concentrating in consciousness." (p. 144) "Attention is detention in consciousness." (p. 155) Titchener, *Psychology*, 1896, p. 125: "The idea to which we attend is made clearer, and lasts longer than other ideas." Volkmann, *Iehrbuch*, 1895, p. 204: "To attend to something means firmly to grasp an idea, a train of ideas, or a presentational mass, and defeat their tendency to sink." 

Note: In the above: The universal opinion appears to be that attention is not co-extensive with thought and action. For my part I find it impossible to agree with such a view, and shall follow the following reasons. If we take the area of distinct vision by itself without regard to what adjorns that area, we obtain a caricature of reality; for what appears about the focus, though comparatively vague, is still of crucial importance as far as sight is concerned. Indeed, the vagueness is due to the structure of the eye, while, probably, the attention is as much, or nearly as much, engaged with what is outside as with what is inside the focus. For ordinary purposes the total field of vision counts, however vague some parts may be. Again, the "distinct" area of vision is in itself but partly distinct, only portions of it appearing in definite outline. This becomes evident when we focus a part of some whole which we had focussed previously: here some details which had been vague are now clear, while other details which had been clear have become vague. For these reasons, I am tempted to hold that the focus of vision is equal to the total field of vision, or, speaking more generally, "at the focus of assimilation at any time is co-extensive with the total field of assimilation. Once more, the meaning of the word attention frequently covers the whole field of activity. We speak of persons attending to their work, to their lessons, to their duties, to their business, and so forth. When, however, a thing is not attended to, the implication is usually that the attention was occupied with something undesirable. To be inattentive means thus in common speech, to attend to any particular object sporadically and carelessly, and not, as I understand it, to attend to nothing at all. Master Scatter-brains and Master Gather-brains are both equally attending without pause, except that the first can overcome insignificant obstacles only, the latter being a giant and the former a dwarf as regards efforts of attention. All things considered, then, it seems strange that psychologists who should be free from the popular bias of only observing what is prominent, should have identified attention with a particular and undefined degree of attention. It is as if one should say that only very heavy objects had weight, or that only very strong men had strength, for the so-called special characteristics of attention are characteristics more or less pertaining to all thought and action at every moment and in every part. The fact that human activity is throughout determined by needs, tends to prove that 'focalisation', concentration, exclusiveness, insistence or predominance, are general features, though this does not destroy the notion that there are degrees of attention, and that the attention does not have a constant.
At least for practical purposes it is essential that we should appreciate the bodily aspect of attention. Just as, broadly speaking, men's muscular strength varies only within a moderate compass in the individual and from individual to individual, and that because the organic transformations are equable, so we naturally expect the same to hold good of the brain, and consequently of its functions. This is really the case. The only thing measurable which at all corresponds in the sense realm to work done by the brain is, as we saw, the feeling of effort. But this passing feeling, besides being itself, since it is a feeling, the result of attention, cannot be considered a constant factor in change. In the mind, as ordinarily conceived, we have nothing corresponding to the stable and complex human organism.

Introspection yields nothing for us to measure but the elusive feeling of effort, if we leave aside what is immediately given. Hence we refer to the physical transformations, which we can gauge, to illumine for us the nature of the process of attention. Strictly speaking, to express ourselves physiologically, we mean by attention, neural functioning, or, less concisely, the expenditure of that portion of the fund of bodily energy which is devoted to neural functioning. The act of attention expresses such neural functioning and constitutes primarily a process of organic re-adjustment, as when the healthy stomach craves for food and obtains it through neural mediation. When we say that we attend, we mean that neural changes are proceeding in a certain direction. Similarly, when we speak of the field of attention, we understand, for our purpose, the field of neural functioning. More generally stated: in the normal waking state something is always immediately given and that something is a constant quantity which constantly changes at a constant rate. The word Attention is throughout this work employed in the sense here defined. (See further sec. 48.)

I speak of neural functioning, so as to exclude activities not specially connected with the central nervous system, e.g., the actions of the liver or the kidneys. At the same time, however, the total fund of bodily energy can only be parcelled out in theory, while motor activity, alluded to before, is not fundamentally connected with sensations (sec. 19, 5th conclusion). The physical processes which are covered by the words Work, Energy, Attention, I leave undetermined, and nothing can be said here as to the precise dimensions of the field of attention or of the rate at which it changes. In the present unsatisfactory state of neurology, I naturally decline to commit myself to any theory. For a discussion of the subject on the physiological side, see: Bain, in Brain, 1890; Bastian, On the Neural Processes underlying Attention and Volition, 1892; Cappie, Some Points in the Physiology of Attention, Belief, and Will, 1886 (reprinted in Popular Science Monthly); Delabarre, L'Influence de l'Attention sur les Mouvements Respiratoires, 1892; Dissard, Influence de l'Attention sur la Perception des Sensations, 1895; Féré, Physiologie de l'Attention, 1890; Ferrier, The Functions of the Brain, 1885, who says that "intellectual attention is mainly ideal vision" (p. 464), and that "the motor centres are not merely the basis of sensory-motor cohesions and acquisitions, but also the basis of the 'power of concentration and control of ideation'" (p. 468); Fouilléé, in Brain, 1890; Hämisch, Attention and Distraction, 1896, who discusses the numerous physiological theories; Höffer, Psychische Arbeit, 1894; Hylan, Fluctuations of the Attention, 1886; Landmann, Über die Beziehungen der Atonie zur psychischen Tätigkeit, 1895; MacDougall, The Physical Effects of Attention, 1892; Marliére, Les Mécanismes de l'Attention, 1889; Obersteiner, Expcri-
mental Researches on Attention, 1879; Pilsdacter, Die Lehre von der sinnlichen Aufmerksamkeit, 1889; Ribot, Psychologie de l'Attention, 1889, who states that "attention acts always on muscles and by means of muscles" (p. 3); Santis, Studien über die Aufmerksamkeit, 1898; Stout, Apperception and the Movement of Attention, 1891; Sully, The Psycho-physical Process in Attention, 1890; Waller, The Sense of [Muscular] Effort, 1891, and Washburn, Subjective Colour and the After-Image: their Significance for the Theory of Attention, 1899.

24.—Deliberate Attention.

Deliberate attention, together with attention under difficulties, or rapt attention, have generally been confused with attention as such. Suppose that I wish to follow a difficult argument in the book which I am reading. Though I strive to attend, my thoughts, as a matter of fact, are wandering nearly all the while. [Is this so with you? Describe.] I recur to the argument again and again, and fly off at a tangent almost instantly. We encounter here an ineffectual desire. My wish to attend is only a pious wish, and is not converted into activity in the required direction. On such occasions there may be no felt effort traceable; we may return to our subject with ease; and yet leave it, against our intention, in the same manner. Deliberateness of process is in such cases at a discount. We have to persist ceaselessly wishing to attend, because a single resolution does not suffice. Effort is here useless. The wish, again, must not be confounded with the deed. We are really active in other directions, whatever our wish may be.

If the volitional state is said to occasion certain changes, this belief is explicable on the basis of an insufficient induction; for volition, or an unequivocal resolution, may exist in perfection without influencing the trend of thought. [Observe such occasions.] This state is, at least, a fairly reliable sign that a change will take place. Apart from this, its prophetic function, it has only the significance of an item in a series. We might as well argue that the danger signal itself brings the train to a standstill, because the second event usually follows the first; or that trains can only stop when a danger signal is exhibited.

Attention may be successful or telling without the presence of marked strain. A trained musician follows with ease an involved piece of which feat he could not have accomplished at an earlier stage of his career, however great the effort. It is not that he is now more able to attend than he formerly was. On the contrary, he is less able. But though arduous attention has diminished, its desirable effect is increased. Re-attention, by excluding waste of attention, has the virtue of making attention less troublesome, and of enabling us to attend to much with little effort.

Deliberate attention so-called is not essentially different from usual attention. Neural functioning is, in the former case more prolonged; it is more exclusive, or keener; it is less diffuse. [Test this.] Hence we are more likely to reach a goal quickly. However, the process is still the same in both instances. We are busy with some unfamiliar detail, till,
through repeated endeavours, it becomes familiar. Then we are enabled to busy ourselves with a second detail, then a third, until we have at last completed our examination. Attention is strenuously deliberate when it is accompanied by a somewhat more than usually decided notion of an end to be attained. It is action, guided by a rather pressing need or functional tendency, and argues more than normal absorption. In substance, all attention is deliberate, since all thought and action is relational. As I walk along the road my eyes are turned to at least sixty objects a minute, and each object discerned implies deliberate activity. [Test repeatedly, and describe.] It is a non-organic view which gives rise to psychological word-couples such as habitual-deliberate, voluntary-involuntary, attentive-inattentive.

Opinions on Voluntary and Involuntary Attention.—Baldwin, Senses and Intellext, 1890, p. 69: Attention “is the act of holding a presentation before the mind. It is in all cases a conscious act.” Drolsich (Psychologie, 1842, p. 80) distinguishes between voluntary and involuntary attention, “the former is directed to objects, the latter is attracted by them.” Hamilton, Metaphysics, 1877, i, p. 237: “Attention is a voluntary act.” Herbart, Lehrbuch, 1816 (Hartmann’s edition), p. 147: “Attention is partly involuntary and passive, and partly voluntary and active.” Hofding (Psychology, 1891, p. 315) distinguishes between the two classes. Maudsley, Physiology of Mind, 1876, p. 312: “It is an obvious distinction to make between involuntary and voluntary attention, the interest of the object or subject forcibly soliciting it in the former case, while it is said to be directed by an effort of will in the latter case.” Ribot, Psychologie de l’Attention, 1890, p. 3: “There are two well-distinguished forms of attention, the one spontaneous, natural; the other voluntary, artificial.” Stout, Analytic Psychology, 1896, i, p. 180: “Attention is the self-direction of the mind to an object.” Sully (Human Mind, 1892, i, p. 164) says of voluntary attention that it is “marked off by a clear idea of end or purpose.” Wundt, Grundriss der Psychologie, 1896, p. 245: “That condition which is characterised by peculiar feelings, and which accompanies the clearer apprehension or psychic content is called attention.”

According to the views submitted in this chapter, the characteristics enumerated in the above list are of no more scientific value than differences of stature in human beings. The organic flux in thought and action, by excluding this and including that, necessarily implies “predominance,” “fuller presentation,” “clearer apprehension,” “heightened reaction,” “concentration,” and the like. It would be interesting to have it defined when “concentration” or “predominance” are absent.

25.—The Measure of Attention is its Effectiveness.

We conclude, then, generally, that the sole measure of attention, as far as a particular field is concerned, e.g., this page, is what is immediately given of that field, and that felt strain, desire to attend, or attempts to attend, are not a measure of attention. A desire to attend may or may not be followed by the desired attention; an attempt, however desperate, may equally fail.

Let us add an illustration, so as to make the trend of this section plainer. The novice, in his struggles to follow a demonstration, succeeds but

"To this, Klüpe (Zur Lehre von der Aufmerksamkeit, 1869, p. 31) replies: "I cannot recall ever doubting whether in a special instance I was attending or not." I would suggest that not casual recollection but conscientious experiment should form the basis of a serious statement."
casually, the main portion of his energy being spent, as a matter of fact, in other directions. When, at last, he has grasped the matter thoroughly, he turns to it with ease, and attends to it more than previously, without any waste or friction in the effort to attend.

26.—Attention has no Focus.

Normal, as distinguished from keen and lax, attention allows of elaboration without our observing any appreciable strain or noting any restlessness. Imagining this normal strain as a centrally placed point in a line of points gradually thickening from left to right, X . . . Y . . . Z, we obtain towards X a lessening of the strain, and, towards Z, an increase of the strain. [Test your capacity.] The one end like the other is quickly reached. We soon cease to perceive, and we rapidly become incapable of further scattering our thoughts. By our very organisation the pendulum of attention ever tends to rest at Y, and this tendency we cannot counteract except by violent means, and then only fitfully. Under normal circumstances, we must attend, must burn up the normal allowance of fuel, must "move on."* What we have stated implies that there is no precise point which we may call the focus of attention. While writing now, there are some details which I but just distinguish, others which require normal effort, others which demand sensible strain, and still others which I do not observe at all. [Describe minutely such an instance.] The totality of my present sensations and images is the result or the equivalent of neural processes of a complex character. Throughout life we always, at one and the same time, attend more to some details and less to others. Even in studying the book referred to, some of the energy went into the act of reading. If we try not to attend at all, we are soon forced to attend; and if we make a supreme effort to fix the attention, we only succeed to a very limited extent, and for a brief period, and that effort narrows the field of attention proportionately. Details, which we should have perceived normally, escape us, when the limited field of attention is already occupied.

27.—Abnormal Attention.

Under ordinary circumstances, as we have seen, the total amount of energy, as well as the rate of its expenditure, is nearly constant in the human being. A consideration of abnormal instances will bring into relief the normal state of attention, and yield further proof of the probable correctness of our interpretation.

We are usually awake for about sixteen hours, and asleep for about eight. During sleep the senses are apparently inactive. The noises in the room

* As early as Locke this was recognised. He says: "Hinder the constant succession of fresh [ideas a man] I think, . . . cannot, though he may commonly choose, whether he will heedfully observe and consider them." (Human Understanding, bk. 2, ch. 14, sec. 15.) So Hamilton, Metaphysics, ed. 1877, i, p. 247: "We may close our ears or shut our eyes; . . . but we cannot, with our organs unobstructed, wholly refuse our attention at will."
and in the street, as well as other stimuli, have ceased to appeal to us.
Taking the case of dreamless sleep, there is a considerable decrease in the
total energy to be expended, e.g., waking in the night we feel drowsy, and
thought as well as locomotion encounters opposition. There is in sleep no
need urging us to attend to what is going on about us, and hence it is
impossible that ordinary stimuli should affect us. As we have seen, it is
attention or neural activity which transforms the unintelligible into the
intelligible; and as attention is absent there can be no intelligible appre-
hension. In the waking state, only a fraction of what takes place is
assimilated by us. In the sleeping state, even that fraction is ignored; and
this is not because of our being absorbed, but because of a reduction
or a diversion of neural activity. As far as appreciable systems are
concerned, we meet with death in deep sleep. Central activity having
lapsed, sensations have ceased with it. The life of thought is there only
potentially, or in a rudimentary condition. Probably only the very faintest
feelings exist. We meet with a parallel to this in the waking state. Some-
times, through ill-health, we are in a perpetual doze. [Describe such an
instance.] We hardly integrate anything, or think about anything. There
are no reactions worth speaking of. In deep sleep there is a further
lowering of this dozing state.

In dream-sleep attention is at work at a level which is usually below the
normal. Nevertheless, since to see or imagine involves central nervous
processes, the forms and figures of dream life are as truly creations as the
forms and figures of waking life. Still, in dream life there is almost invari-
ably little connection between the thoughts, the most superficial suggestions
appearing to be on an equality with the gravest considerations. [Verify
this.] All that requires appreciable effort is missing in dreams (ch. 10).

In fainting we have a similar instance to that afforded by deep sleep.
The amount of attention or neural activity present is almost nil, the result
being that nothing is observed and that motion ceases.

The phenomena of hypnotism, considering the psychic aspect alone,
resemble those of sleep, only that dreams are suggested to the "subject." The
defauneness and blindness of the latter are occasioned by attention being
absent as far as all but the suggester, or the things suggested, are concerned.
In proportion as the "subject" has visions, so far is he attending. The
very fact that he imagines anything which for him possesses colour, sound
or temperature, is conclusive proof, as we have seen, that his brain is busy,
that he is elaborating sense elements.

Thus sleep, dreams, delirium, insanity, and other abnormal states, find
their explanation in what has been said in elucidation of the normal process
of attention.*

*Prof. Libbhen has an interesting article on "Sensory Stimulation by Attention," in
the Psychological Review, 1895, in which he analyses abnormal cases where the attention
factor is prominent. Of one case he writes: "Whenever the subject is one especially
interesting to her, she hears without great difficulty; but whenever there is no interest in
conversation it is with greatest difficulty that she can be made to hear at all; and it is
impossible to gain her attention by any sounds, however loud, if she is engrossed in any
28.—The Larger Waves of Attention.

The quantity of attention, in the waking state, is, as we have learnt, normally always the same in all normal persons. It might appear from this that we could at any time attend continuously along one line; but this is not so, for protracted thought in one direction tires, though we can freely continue our thought in other directions. [Notice such cases.] In accordance with this we find that in ordinary life the topics of thought change considerably. We also generally tend to pursue a subject only for a limited time if that subject requires much thought, and we incline to recur to it repeatedly rather than follow it without pause. Neural functioning, in conformity with the spatial nature of the brain, or as the result of other neural factors, tends to change its direction at intervals. Hence we become tired of one subject, and yet find no difficulty in busyng ourselves with others. It is, therefore, profitable to allow for pauses in our thinking. Instead of imagining attention in time as a smooth sea, we have to look upon it as a stormy one where the surface consists of huge waves. These waves, which form the ocean of thought, represent the several subjects which constitute the field of attention in time, and the largest waves are constantly broken up, so as allow others to form. Or, we may say, that as the blood is propagated, not in a steady stream, but in waves, so in attention, or neural functioning, advance proceeds by pulsations.

29.—The Smaller Waves of Attention.

Yet even this account misses a portion of the truth. The following is, for instance, observable when the attention is turned fixedly to a single aspect of an object. Sometimes, try as we will, we keep on attending afresh instead of attending uninterruptedly, as we desire. At other times we succeed in attending continuously, and then our look [after how long?] develops into a stare, and what we are observing loses all intelligibility. (Sec. 19, first conclusion.) In normal life we ceaselessly pass from detail to detail, for persistent attention to one detail, as in hypnotism, produces vacancy or non-attention. (Secs. 220 and 232.) While, therefore, normal attention tends to wander from subject to subject, it also tends to be rapidly moving within the subject from one detail to another. There are, in other words, larger and smaller waves of attention. When we dwell on a subject, we consider the several items of which it is composed. When we study a detail beyond a few moments, a vacuum results. Attention is like a river; it cannot rest; it must report progress. If the larger waves represent the subjects of thought, then the minute ripples which cover the whole surface absorbing task or play" (p. 370). Stout (Analytic Psychiatry, 1895, p. 188-9) writes of himself: "I am somewhat deaf, and when conversation is going on among a considerable number of persons I am usually unable to hear anything which is not directly addressed to myself with a distinct utterance by my immediate neighbour; all the rest of what is being said around me is a confused murmur. I sometimes find, however, that if any one even at some distance from me happens to refer to philosophy or any other subject in which I have a keen interest, his words disengage themselves from the chaos of sounds and fix my attention."
of the stormy sea represent the essentially dynamic property of attention. Attention, like all work, is movement. At every instant we have to pass onwards, and we halt only as long as there is something for us to do.*

30.—Narrowing the Normal Field of Attention.

Let us begin with an illustration. It is some time since I visited a certain friend. As I enter a street near that friend's house, I see his terrier who used to accompany me on my rambles. I shout across the road "Caesar." The dog instantly turns. His head and neck, his limbs, his tail, his whole body, in short, appear rigid and motionless. His eyes are vacant. His breathing, I suspect, has almost ceased. After a few moments the eyes suddenly brighten, the body becomes a volume of living springs, and the dog bounds over to me. I am recognised by him. My voice apparently has struck some familiar chord, for else he would have taken no notice of my call. His whole being, we may say, has been sucked into the whirlpool of a known voice. The available attention, under these exceptional circumstances, was centred on one detail. From his stiffness and his blank gaze, it was clear that all central activity, except that of deciphering my personality, was absent. His eyes, his ears, his nostrils, his imagination, struck work. Energy was sorely needed in one direction, and was, therefore, withdrawn from other directions.

In this instance the field of immediately traceable activity was reduced almost to zero. There was not merely an exchange of one field for another; but the second field had almost no dimensions. The attention machinery, which would normally produce a certain quantity of immediately traceable detail, was working subterraneously. We meet here with purgative vacancy. Compared with ordinary thought, we miss subject, points of subject and sense elements. Otherwise there are but confused feelings to make up for the extraordinary shrinkage of the view; perhaps even these are absent. It is a narrowing of the traceable field of attention with a corresponding reduction of traceable activity. [Examine such cases carefully.]

Such shrinkage is produced on various occasions, notably: (1) when we are trying hard to re-collect something; (2) when we put a difficult question to ourselves and insist on obtaining an answer; (3) when we attempt to grasp an intricate problem, as in the case of understanding what we read; (4) when we wish to think of a subject under unfavourable circumstances as in ignoring a conversation going on around us; (5) when we slip into bed, close our eyes, and make ready for sleep; (6) when we are subjected to long-continued and monotonous stimulation, as when the hypnotic state is induced; and, lastly, (7) when we are on the qui vive as regards some

* As to certain minute oscillations of the attention, as when listening to a just perceptible sound, see especially Münsterberg, "Schwankungen der Aufmerksamkeit," Heftage, 1889, Heft 2; also Hyman, "Fluctuations of the Attention," 1898 and 1898; Urbantschitsch, "Physiol. Archiv," 1881 and 1882; and Centralblatt f. d. Med. Wissenschaft, 1875; Cook, "Fluctuation of the Attention to Musical Tones," 1899; and, in Wundt's Phil. Studien, Lanc: (1897), Eckener and Pace (1892), Marbe and Lehmann (1893).
matter, as in endeavouring to hear whether a nightingale is singing in the distance. [*Test the whole list and add to it.*] In all these instances our neural system is like a stretched elastic band which has a strong tendency to return to its normal condition. If we persist in such an attitude for long, we invite headache and dizziness. Usually, therefore, our attempts are consecutive; but even then frequent trials, at short intervals, to narrow the field of attention defeat themselves.

31.—EXPANDING THE NORMAL FIELD OF ATTENTION.

The normal field of attention may be narrowed. May it also be expanded? That does not appear possible. [*Challenge this statement.*] Suppose that we desire to observe all that is passing around us. We act accordingly, and we soon learn that no appreciable growth of the field of attention has taken place. What happens is that we quickly fly from detail to detail, the peculiar excitement favouring retention of what is observed. It may be, however, that excitement induces a more than usually voluminous and rapid flow of thought.

32.—BRAIN AND MIND.

Assuming that the brain resembles the other portions of the human organism, then what we have stated in the four preceding sections is in accordance with what we should expect. Take for an illustration the arm. The same human being, at his stage of development, puts forth about the same exertion. Strenuous and monotonous exercise of the arm tires, while different parts are readily employed in succession without consequent fatigue to other parts; or, what is the same thing, the arm, after being tired with one kind of work, easily performs some other task, because different muscles are called into play.* Thus the larger as well as the smaller waves of attention find their explanation on the physiological side, in the structure and arrangement of the nervous system. Also, when the current of attention is stayed, we find the reason in the absorption of the attention in certain nervous work, the correlate of which is the re-membering some fact or answering some question. [*Test the above illustrations.*]

The differences between muscular and neural work are similarly explained. While the size of the muscles varies considerably from individual to individual, and from infancy to manhood, the brain soon ceases to grow, and varies only to a trifling extent between individual and individual.† Hence we should expect the field of attention to vary little in the individual and in different individuals, and this expectation is justified by the facts which our inquiry has elicited. The brain is also an essentially active organ, and hence we always tend to move forward. The psychology completely agrees with the neurology.

* So Foster, *Physiology*, part 3, 1897, § 665.
† Weight of male brains: Children at birth, 330 grammes; from 1 to 2 years, 941 grammes; from 30 to 40 years, 1364 grammes; and from 70 to 80 years, 1288 grammes (*Quain’s Anatomy*, 1893, iii, part 1, p. 178).
GENERAL ANALYSES

33.—THE FIELD OF ATTENTION.

What is meant by the field of attention? [Test the contents of this section.] Let us assume that we wish to lift an object. If it is but an empty matchbox on a table near by, no sensible strain is noticeable. There is no change in the field of attention as a whole, except that a portion of the total state is mechanically exerted and made to give way as mechanically to the newcomer.* The greater the weight we have to lift, the greater the strain. Suppose we see before us on the ground a lump of iron marked "112 pounds." We wish to lift it. We have lifted weights before, and we know that much of our strength will be required for the task. Observe how we prepare.† We take a deep breath. The muscles of the body harden. The feet are firmly planted. We assume the most convenient position. We are almost a blank as far as anything but our intention is concerned. Our strength, except that absolutely required otherwise, is spent in prospectively raising the weight, or what is its equivalent. When we are about to make an unusual effort, or are making it, we abandon general thought and observation. If the weight does not demand the whole of our strength, we can lift another weight alongside of it, or we may think about other things. When the object to be moved is but a rose petal, a child may be humming a tune, skipping, and wondering about the nature of a rose petal—all at the same time. (See sec: 25.)

34.—ATTENTION ENERGY AND MOTION ENERGY ARE ONE.

What is true of muscular strain, and the consequent narrowing of the field of attention, is true of neural strain; for the two are one. We have noted how we prepare to raise a heavy weight. An exact counterpart of this is to be found in connection with ordinary attention. Suppose I think that I discern a voice in the wood. I "strain every nerve" to hear. [Test such a case.] Am I now attending? I am attending only in the same sense that I am when preparing to lift a weight. The attention is absorbed in the preparation. The brain is becoming supersensitive at certain points. Without this I should fail in my task.‡ If other thoughts do not vanish and if labour is not concentrated, we cannot move a heavy weight, and thus when the field of attention is left unaffected, we cannot attend vigorously in a new direction. [Is that so?] The field must change as the attention becomes keen. All bodily motion, like all thought, results from organic transformations. Attention reflects but one class of work which appears now as motion and again as sense.

We have remarked that it is not possible to distinguish between non-physiological and physiological effort; that they are one. It will be as

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* This fact, if it be one, contradicts the current theories, which imply that our condition at any moment is constituted of an indivisible organic whole.

† "There is no attention without previous attention" (Ladd, Psychology, 1894, p. 77).

‡ The influence of expectancy is a favourite subject with psycho-physicists.
well to enter into somewhat greater detail. The fact usually observed in this connection is that great neural strain excludes great muscular strain (as in the dog trying to re-member), and that great muscular strain excludes great neural strain (as in lifting a heavy weight). When attention is rapt, all outward motion is suspended; and when we are engaged in severe physical work, thinking must be discarded. One fund of labour is expended in one direction, be it of thought or of action, of brain or of muscle. This might be disputed on the ground that a man may be strong in muscle, while his neural powers are indifferent. Thus it is, for instance, rightly contended that muscle training, as such, no more strengthens the nervous system than neural training, as such, strengthens the muscles. The distinction is, however, illusory, for what is true as between neural and muscular activity, is equally true within these two departments. As I attend with ease to an elaborate piece of music, and am perhaps helpless when it is a question of grappling with a mathematical demonstration, so I can be physically strong and effective in one direction, and weak and ineffective in another. Assuming the normal state, the slightest muscular effort interferes as truly with neural effort as the greatest, and vice versa, just as any neural or muscular exertion in one direction tells respectively on neural or muscular effort in every other direction. \[Is this not too sweeping?\]

The analogies between these two kinds of effort are numerous and instructive. We have already observed that in both spheres we can be strong or effective at one and the same time in a few directions only. We add that great strength or effectiveness in one direction is normally excluded in both departments unless we are healthy in every way. In physical exertion, too, strenuous exercise plays the same part as in neural exertion. In the former, as in the latter, the output of labour must be measured by effectiveness, and not by felt strain. Thus, again, certain parts of the body may be tired, while others are not. These various correspondences suggest a common cause, for they are far from being superficial or accidental.

Men often learn that, after practice, they frequently perform a muscular act in spite of themselves. Thus wishing to raise my eyelids for the purpose of removing a speck of dust from the eye, I meet at first with stubborn resistance on their part. \[Repeat this experiment.\] Again, as physiological acts are attempted more and more frequently, so we often lose control over them. In a similar way, control in matters intellectual becomes frequently impossible, trains of thought continually passing across the stage with apparently no volition preceding them. All that we are entitled to conclude in such cases of uncontrolled activity is that changes are readily initiated in those directions. Involuntariness of actions offers no ground for a division between neural and muscular activity. Apparent unconsciousness of activity, ease and readiness of activity, independence and continuousness of activity, hold good as much in the muscular realm as in the neural, as might be proved by a profusion of examples, and these
states can, therefore, not be considered as distinguishing neural from muscular activity. Waking during the night, I am unable to dismiss an absurd dream; having seen a loathsome sight, I am unable to banish the surviving image; having felt strongly, I am unable to calm myself; laughing, I am unable to regain serenity; thinking intently of a subject for some time, I am unable to dismiss it; being tempted I cannot resist; etc., etc. [Test these assertions.] The chief instances are perhaps supplied by our general habits which are yet so little known even to the specialist observer (ch. 3).

35.—Attention and Heredity.

The general nature of human activity—the mould into which it is cast—is determined by the organism we inherit. We readily attend. There is no need for schools where we shall be taught to distinguish, to see, to act. This power, on the whole, the organism takes over from the past. We spring into life, as regards the building up of the inner and outer world, as Minerva sprang from the head of Jove—armed from head to foot, though the equipment differs with different species of animals. The infant pigeon employs its wings to regain equilibrium; the kid jumps about and is frolicsome, unlike its adult parent; the chicken flies up to escape a rat; the gosling placidly rests in the shallow basin full of water.* Again, our customary movements are so complex that, apart from pre-disposition, we could not have learnt them. Uninstructed attention in this wise performs that which years of elaborate training could not accomplish, while education only enables us to avoid a little friction here and there. Our acquired activity, compared with that inherent in the organism from birth, is like that of the shopkeeper who polishes and arranges his newly arrived goods, education being to heredity what the individual is to the race. The same stimuli occasion the child or young animal to spend energy in varying grooves of action. The discharge of energy, in one instance as in the other, is along certain well-established lines. No one who has closely watched the development of a human being can escape being struck with the large proportion of wisdom which the new-born child brings with it. [The advanced student should keep a record of the development of some child.] An infant is not a piece of clay, and what tuition does, is as nothing compared to what the child knows and does without tuition. Apart from the child's latent powers, and its magnificent nervous system ready to develop, it would be as little amenable to education as a snowman. The full-grown person, too, is mostly himself and acquires from others little which is fundamental. The very depths of his being he has brought with him, his special impressibility being the result of his special organisation. What is easily admitted as being true of muscular activities is equally true of neural activities. Here also study shows that acquirements constitute an insignificant fraction of

* "The twilight that sends the hens to roost sets the fox to prowl, and the lion's roar which gathers the jackals scatters the sheep." (Ward, Psychology, 1886, p. 42, col. 2).
our outfit, as regards fundamentals, though education has enormous practical bearings.

36.—Observation and Attention.

The limited quantity of bodily energy which can be devoted to neural functioning, explains the varied quality of observation, both inner and outer. A man lives in the country, and scarcely knows the shape of a single kind of leaf. [Verify what follows.] Raising my eyes, the sycamore tree under which I write is guessed at rather than seen, while the other trees in the background appear still more indistinct. I meet with considerable difficulty in discerning a single leaf in full, for in most directions I can only see shapeless green patches. In a few places alone, though I am but a few feet off, can a leaf be clearly distinguished. To observe a leaf unmistakably, means that we observe it in preference to others, that we assimilate its structure, its size, its form, its colour, and the relation of each of these to one another and to the whole. Besides, the shapes vary somewhat, as with the ivy, for instance; they also differ with the season in colour and size; and caterpillars, and sundry other factors, give rise to additional changes. If we wish to know more of the leaf, we must, in a critical manner, compare it with other leaves. Usually there is no attempt to attend carefully to any object; for, in the instance we have cited, such attention would imply that we stood still, that we had procured a convenient number of leaves, and that we had scrutinised them until we had satisfied ourselves as to the nature of the normal leaf. Glancing at trees in passing is inadequate for such purposes.

As I walk down a lane at the end of June I note a wealth of grasses and flowers along the roadside; but no glimpse can give one a reasonable notion of even a single blade. As the average person observes superficially, it follows that he has a scanty knowledge of botany and of things in general. He usually glances at the shape or colour of some leaf, and forgets it as quickly.

In seeing a small square □, we see something primarily given in space. But with the majority of objects, time enters as a salient factor, e.g., a daffodil is a continually changing object, and to know this flower well we must observe in due order the changes through which it passes. [Watch the growth of some flower.] Fresh knowledge can only be acquired by strenuous endeavours, and when we neglect being strenuous, what is before us remains imperfectly known to us. If the outline of a tree strikes me as familiar, I already know something of that tree. If I can tell the name, size, shape, colour, structure, function and development of its leaves, branches, trunk and roots, then I know just a little more, that is all. There is only a question of degree in attention, or in the result of attention—knowledge. From the standpoint of attention there are ever higher syntheses; and, similarly, lower and lower. The vaguest feeling varies only in complexity from the most elaborate conception. We are constantly passing up and down the ladder of knowledge. The wildest dream, in its
several portions, has consistency, and the most careful thought has simply more of this consistency.

37.—The Growth of Knowledge Complexes.

At this juncture let us, from the standpoint of attention, trace the growth of knowledge complexes.

A man, say, often travels to a metropolitan station. The ticket collector there sees thousands of people pass by him whom he could not recognise if they presented themselves a few minutes later. How is it that he knows the man we are thinking of: his easy gait, his indifferent bearing, his peculiar voice, his dress, and most of his features and ways? Perhaps the man passed the ticket collector a score of times before he was noticed at all. Then some trifle, in an idle moment, caught the official’s eye. Next time, when he observes that trifle again, he dimly re-collects that he has seen it previously. He connects it with the man, some vague personality. Then he takes account of the walk, then the bearing, then one of his features, then another and still another, then he hears the man utter a few words, then he becomes acquainted with his temper, his manners, the newspaper he reads, and the like. If we suppose a typical instance, the ticket collector’s knowledge complex slowly grows. His attitude, as we have repeatedly seen, is that of restlessness. He notes some detail, and has it impressed upon him by repetition. Some waste of attention being thus avoided, he comes to be familiar with a second point; then with a third; and so with a fourth. His conception grows in this way for years. At the same time, the growth is not dependent on any express desire to possess a clear notion of the man. This case serves as a simple illustration of the development of a knowledge complex, stimulated mainly by the necessity of paying attention to unfamiliar details, and aided by the fact that when the attention is directed to the unfamiliar it gradually becomes familiar.

A striking instance of a similar character exemplifies the same principle. Some one is introduced to two brothers, who appear to him so very much alike that he cannot distinguish the younger from the older. In time he comes to know each intimately, and he can then scarcely conceive how he could ever have confounded the two. Their every feature, their every movement, their manner, their voice, seem peculiar to each. How did he come to see them in such a different light? He was in their company a good deal. Meeting them frequently, their appearance grew familiar and sharply defined. The constant play of attention selected detail after detail, and memory treasured these up. The homogeneous conception of the two brothers became more and more disparate. In this instance we encounter again growth from the relatively simple to the relatively complex.

Leaves, again, are but leaves to the countryman who walks frequently across a certain part of a wood. His attention employs itself tentatively with the objects surrounding him. In time the leaves of the familiar bushes come, in the fashion already delineated, to be more and more clearly discriminated. The shades of green of the hazel, the blackberry,
and the hornbeam, sink into the memory. From bush to bush he feels the differences. As with the shades of green, so with the normal size, outline and structure of the several classes of leaves. He has no express desire to know these intimately; though there may be now and then an interest in this or that aspect. Thus knowledge complexes are built up. He ends by knowing much where he knew little.

So with other objects. Being familiar with the full-grown robin, one finds that one is enabled to recognise, as a consequence, young robins. Knowing these vaguely, the knowledge, through unpremeditated observation, grows more defined, and one can tell the different stages in the development of young robins. In this way a great multitude of knowledge complexes come to be acquired.

Take the book which I was reading. Certain notions were embodied in it. These were not concentrated into a word or two. They had to be abstracted from the perusal of the whole volume. Perhaps the aim of the work is merely to impress one important truth or knowledge complex. Aspects of that truth are, for this purpose, continually introduced and illustrated. As I study the book closely, the central conception slowly takes shape. The same factors are still at work. Certain details, by being repeatedly attended to, grow more and more familiar, and thus separate facets of the truth are gradually detected. Then several of these are seen in relation to each other. At last, as the result of progressive activity, the truth, as such, flashes into existence. The process has been one of development; and attention, in its unobtrusive fashion, has been leading me towards the end desired. By reading a volume several times, more and more is re-membered. Attention is consequently set free, and we grapple with new aspects.

Often the notions latent in a book, or in a person, or in any form of knowledge complex, became apparent without being searched for. Let us say that the author I am interest-ed in is Robert Browning. I read poem after poem, and many a one again and again. If the poet has a marked style of his own; if he shows certain mannerisms; if his stories are worked out in a fashion peculiar to himself; if he has a limited number of ideas which he seeks to inculcate, these idiosyncrasies gradually become transparent. Repetition forces what is like to the foreground; for it is his fundamental notes which he is ever repeating. Hence the memory retains these rather than the incidental items which have not the advantage of being rehearsed, provided that this process is not disturbed by theorising. In time we may know Browning well, without ever having made a deliberate attempt in that direction.*

38.—Attention to One Object at a Time.

We have seen that the normal amount of attention is constant. We have learned how familiarity in one direction allows of additional functioning in

* While in one instance the notion of wishing to know Browning well is present, the same result is yet obtainable by a series of less comprehensive notions.
other directions. We have also observed that attention does not deal so much with points as with fields. Hence we answer the question, "Can we attend to more than one thing at a time?" with a decided "Yes."

Indeed, there cannot be a "one thing" to attend to. All functioning implies breadth and plurality, and the field is not even limited to one notion or one act. While I was endeavouring to understand what I was reading, I was, of course, reading at the same time. The latter claimed some of my attention, and I was thus active in two sets of directions. I might have been reading the passages aloud, and walking while thus reading. In addition, I might have been playing with a key in my pocket, and so on. The field of attention is only restricted by the quantity of labour requisite for an act. Various activities are pursued, separately or conjointly,* as easily as one, if those activities collectively absorb no more than the normal amount of energy.

The attention is usually divided, as in the instance just referred to. It seems possible to speak as fast as one can, while, at the same time, reading an announcement on a street hoarding; and inwardly contemplating a landscape. [Test this.] Again, in any simple performance, a multiplicity of actions is carried out simultaneously. In lifting a heavy weight I do not need to choose first a convenient position, then stand firm, then adjust my hands and fingers, and then exert a strain. Many of the various movements are normally performed at one and the same time. [Repeat this.] The subdivisions of such an action can be again subdivided, if need be, for there is scarcely an ordinary movement so simple as to lack parts. We, therefore, find, as we might have anticipated, that, in learning, we generally proceed only with portions of a process at a time. After a period several portions are performed simultaneously. Sometimes, as in the case of lifting a weight, the activities form one connected whole. At other times, they are disconnected: the walking has nothing in common with my playing with the key, and my playing with the key is not thought of in connection with my reading aloud.

Let us re-remember what we have already referred to, that the functioning of the central nervous system is due to the pressure of organic needs, or to functional readjustments. For this reason, if what we are occupied with requires less than the normal energy available, series after series will establish itself until the available energy is fully employed. Hence when we are engaged in routine occupations of a low order, i.e., occupations which absorb little attention, we always add to our immediate repertoire of thought or action. As a difficulty in the work arises, so the objects attended to decrease; as the work becomes easier, so we are occupied increasingly with what is not connected with the task. [Test this minutely.] In some matters alone do we encounter the fact that we cannot do more than one

*Stout (Psychology, 1896, i, p. 212) says that we can only attend simultaneously to the ringing of a bell and the swinging of a pendulum when the two are connected in thought. This is certainly not so with me. While I am continuously speaking, I see at the same time the trees outside my window and hear the tram cars passing by, without connecting these three processes.
thing at a time. I cannot, for example, sit here writing, and be, at the same time, strolling through the neighbouring wood. Such instances, however, prove little. Only a few days after I had written this, I overheard a remark illustrating the view which is here put forward. A builder said somewhat sarcastically to one of his masons, as he was passing by, "You wouldn't do for a carman; you would pull up the horse every time you wanted to speak," plainly intimating that the man might do his work and talk at the same time. Of course, an untrained psychologist would be confused if he attempted to do deliberately what he constantly does without pointed deliberation. But time will soon prove to him that introspection is not bound to be a barrier to the direct observation of immediately traceable facts. As practice proceeds, he will be able to institute an "introspective series."

The problem involved in this section has been much debated. Brentano (Psychologie, 1874, pp. 204-32) holds that several things can be thought of at once, but they must form one whole. Hamilton (Metaphysics, 1877, i, p. 254) contends that five or six points can be discerned simultaneously. James (Psychology, 1890, i, pp. 405-9) seems to me ambiguous. Lipps (Grundzüge der Philosophie, 1883, p. 164) believes that "only one process of thought can proceed at a time without interruption." Paulhan (La Simultanéité des Actes Psychiques, 1887) recounts a number of most interesting experiments of his own which tend to prove our contention. Stewart (Elements, 1868, ch. 2) considers, as we have seen, that the minimum visible is the time-atom of thought. Stout (Analytic Psychology, 1896, i) concurs with Brentano and Lipps, saying, in explanation, that "each mode of mental process tends to arrest and suppress others" (p. 196), a conclusion with which I cannot agree. The fact that effective introspection is generally denied, implies that thought is considered only one storey high.

39.—Do we Attend in Habit.

This is not the place to face the question of routine; that is dealt with in ch. 3. We can here only consider the problem from the standpoint of attention. As an illustration take the compositor who is setting up this type. [Examine in detail some process familiar to you.] If he is not introspective, and he is asked how he does his work, he will be unable to re-collect more than a minute portion of the process. Why is that? It is because he does not, now at least, think of the different parts of the process as a whole and in relation to other things. He only regards the steps in connection with those that immediately precede and follow. Through continued improvement he has become an adept in doing the right thing at the right time. Being uninterested in the nature of his work and interested in other things, he has a tendency to crowd out of the total process whatever can be spared. He busies himself only with that which he is compelled to do, being employed otherwise in reflecting over pleasanter, and to him, more fascinating themes than setting up type. The gathering thoughts push aside all that they dare. As a result, attention to the work is reduced to a minimum. He just re-members what is necessary —no more and no less, roughly speaking—and what is not necessary falls a prey to oblivion. Each movement is involved in the one which precedes
it—it being immaterial here whether the stimulus is central or not—and is entangled in the following movement. As these movements are of no general interest, as attention to them is reduced to a minimum, and as the main stream of thought rushes by them, they become lost to the memory under ordinary circumstances. Assuming that the composer has duly learnt his art, his knowledge, through economising the attention, is reduced to what is indispensable. That he attends to his work is plain. From a number of letters in a box, he selects the one which lies in a certain position. Previous to that selection his right arm moved towards the proper box. If he shut his eyes, he would soon find out their use: if he then lost the sense of touch, he would be unable to proceed. Sensations, images and movements, are the result of attention, and since they occur in the process, the composer must be attending. Or, to test the matter differently. If the composer is so inclined, he can observe what he is doing, and thus re-develop the various steps in order.* In noting his own procedure, he will soon be convinced that he is busy attending during the whole process. Again, let the composer be interested in a conversation, let that become absorbing, and his arms gradually come to a standstill, which proves that attention covers the whole field of organic functioning. No process is so elementary that it escapes falling under this rule.

40.—Can we attend to habits.

A misconception has been created by the opinion that it is not possible to attend to a habit without influencing it. Only casual observation bears that out. It is true that with some activities the first attempts at following the process modify it or give rise to perplexity. More critical study, however, shows that the embarrassment soon disappears, and that after prolonged practice we can fully observe without in the least degree introducing any change. At first, in following the process, we incline to divert the labour requisite for the process itself, which produces disorder. We are also apt to introduce crude notions, or deliberately fix our eyes instead of allowing them free play; and the like. But as we continue striving to attend to the manner in which we perform a task, less labour is wasted or misdirected, and the two processes of performing a task and of attending to the manner of performance proceed together. In some instances, besides, it is essential that we “attend” to our work. In others, we freely attend to our dress, to our looks, to our walk or to our conversation, e.g., we not only converse, but we take note of how we converse.†

*Stewart (Elements, 1808, ch. 2), believes that we attend in habit, only that our thought is much quicker. Dr. Stout (Analytic Psychology, 1896, i), with the majority of psychologists, excludes attention from the realm of habit. He holds that “independence of attention” is one of “the chief features of permanently fixed habit” (p. 258); that “established habit is independent of and exclusive of attention” (p. 261); and he tells us further that “a practised reader does not usually attend to the letters and words; his thoughts are occupied with the meaning” (p. 266).

†Stout (Analytic Psychology, 1896, i) strongly maintains that in attending to habit, “habit is disturbed; there is loss of facility, rapidity, and uniformity” (p. 261).
41.—The Routine of Life.

Besides the routine of work, there is the routine of life. In daily life we pay but a semblance of attention to the objects around us, because they suggest nothing of interest, and because, if severely attended to, they deprive us of the normally necessary attention. Thus we do not linger over each letter in a book. Similarly, in town we take little account of carts, horses, houses, names over shops, or the people we pass, and we notice only in the vaguest manner the stones on which we tread. In the rumbling of wheels we distinguish neither wheels nor rumbling. If again, in strolling through a maze of trees in June, I did not ignore the majority of the surrounding objects, I could never think of anything else but objects connected with the wood. The opportunities at our disposal being limited, we attend only to an inconsiderable extent to our surroundings, and these hurried observations being useless, or nearly so, for the general stream of thought, they are little dwelt upon, and hence not re-developed. For example, every one has noted the moon in the sky, and also the fact that she is sometimes full and sometimes not; but her exact path, the rate of her speed, the reason for the changes, are not revealed by an occasional upward glance. There must be consistent, connected and long-continued activity to discover these facts, and this, in contradistinction to routine observation, holds of the main facts of existence.

42.—Attention and Memory.

In the routine of work and of life we meet with attention. Turning to memory, we are face to face with the same factor. To remember, according to our interpretation, is to "re-member." The traces of the original stimuli are preserved in some form, if they were attended to in the first instance, and attention converts the modification into some image, etc. Without somatic or bodily stimuli, attention as we have seen, can do nothing, and without sensory attention such stimuli create no sensory effect. Hence we are bound to reason that in re-development we apply energy to traces left by the original stimuli.

The moment the processes comprehended in attention come to a standstill, form, totality, sound and colour, cease to exist for us, while with the birth of attention, objects are realised in the manner already explained. Hence the sensory world, as we know it, does not exist apart from attention. Accordingly, no image, no sound, no taste, no thought, nothing intelligible is stored. (Sec. 15.) As long as attention is at work, so long do secondary systems exist. We re-develop everything, in the sense that we have developed it previously. The process of memory, like that of sensation and feeling, is one of elaboration, only that in the former instance we are dependent primarily on central stimuli. The objects of possible memory are latent in the brain structure as a tree is said to be latent in a seed, and possess no other existence. Attention makes real what is otherwise only possible. We have no more reason to believe that images exist in the
absence of attention than that a blind man can see, or that a puppet will move if the strings are not pulled. Our needs (ch. 7), coupled with the trend of attention (sec. 44), decide which out of innumerable possibilities shall become actualised.

No strict line can be drawn between primary and secondary systems, or fact and memory. Most objects integrated are not integrated at once, e.g., in viewing a landscape I view now one part, now another; my eyes sweep across it; and were it not for apposite memories the impression would be far different. Thus even the simplest figure takes time in apprehending. Again, listening to a conversation, an argument or a melody, is a meaning-
less process except in so far as we connect what happens from moment to moment. Were it not for memory, feelings and sensations would be impossible.* (Ch. 5.)

§ 43.—SUB-CONSCIOUS AND UNCONSCIOUS THOUGHT.

As with memory, so with unconscious or sub-conscious happenings. Thought being impossible without attention, there can be no attentionless thought, and consequently no unconscious or sub-conscious thought, if these presuppose absence of attention. The subtle facts which are said to mark subterranean thinking must be explicable in the light of what we have learnt. Here the relation can only be hinted at.

First, we must allow for misinterpretation. Images are often so faint, and so little dwelt upon, that we forget or are unaware that they occupied the theatre of thought. Feelings, again, are not seldom misconstrued and often not actively discerned. These classes of facts might be conveniently called sub-conscious, or loosely connected, if it be observed that we only refer to facts which are much misinterpreted or little dwelt upon.†

* Smith, The Relation of Attention to Memory, 1895.
† Morgan (Psychology, 1894, p. 14) would restrict the word "sub-conscious" to the margin of consciousness as distinguished from its focus. Stout (Manual, 1898, p. 68) defines sub-consciousness as one with sentence. Sully (Human Mind, i, p. 75) also inclines to use the term as we have done. Lipps has a curious theory as to unconscious activity. He says: "All psychic activity is primarily unconscious. Out of the multitude of which is unconscious rises the conscious when the conditions are favourable" (Grundtatsachen, 1893, p. 695).

The words "consciences" and "awareness" express a simple fact which is rather hidden than revealed by these two words. When I say that I was fully conscious of the course of action I took, I mean that I connected the course of action with some other fact. When I say, on the other hand, that I was not aware of what I was doing, I mean, again, that I did not connect the course of action with anything else. Consciousness or awareness thus means that a notion does not stand by itself, but is connected with some other notion or notions. Whenever a notion is thus palpably connected with some other notion, and only then, do we speak of consciousness or awareness. For this reason it might be best to vary those two words with the more precise word Connection. Hence we may say, "The course of action was closely connected with certain reasons for such course of action," or briefly, "The course of action was closely connected." Likewise we may say, "What I was doing was not connected" with any notion. Hence though it is a sacrifice to dispense with two such well-known words as we are here criticising, it will be found a useful innovation to say, "I connect this," "I do not connect that," in the place of "I am conscious of this," "I am not aware of that."
Secondly, we are bound to allow for a possible activity of the brain in the absence of any decided feeling element. In this connection we must not forget that attention and stimuli produce a neural activity, the counterpart of which we call thought.

Perhaps an illustration or two will elucidate this problem. I wish to re-integrate the second line of a verse, but after repeated efforts I fail, and turn away from the subject. [Try deliberately to re-instate things or names which you do not easily re-develop, and note result.] Suddenly, in the midst of some train of thought, rises the sought-for line, like a ghost out of a gulf. How are we to account for this? Coincidence is out of the question, and sub-conscious thought, in the sense in which we have defined it, we must also reject. These may account for individual cases; but they do not explain the facts as a whole. The line rises spontaneously, unbidden, unsought, perhaps unwelcome.

Here is another instance. I want to know how a certain argument is to be answered. After several unsuccessful attempts I drop the matter. Then some time afterwards the solution develops. What explains this and similar facts? The theory here propounded is as follows. (See ch. 5.) In hard thinking, re-collecting or passion, certain central nervous tracts are supernormally sensitive, agitated or active. When the main stream of attention is turned into a new direction, the activity which has been set going persists for a period, much as vibrations persist after the initial antecedent is withdrawn. A solution, if arrived at as the result of the continued activity, then emerges, as if we had kept on thinking in sense terms.

This theory will be shown, in the proper place (sec. 110), to be more than plausible. It not only gives a rational explanation which accords with the illustrations; but it is also in harmony with general facts. We know how anger or passion clings to us; how a thought which is dwelt upon haunts us; and how moods thus created defy interference (sec. 109). These sudden re-developments are also accompanied by a feeling peculiar to them, which we cannot banish. Sometimes it is distinct; at other times it is only observable when sought for. Thus in the case of re-instating the second line of a verse a somewhat faint feeling clearly accompanied the sensitiveness, implying an expenditure of overground attention. This feeling is strictly comparable to any persisting organic feeling; it is liable to be misinterpreted like others of its kind, and persists like the craving of hunger. Compared with other feelings it shows a difference of degree, but none of kind. Important developments of this theory are possible; but would not

that "conscious" and "aware" should be identical with knowing, yet analysis supports our statement. I know or I do not know this or that, means invariably I connect or I do not connect this or that. If a name heard, or a thing seen, suggests something or nothing, or is connected with something or nothing, we say ordinarily that we know or do not know this. Psychologically, therefore, consciousness, awareness and knowing are best expressed by such verbs as to connect, to link, to chain.

We must go a step further. To believe, to doubt, to be certain, are degrees of knowing, and hence interpretable in terms of connecting. We can, therefore, employ "to part-connect," "to semi-connect" and "to connect perfectly" for to believe, to doubt and to be certain.
be in place here. The bare statement must suffice that there are neural processes which at some point end in a more or less complete thought, suggesting a brain activity equivalent to, but unaccompanied by, overground thinking. There is, however, no evidence that anything but shreds of thought are developed subfebraneously, and we may dismiss the notion of an “unconscious mind” as unjustifiable. (Sec. 217.)

Hartmann (Philosophy of the Unconscious, 1884) explains everything by reference to the unconscious—a brilliant device to escape the trouble of tracing stubborn facts. The Herbartians keep their eager-to-come-to-the-top ideas in the dark cells of unconsciousness. These unfortunate ideas harass their more fortunate brethren who for a moment breathe the sweet air and see the light of day. The Herbartian hell and heaven are purely mythical. Ward (Psychology, 1886, p. 47, col. 2) compares the threshold of consciousness “to the surface of a lake and sub-consciousness to the depths beneath it,” without indicating where exactly the process of drowning begins and how it proceeds. Once conceive an idea to be an organic complex (sec. 80), and both Herbartianism and Associationism seem superseded.

44.—Conditions Favouring Attention.

We discussed at length the meaning of attention. A few words will suffice to determine the conditions which favour attention.

(1) First and foremost in stimulating attention, always taking for granted the existence of needs, i.e., of functional tendencies, is the presence of an irresistible inclination to attend. A certain quantity of attention perpetually strives to spend itself. Be the interest ever so low, if we are not otherwise occupied, every trifle is likely to enter the avenues of sense or of the imagination. What would otherwise not be attended to receives recognition, because we must be occupied somehow. When for any reason, as on occasion happens, we have nothing special to busy our thoughts with—nothing that stimulates to marked endeavour—then a long caravan of thoughts travels across the pasture lands of fancy, each part of which, as soon as it requires marked attention, is displaced by other thoughts of a similarly ephemeral nature. [Examine such cases.] Everything in turn then captivates the inner and the outer senses. The completion of a thought, in these circumstances, depends on the ease with which it may be pursued; and as difficulties are bound to arise in the process, each thought, in the case we are considering, tends to be abruptly displaced. As birds lay eggs, whether these are fertilised or not, so we continue thinking whether there is a present necessity or not. Since some difficulty may have to be solved at any moment, the attention does not slacken. When thinking is not compulsory, our thoughts lack the germ out of which other thoughts evolve. These are the unfertilised eggs which the bird of fancy cannot help laying.

(2) In the next place comes the precise quantity of available attention, as distinguished from its perpetual presence. The latter determines that we shall be active; the former decides how far we shall be active. Thus as routine generally lays claim to but little of the available attention, we have rising tier after tier of thought until the demand equals the supply.
As the dog pretends to be anxious to fetch a stick out of the water when his desire is to bathe, so we often make believe that we are busy with many details when we are hurried along by the imperative necessity to continue acting.

(3) Just as before going to sleep we frequently doze, attention being on the decline, so ill-health often tends to decrease the energy available for functioning. This usually expresses itself in two ways. First, we attend less absolutely. Secondly, the value of an effort is largely reduced, so that no suggestion is pursued to its legitimate issue. In robust health, on the contrary, attention is at its maximum both as regards strenuousness and effectiveness. Hence, other things being equal, attention is most effective in good health.

(4) In our analysis we noted that unfamiliarity offers a barrier to voluminous attention. While the flowers and grasses along a lane are meaningless to one individual, to another, a botanist, they yield a rich harvest of knowledge. This man recounts a score of floral species which he has observed, with much other information, while the former cannot distinctly recall anything. What is most easily attended to, is that which has been attended to strenuously on former occasions. As a magician’s wand was said to rear a castle in a moment, so attention, with bewildering swiftness, utilises the bricks and mortar of memory. It sorts, sifts, distinguishes, classifies and re-cognises, a variety of details in a very brief space of time. Attention is, therefore, most effectively employed on what it has been previously engaged upon.

(5) For practical purposes it will not be enough merely to re-cognise, to re-attend. Re-attention is most useful when it is combined with simple attention, or, at least, with attention to something not well recognised. When the comparatively new is involved in the comparatively old, the consequences are most fruitful. In proportion as the new is isolated, so will it be difficult to make it a permanent possession. Thus when new truths stand by themselves, they are hard to assimilate and re-member, while, if they are shown to be part of an old truth, they are often re-instated or comprehended with the greatest ease. For the advancement of knowledge—for effective attention—nothing is more valuable than to show the old in the new.

(6) What is conveniently grasped, other things being equal, is also more conveniently attended to. If an object exhibits a special design; if the parts are correlated; if its scheme is not fantastic; if it is not so small or so large that much effort is required in its examination; if it is of a class known to us, then we readily busy ourselves with it. Thus a fine mansion is easily conceived of as a whole; a name encountered for the first time is yet fluently read by one accustomed to reading; a geometrical figure of regular proportions is not as exhausting to take note of as one of irregular proportions; a picture representing a scene from human life is understood the more readily the more evident the relations of the figures to each other.
The business of the attention, i.e., the business of the central nervous system, is to serve the organism, and in this sense attention is teleological. Some demand of our nature, muscular or neural, nutritive or regulative, sets the brain going and, if advisable, keeps it going until the demand is satisfied. Then another want acts as a stimulus, and so forth. This is an abstract way of regarding the matter. We have normally several wants engaging the attention simultaneously; and, as a rule, the want absorbs the attention for a time only, and not until it is satisfied. If a man is fond of strawberries and they are before him, his attention, or part of it, will probably be devoted to the strawberries until he has done with them; but if they are difficult to procure, a little speculation is all which is ventured upon. Our wants are also frequently complex; a man goes for a walk, for instance, because he desires exercise, fresh air, the music of the birds and the sight of flowers. The purpose of neural activity is to satisfy our primary and other needs; but when we are specially eager about one matter, the whole available attention is concentrated on that alone.

When interest is acute, attention is highly effective without any strain being perceived, though the consequences often show that such strain existed; when interest is slight, attention is comparatively ineffective, while the related effort of attention is distinctly felt. In interest there is a rush of available energy towards a certain point.

When interest, for any reason, is absent, ennui sets in. We then long to do something. We are uneasy as the result of being unemployed. Adults, under such circumstances, yawn and grow languid, while children cry for something to do. In ennui the attention is largely absorbed in uneasiness, as there is no sufficient incentive to make use of it through the accustomed channels. The existence of ennui proves, in addition, that the tendency to action is constant, and not solely determined by the presence of this desire or that.

An important aid to continuous attention is to dismiss decidedly and completely the previous thought, and to turn whole-heartedly to the matter to be attended to. If that matter be fairly interesting, the attention will then easily be sustained, and quickly recur to the subject in the case of momentary absent-mindedness. Much of children's inattention is due to the difficulty they find in ridding themselves effectively of thoughts which precede, or arise out of, the lesson.

When I sharply dismiss a thought, I do it usually by shutting my eyelids forcibly; by looking emphatically at some object; or by some other abrupt muscular act. The only alternative is to refuse to think, when, after a little while, some casual percept or idea emerges. In any case, dismissal seems due to change of activity alone. It is as if we could only dismiss visitors by inviting others to take their place.

The more the attention is trained, and the more we can appeal to some congenital or acquired predisposition, the more readily are we active in any chosen direction. [Test (i) to (xi).]
45.—The Education of the Attention.

What has been remarked concerning the conditions which favour attention must be considered in education. There are at least three principles to be taken into account.

(i) The attention should be deliberately exercised. No tasks requiring either no sensible effort or a great effort should, as a rule, be imposed, for in both instances the labour is almost wasted. Supposing now that the exercises are rational, we shall discover that what at one time could not be done at all, can later on be readily accomplished. After appropriate practice we glide at will from subject to subject, or row deliberately among the shallows and deeps of one thought. In the education of the attention it is of prime importance to prevent aimless thought, and to develop the power of firmly, freely and fully fixing the attention on any subject we choose. It is not sufficient for us to be trained in certain directions, as mathematics or languages. If no more is done, vast tracts will remain uncultivated. Education must enable the individual to control his activities generally, or rather should aim at perfecting, as a whole, the neural mechanism.

(ii) The motive for attending must be detached from special interests, and the supreme notion to plant in the child, as regards attending, is to make it desirous of acting effectively. In other words, the child must be brought to have a strong inclination (sec. 146) in favour of proper attention. The need for reasonable effort should be the incentive. The employment of the attention must be dissociated from the interest in the thing immediately attended to. In all sound reflection there is readiness to attend to what is not specially interesting except as a means to some remote end.*

(iii) The training of the attention must begin early in life. Later results are most disappointing. †

46.—Factors Producing Changes in the Field of Attention.

Changes in the field of attention are mainly induced by one of the following circumstances: (1) when attention has attained its end (Stout); (2) when fatigue sets in (Stout); (3) when a strong sensation competes (Stout); (4) when, through lax or overwrought attention, the topic tends to change; (5) when a new or old topic recently thought of, takes possession of the attention; (6) when a word, a tune, a sentence, etc., haunts us; (7) when we are full of anxiety; (8) when attention was due to a mood which is receding; (9) when we attend to various objects alternately; (10) when we dismiss a thought deliberately; (11) when a thought shows signs of tiring, and is not of pressing importance; (12) when we have given sufficient attention for the time being; ‡ (13) when in a subject or in our

* The Associationist school lays the stress on feeling, interest or pleasure-pain; the Herbartians, on connecting what is new with what is old.
† On the subject of the training of the attention, see Carpenter’s Mental Physiology, 1876, ch. 3.
‡ We usually devote only a short period at a time to any particular problem.
surroundings we observe something of special interest; (14) when some routine duty is to be performed; (15) when, by previous resolution, we are to do something at a stated time, or on encountering something or somebody; and (16) when a feeling of hunger, etc., becomes imperious. * [Test the list, and, if possible, add to it.]

47.—General Conclusions.

We have endeavoured to discover a satisfactory answer to questions such as the following: Why does attention not vary normally in any one individual or from individual to individual? Why do we normally attend to, or tend towards, something or other without interruption? Why can we increase or decrease the range of attention but to a very limited extent? Why do we reason in subjects, and move quickly from point to point? Why can we not stop attending? Why is attention normally easier when the subject is familiar? Why can we attend to more than one thing at a time? Why are observation and thought slow? etc., etc. Secondary systems or facts of non-bodily feeling have supplied us with no clue to the solution of these questions, and assuming only these, any answer, as long as it was not self-contradictory, could be tendered, each being equally empty. But on turning to the bodily organism, we met with facts of great significance. All activity, we learnt, is apt to leave traces behind. Certain classes of activity are followed by growth of a more or less extensive nature. The organism as a whole varies little in individuals. Development proceeds along well-marked lines. Different parts of the body are more or less active, the heart and the lungs working ceaselessly and uniformly without need of rest, while the voluntary muscles require more intermittent and varied exercise. The brain in the waking state, we know, is an organ which is steadily active like the heart and unlike the muscles. Assuming the central nervous system to be the complement of the laboratory of thought, we saw that all that was evident, and all that was obscure, in the process of attention was readily explicable. Indeed, it became evident that the complete understanding of our nature, the general form of thought, could be arrived at deductively from a contemplation of the body in general and the brain in particular, there being no connected continuity in the secondary realm while there is such continuity in the brain.

48.—A Bird's Eye View.

The term most intimately connected with attention is direction. In attention, therefore, regarded physiologically, we consider the play of neural changes from the point of view of the direction in which they take place. It is not so much change, as the line of change, which we refer to.

* * * Attention in any given direction ceases only under one or more of the following conditions: (1) when its end is attained ... ; (2) when fatigue sets in; (3) when some competing sensation ... interrupts it; (4) when some sensation or image occurs connected with a system of psychical dispositions which ... happen to possess ... a relatively high degree of excitability, i.e., casual associations (Stout, Analytic Psychology, 1895, i, p. 197).
in speaking of attention. In this sense the present chapter deals with a
certain aspect of cerebral change—with the reasons why neural change
tends now in this direction and now in that. Further, since normal
activity is subject to interference and has certain characteristics, we speak
of the degree and the volume of attention. Attention, thus, treats of the
direction, the degree and the volume of cerebral change. It embraces all
activity; its field is the field of activity. Thus the word attention is as
useful as is the word direction. It helps us to express the fact that the
brain is busy in this direction and not in that; that its forces are massed
here and not there; and that in the normal waking condition it functions
incessantly, to the same extent and in varied directions.

From this position it is but one step to a looser use of the term where
it sometimes only spells activity or change. Thus when we say that we
attend in a certain direction, we mean that we are active in that direction.
In this way attention has come to be identical with change and change
with attention. In the strictest sense, then, our subject has been the
systematic aspect of neural functioning.

We have identified attention with cerebral change. The meaning of our
key-word is readily distinguishable from the only other term, besides
activity, with which it might be confounded. Willing is divided from
attention, and attention from willing in that attention always is change and
nothing else, while volition never is change, but only points to it. The
relation between these two is that between being and becoming, between
sein and werden.

Viewing the subject of attention from a still higher position (which
embraces the physiological aspect), we say In the normal waking state
something is always immediately given and that something is a constant
quantity which constantly changes at a constant rate. Here the terms
attention, activity, functioning and energy, become superfluous. In our
exposition, however, we have found it impossible to break with the old
terminology without endangering the sense and making comparison
difficult. Nevertheless one feels that it is most undesirable to assume
some mysterious power or capacity along with what is immediately given;
for such a power or capacity describes nothing and explains nothing; and
has, therefore, no place in science.

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CHAPTER III
SYSTEMS AS ORGANISED

Habit fashions every act,
Sees that thoughts are closely packed.

49.—THE HISTORY OF A HABIT.

A child is being taught to write.† Laboriously he learns by heart the precise appearance of each letter. He does not distinguish between d’s and b’s, p’s and q’s. He dips the pen too far into the ink-pot. He blots the paper, and his characters are now too faint and now too pronounced. He forgets to shape the letters properly: neither higher nor lower, neither broader nor narrower, neither thicker nor thinner, than the example. The pen is not held so as to prevent unnecessary work or awkwardness of movement. The paper is placed wrongly and is not kept clean. The arm is not sustained in the particular fashion required, and the general bodily bearing fails to conform to prescribed rules. The necessary speed is not attained. The words are not properly divided. The lines are not at right angles to the sides of the paper. The spaces between these lines are not uniform.

Much that is objectionable, the child picks up by the way, and thus he has afterwards to unlearn what he has injudiciously acquired. Many things the child is told, and some of these he forgets or misunderstands. Here, again, much ground needs to be recovered. When an explanation is proffered, the child has difficulty in following it. He does not at first re-member with ease. He often stops trying to re-collect something he has forgotten. He suspects that he is wrong. He doubts. He argues with himself. He asks questions. He corrects his writing. He watches the movements he initiates. He observes what progress he is making, and imagines what teachers, parents or fellow-pupils will say. He repeats to himself: “I mustn’t hold the pen so; I must hold it in this way.” “That

*Organised reaction, organised trend and organised activity are used in this chapter as equivalents of routine process or habit.
†The example of the child learning to write has been chosen merely for the purpose of illustrating the nature of habit generally.
letter falls below the other letters of the line." "This letter I wrote all right." "Oh! look at that blot!" "I wonder whether this is right." "I wish I had finished." [Acquire some habits purposely, and follow to the minutest detail the process of development.]

Many years after the child has finished his lessons, we meet a person who writes easily and well. This adult is the whilom child who found learning to write an arduous task. That accomplishment is no more a problem to him. He proceeds now without apparent effort. How shall we account for the surprising change? To this question I propose to seek a satisfactory reply.*

50.—Memorising the Facts.

(1) In learning to write, various facts came to the child’s notice, and these he was asked to retain. Through instruction, through both deliberate and chance observation, through interconnecting or reasoning, the facts were collected item by item. Committal to memory gradually made re-collection of the material to be utilised perfectly easy. After the lapse of a certain period the child knew that which the man knows. As soon as any detail was required, it instantly developed.† Having what is relevant firmly established in the memory, there is never—or almost never—a need to doubt, to argue, to cast about or to try to remember. [Observe this phase in your habits.]

(2) A variety of accidental difficulties embarrasses the learner. There is a blot—how is he to behave towards it? The new pen refuses to take up the ink—what is he to do? The position of his body is ill-chosen for writing—how is this to be remedied? His shadow falls on the paper—

*I am not aware of a single piece of concrete analysis of a habit undertaken by any psychologist. [Observe in action: your thumb, your fingers, your arm, your lips, your tongue and your eyes, keeping a copious record; also handle stick or umbrella, button your coat, take off hat, stretch yourself, pull out watch, etc.]

The practical importance of proper habits has always been recognised. Aristotle, in his Nichomachean Ethics, bk. 2, insisted upon their value; and in recent years James (Psychology, 1890, i, pp. 120-7) has eloquently urged their claims upon students.

On the theoretical side, as regards habits, the speculative method has borne undisputed sway, painting the grotesque fancies of the plain man in luxurious tints. The common doctrine has been that repetition, exercise or practice, makes deeper and deeper furrows or "a smooth path" (Locke, Human Understanding, bk. 2, ch. 33, sec. 6) in the brain; and that in consequence there is "lapse of psychical initiation, . . . precision of response, . . . unfailiness of response, . . . difficulty of modifying it by special volitional effort" (Sully, Human Mind, 1892, ii, pp. 228-9). So Destutt de Tracy, Ideologie, 1801, p. 231: "Our frequently repeated movements [and thoughts, p. 238] become easy, rapid and little felt." So Maine de Biran (De l’Habitude, 1803, p. 169) quotes as effects facility, rapidity and indifference. To these marks of habit Reid (Essays on the Active Powers of Man, ed. 1863, Essay 1, part 1, ch. 3) would add "inclination or impulse" to act; and with this judgment Stout (Psychology, 1896, i, p. 258) agrees. See also Foster, Physiology, part 37, 1897, pp. 1116-8.

The law of habit has been raised to great dignity. Dumont (De l’Habitude, 1875) holds that habit is a general property of matter, quoting (p. 348) Gassendi to similar effect. This opinion is shared by many; but see especially Heying, Ueber das Gedächtniss, 1870.

† To make the memory work instantaneously and unerringly in a complicated task is a matter which may require months and years of practice.
how shall it be prevented? The pen scratches or spurts, the penholder or pen is one he is not used to—how meet the difficulty? Such are some of the obstacles which detain the intelligent learner. These queries come to him at first as problems demanding a solution, and some of them may require severe thinking before they are disposed of. But as practice proceeds new cases tend to be extremely rare; for, once a difficulty is settled, the solution is soon well re-membered, and the problem ceases to exist. Thus special instances which resemble problems do not present themselves as such; they are now mere re-membered facts. Just as a normal constituent in a routine or organised process is re-developed, so we re-member these isolated instances, for they have become part of the normal order. Consider an example. The country road along which a certain individual passes is too rough for comfortable progress. He shuns the flints. If one of them is in one position, he steps beyond it; in another position, he takes a shorter step; in a third, he steps to the right; in a fourth, he steps to the left. By accident he may tread on an ugly piece of flint sideways, or on his heels, or on the arch or the ball of his foot, and in each instance he meets the difficulty in an intelligent manner. So with the minor undulations of the ground, or in walking up hill or down hill, or on board a vessel—an appropriate solution is forthcoming for each instance. At first it might seem that on every separate occasion he is compelled to decide on one of a dozen courses. As a matter of fact, each special difficulty has occurred previously, is re-membered and stands isolated. These cases cease to be cases of special difficulty. The solutions are firmly fixed in the memory. The obstacles, as they appear, are settled by reminiscence, and not by reasoning, speculation or inquiry. [Observe yourself in dressing and undressing, and in walking.]

(3) The precise effort needed in the formation of any letter or part of a letter is re-collected. Should more or less energy be required, the memory will gauge it. But for memory the hand instead of going slowly, might go quickly; instead of in one direction, it might move in another. The particular quantity and quality of muscular activity needed in an organised trend or habit is not generally a matter of calculation. Suppose a man discards an umbrella and procures a new one. After he has used the latter for some time it strikes him that the umbrella flies open rather too quickly. Then it occurs to him that the spring of the new one acts much more readily than the spring of the old, and that he had neglected to observe the difference. Unsuspectingly he was as active in opening this umbrella as in opening his late one. That is to say, we do not take each case on its merits; we go by precedent. In writing, re-collection stands in the same relation to the muscles as it does to sights or other sensations.

51.—The Process of Simplification.

(1) At first, as was hinted, there is a many-sided interest. We wonder
what is thought of our writing. We speculate whether we shall be praised or blamed. We doubt whether all is right. This interest is bound to depart in time, as is also the play of thought connected therewith. No needs remain that induce us to concern ourselves with our calligraphy. There is nothing left to wonder about—except, perhaps, our bad handwriting. The atmosphere of thought has changed.

(2) The time and energy spent in doubting, hesitating, brooding, trying to re-member, etc., are now set free. As the interest in writing declined, these agitations of the spirit decreased proportionately.

(3) At the commencement, especially when the child has little or no guidance, he is sure to make many mistakes. How is it that he forgets these? It is evident that writing would be most cumbersome if he first re-memembered the mistakes, and was bound afterwards to dismiss or correct them. If such were the fact, organised trends would be buried in confusion. Moreover, observation proves that his mistakes do not re-develop. The apparent anomaly is accounted for as follows. When a right solution and a wrong one develop, they do not equally persist. The wrong one has no interest attached to it and speedily disappears. The right one is sensibly retained and is deeply interesting. Other things being equal, of two compounds that which appreciably occupies the attention is the one more easily re-memembered, and especially is this the case when a need for re-membering is present. Hence the right solution will tend to be re-collected rather than the wrong one. Suppose the action in which the right solution persisted and the wrong one disappeared has to be performed for a second time. That will happen which favours the former. An effort will be made to re-develop that and not the wrong one. Other things being equal, memory will favour the re-collection of that which required a sensible effort. The wrong solution is thus less likely to recur. Again, the right solution having been acted upon, the action is connected with the right solution and not with the wrong one. Hence thinking of the action will, by preference, suggest the one and not the other. Further, the one solution having been acted upon, it has been for a longer period in existence, and memory will therefore favour the re-collection of that one of two or more lines of action which has been previously acted upon. And again, the wrong solution is not only dismissed; it is recognised quickly, and therefore set aside the more quickly. There is no waiting till it has fully unfolded itself; it is thrust back before it has seen the clear light of day. Each time a solution is required, the right one is thus favoured, and the wrong one discouraged. Hence, on the average, the one not favoured is soon forgotten through not being re-called. Once more, other things being equal, that is re-called which excites interest. Therefore the right solution which excites interest will be reinstated while the wrong one, in which the interest is negative, will tend to be forgotten through not being re-called. And lastly, since the right solution is acted upon frequently

*See also Stout "Psychology," 1896, i, p. 267.
and at short intervals, it, rather than the wrong solution, will be fixed in the memory.*

In the preceding reflections we have probably an ample explanation of the fact that error lapses. In learning to write, such error tends to disappear, while the knowledge of what the process should be, prevents new mistakes from arising.

The following propositions convey the argument of this sub-section:
(1) That on which attention is more exclusively centred is more easily remembered. (2) That which we do not, in the initial stage, make an appreciable effort to re-member, is forgotten. (3) That thought which is acted on is connected with the action, and is more easily re-formed than that which is not connected with it. (4) That which is re-formed as well as persists, is more easily re-membered. (5) If any part of what is erroneous is re-membered it tends to be immediately disintegrated or suppressed, thus hastening the oblivion of error. (6) That in which we are not interested, or in which the interest is negative, is not re-called. (7) Only that, other things being equal, on which attention has been centred frequently at short intervals, is re-developed.†  

(4) Suppose the child is about to write the letter i. He admonishes himself “Dot your i’s.” So with the letter i, he re-calls “Cross your i’s.” Similarly he says, “I must hold the pen thus.” In this way many of his actions are preceded by shorter or longer remarks. As he advances in his studies such preliminaries become obviously superfluous. The memory being perfected and the interest waning, these scaffoldings are removed in the manner indicated in the preceding sub-section. What happens with preliminaries happens with everything which is not essential to the process. One portion after another lapses until nothing but what is essential to the action (as he learnt it) survives.‡

This elimination of what is non-essential is facilitated by another factor. We can only elaborate simultaneously a limited quantity of systems. If we are considerably interested in one thing, we cannot spare much interest to other things at the same time. Thus there is a constant tendency for thoughts, as with animals in congested areas, to drive each other out of existence. We wish to write, and we want also to think of the subject-matter of the writing. Hence a tendency to make no more

* The words interest, effort, attention, do not necessarily imply here more than the rudiments of these. As we shall see (ch. 4), re-development is always the outcome of effort teleologically determined, and hence known errors are not likely to be reproduced.
† This special analysis makes no pretence to being faultlessly accurate. Ultimately, no doubt, when the foundations of psychology have been laid, we shall obtain a mathematical version of the process of economisation. At present, attempts at mathematical statement, seeing the many problems involved, would be presumptuous and futile. We may as yet only tirelessly re-analyse and re-study our data.
‡ Resolutions, and reflections generally, play the part of a scaffolding in the neural economy. They argue that a system is still in the course of erection. As adaptation grows complete, so the scaffolding is removed. Again, in another light, resolutions are themselves organised. Their meaning is neither verbal, nor a simple transparent something; but an established complex which is pointless unless we conceive it organically and varying indefinitely in richness of content and expression. (Ch. 4.)
ado about a task than is absolutely necessary. The lessening of the interest itself partly disarms opposition. When we are, therefore, concerned about something, any disturbing or unessential phrase such as "Cross your t's," is suppressed as soon as it rises or tends to rise. With these occasions multiplying, and our interest in the writing departing—in the manner explained in the preceding portion of this section—everything unessential is forgotten. As the miller removes the husk, so, in the process of learning to write, our notions are gradually reduced and steadily divested of what is non-essential, until the pure flour, alone remains. The occasions for this grinding down presents itself in practice through the need of, or desire for, development of other systems, and, hence, of our apprentice efforts, we retain only what cannot be rejected. The process of reduction needs no deliberate determination. We require no special knowledge of how to bring about the minimum of attention to our work.

Necessity grinds very small, smaller by far than we expect. We cannot be too clear as to the character of these important changes. Let us then see to what extent our notions shrink. We have seen interest fade, difficulties vanish, problems disappear, preliminaries dispensed with. Next, or along with them, the child forgets the formal aspect of the writing process. When his studies commenced, he learnt that he must hold the pen in a certain position if he wished to write with ease, that the arm should not be placed as the reiesss fancy prompted, and the like. He knew, broadly speaking, why he did things and how he did them. This knowledge of the how and the why of the process was doomed from the beginning. Gradually losing his interest in writing, having no longer any need to refer to that knowledge, and being eager to elaborate other systems, he slowly forgets the how and the why. At first there was a bond of time and order; but now all tics are gone. He cannot tell relationship, time or succession. Each point is re-collected independently of every other point. He cannot even indicate the what, though he knows what to do. The what has departed as a notion, and exists as a remembered act. As the child progressed there was no need to re-develop the what, the how, the why, or any other system of relationships, and so these are forgotten. We detect here no substituted, transformed or added constituent, only certain once-existing factors have been removed. All that could be dispensed with has been cast aside.

Necessity has dissolved the connections which once prevailed, and hence the child cannot freely re-member the process of writing, or its relations, or its successive steps. When a portion is conspicuous, as the holding of the pen, he easily images the attitude. But when called upon to give a description from memory of the whole process—static and dynamic—he, like the mass of men, breaks down in the attempt. Even most of what is supposed to be re-membered proves imaginary.

We usually re-collect things well, because they are interconnected in our thought. So many other things resemble them, and they are related to so much else, that they remain in continuous touch with the general current
of reflections. Most objects have points in common with other objects, so that even when we, to all appearance, do not think of them, we yet ponder over portions of them. As we move hither and thither in thought, we often come across stray notions—just as we meet friends otherwise than by appointment—and when we do not meet these, we yet encounter thoughts that involve fractions of them. Thus ordinary notions have a fair opportunity of being re-collected. In the case of the atoms we are dealing with, there is a difference. They lack universality and all relationship except the one that connects them with their stimuli. These "writing atoms," on account of their peculiar unfitness, never enter the normal stream of thought, and hence nothing is able to develop them. They lack intelligibility. They live entirely to themselves. [Acquire some complex habit and test the process of simplification.]

52.—Reduction of Effort.

While advancing, the child discovers on frequent occasions that a less effort will accomplish his object as completely as a greater effort. The strain is accordingly reduced, and energy is thus prevented from running to waste. [You should test your habits in this respect.]

53.—Appropriate Exercise.

It is known that, within limits, appropriate physical exercise hardens and increases the size of the muscles, and that, as a consequence, we are able to carry out more with the same or a lesser effort. We are also aware that only continued effort, and not effortless exercise, leaves marked traces. As with strength, so with skill. Apart from what a perfected memory accomplishes, there is an additional aid given by neural development of some kind. We become, through appropriate exercise, more skillful than we should be otherwise. Nerve messages are conveyed with greater rapidity and certainty. [Are they?] For this reason, over and above what remembrance, oblivion and reduced effort do to simplify an activity, other circumscribed neural changes lessen the necessary output of energy still more.* [Test by exercise.]

54.—A Comparison.

Let us once more compare the process of writing in the days of the child's early apprenticeship with the state of affairs when he has naturally done learning. To begin with there was ceaseless bustle, now there is none. Through considerations now well known to the student, the amount of attention needed has been greatly reduced. The different parts of normal habits are re-membered without strain; the child knows how to meet difficulties which are likely to occur; he is no longer interested in

*Only exercise and its effects are commonly thought of by psychologists when discussing the nature of habit. Yet even here the quality rather than the quantity of the exercise is the essential factor.
the process itself; known error is absent; there are no problems, or almost none; what is unessential has been forgotten; less energy is expended; and, lastly, the development of nerve and muscle has further reduced the demand upon the attention. That is to say, effort has been toned down in four ways: (1) The child remembers with ease; (2) he has forgotten what is unnecessary; (3) he has regulated the output according to the actual demand; and (4) his developed nerves and muscles work more efficiently with less effort. [Try and add to this list.]

There is, therefore, nothing mysterious in the seeming absence of complexity in routine or habit. The energy required being largely reduced, the process is simplified in proportion.

55.—The Result of Liberating Attention Energy.

Along with the changes which have been described has gone a silent transformation which I now proceed to state. We know that there is present at any time an equal amount of attention. If we require more of it in one direction, we have less at our disposal in any other direction, and vice versa. Hence, as the process of writing is being simplified, the attention which is set free will be employed in other ways, and as the habit reaches its maximum simplicity, the greater part of the attention must be redistributed.

After slight practice we can spare just enough attention to look around us. Later on we may possess sufficient to hum a tune, and later still, to pursue long trains of thought. As, at the commencement, there was no attention available except for writing, so at the finish our writing makes no appreciable difference to the general current of thought. We have observed how in the struggle for life and comfort thoughts drive each other off the field. The same procedure is encountered here in a modified form. At first, when a little energy is set free—when a kind of attention vacuum is created, and our eyes wander—there is embarrassment and the balance is disturbed. We are confused in our work and confused in our thought. As more and more energy is set free the effort to divide the attention is repeated, and, by perseverance, the endeavour becomes more and more successful. Finally, we closely attend to our writing while also attending to other matters. Just as weights tend to fall, so attention ever strives to be fully employed. A simple experiment will provide a further illustration of what we are attempting to elucidate. A man takes two pebbles. He holds them in one hand. He throws them up into the air successively. He tries to catch them in the same hand as they successively return, and to throw them up again. At the start of the experiment he is confused. He has too much to attend to. In trying to follow the eccentricities of one pebble, he follows neither and catches neither. It seems impossible to him to attend simultaneously to both. While he is thinking of one, he neglects the other. His adjustments for intercepting them fail. Instead of closing his hand for an instant when the pebble
touches it, he watches the other pebble, and instead of watching the other pebble, he closes his hand. But as he continues to experiment the attention is thoroughly divided, and he acquires the coveted skill. After additional trials he might be successful with three pebbles, or attend to the two pebbles and be thinking of other matters. [You might repeat this experiment.]

Thus it happens that while we are engaged in writing we are usually engaged in other directions also. When we are copying we may be listening to a conversation, if, perchance, our superfluous attention is not busy with something more serious. Gradually we have accommodated ourselves to write while following other lines of thought. On the one hand, interest urges us to disengage part of the attention; on the other, the presence of liberated energy seeks an outlet.*

56.—Does an Organised Trend ever become Automatic?

(1) Both the process of simplification and the acquired power of pursuing several thoughts independently may have suggested that writing comes to be in time a mechanical act where attention is superfluous. On the other hand, we have seen that there is no fundamental change, only a simplification. A further proof of this, if needed, is easily forthcoming. We know, roughly speaking, that the distribution of systems is at all times equal, assuming the normal waking state. If, consequently, we are absorbed in thought, we should expect that writing would proceed with difficulty and finally cease, and this actually takes place. We cannot be completely absorbed in anything while writing, for divided attention is only possible when the attention is divided.

(2) A purely mechanical act would be one in which no sensations were present. This is not so with any habit, however confirmed. In learning, we encountered sensations to begin with. These sensations grew gradually fainter (sec. 51). Some of them are now so dim that they are hardly perceptible. Yet their unobtrusiveness only indicates a reduction in the energy employed; in other words, it records that less energy is wasted. These sensations represent physical activity, and only when that ceases do these sensations disappear. They are the index of work done. It will be found true, I believe, that sensations are never missed from an activity which at any time was followed by them. It is also probable that wherever the influence of the unimpaired cerebro-spinal system reaches, there we have sensations accompanying physiological activity. Perhaps they are not essential, as is shown in the case of tickling the foot of a man whose spinal cord is injured above the point where the nerves of the lower extremities emerge; for this man withdraws his foot, though he feels nothing. But where the activity is central, or connected by nerves with the higher nervous

* Hence Stout's explanation, already quoted, that "each mode of mental process tends to arrest and suppress others" (Psychology, 1896, i. p. 196) as well as Lipps' similar reasoning (Grundtatsachen, 1883, p. 164) fail to convince.
centres, there we shall find sensations alongside of physical activities. However, these are matters for physiological research.

The nature of sensationless human activity would well repay careful study. Here we can only touch upon the subject. From ch. 2 we know that reactions are systematic, and that any severe drain upon the attention in one direction entails a breaking-up of systems in other directions. Thus we may readily listen to this conversation or to that; but once we are interested in one, the other ceases to exist for us. For this reason the vast mass of possible systems are never formed. Now the tendency of economisation naturally favours minimal development of what is unimportant, and this may be illustrated by the case of reading. With the attention fully employed with it, not only is everything noted and easily remembered; but the printed thoughts are read in connection with one another, and with due regard to relevant memories. Lesser the attention and things are little connected; each sentence is understood only by itself; and is no sooner understood than it is forgotten. Further reduce the attention and the words become bare sounds which are perhaps not even heard. Once we recognise that every sensation represents a system, we can see how we may speak without hearing our speech, and how, generally, habitual motor action may persist when we are otherwise very fully absorbed, although sensory systems are not developing. Given, however, normal attention, and the sensations re-appear.

It is a commonplace that special attention to any portion of the body, develops, as we shall see, unexpected sensations and also ordinary ones in greater fulness. When then we contemplate the opposite process of being specially inattentive to the body, we learn that cutaneous sensations and pains are often wholly absent. The extremities and the body move; effort and discrimination are present; and yet nothing is felt. This is in full accordance with theory as well as with experiment, and can only surprise us if we have paid too little heed to the nature of economisation.

A further step is yet possible. The man who has hearing, not only hears a loud report, but shrinks and is disconcerted. So also a child who has accidentally touched a hot dinner plate, not only feels the heat but screams. Thus not only is a putrid smell or a nauseous taste recognised by him who senses smells and tastes, but disgust and loathing follow. Things are different with the senseless man. The loud report, the hot plate, the putrid smell and the nauseous taste, do not exist for him, nor does he shrink, scream, or show disgust and loathing when what is objectionable to the normal man is present. And such is the normal man's attitude when the attention is deflected: he neither hears nor shrinks. Hence we may conclude that sensory inactivity, whether temporary or permanent, implies the strangling of a process at its very inception. When these facts are allowed for, we can understand how, under certain circumstances, a temporary inactivity may become permanent. Suppose a lad wishes to walk in a soldierly way. Holding himself upright, the act being a new one, is accompanied by clearly appreciable organic feelings. As he practises, physiological adjustment becomes closer. Finally, internal bodily changes create a new situation where the holding oneself upright ceases to be accompanied by peculiar sensations. Certain systems, therefore, tend to cease entirely or tend to be replaced by others.

Economisation has then several effects as regards sensations. It may temporarily suspend them; it may reduce them; it may abolish them; or it may change them. Circumstances will decide which line of development is to prevail.

A point of view such as is outlined above, goes some way towards explaining such a phrase as acting with or without consciousness. When, for example, owing to a severe cold, the sense of smell forsakes us, we say that we are "unconscious" as regards smell: the perfume of the wall-flowers close by leaves us unaffected. Here "to be unconscious" means that no smell system has developed. However, since we shall see in ch. 8 that all knowledge is embodied in primary or secondary systems, the total cessation of these systems will not leave us the world of objects minus "consciousness," but blank nothingness. (See also sec. 19.)
(3) It might seem a plausible surmise that every step in a routine process or habit is developed by the step which precedes it, and that on the first step being developed the others follow automatically. The whole process, unless interrupted, would according to this hypothesis, run down like an alarm-clock; or it would be as with a row of bricks appropriately arranged: as the top portion of the first brick received a push in the direction of the other bricks, it would fall on the second brick, which would fall on the third, and so on until the last brick fell. Facts, however, do not bear out this theory. It is not the outward stimulus that develops the reaction; for as the stimulus makes itself felt so, at the same time, the reaction begins to develop. The stimulus touches a brain area where both stimulus and reaction are implicated. It is not a case of one neural affection following another; there is but one neural affection as a result of which we both observe and act. And, likewise, along with the reaction there is already developing a tendency to prepare for a further stimulus. The disturbance, to state the thesis differently, is never strictly a local one. Hence we must reject the suggestion that routine process is a mechanical step-to-step process.*

(4) We are bound to go further. With any complex process such as writing, we cannot stop at inconsiderable neural changes. We have to reckon with a need which persists throughout. When this is interfered with, we cease to write. Such stimulating needs, the needs of our nature, are the source of organised trends of every description, as indeed of every task. They represent a definite neural sensibility which enables the work to proceed. The cessation of the needs involves the cessation of the sensibility referred to. It is this sensibility which conditions the ready reception of the stimuli and the ready reaction following. In the literal sense, therefore, we have nothing atomic or purely mechanical in a routine act like that of writing. We are still dealing with a living complex.

57.—Organised Trends and Memory.

The child is resolved to write the letter r more distinctly. Next time he sits down to write he does not re-member his resolution. In some instances he knows that he is coming to an r, and yet again and again writes in the bad old fashion. The explanation of this, after what has been said in the section preceding the last, is not difficult. The child pursues his task independently of other labour. He has drilled himself into not permitting different activities to interfere with each other. Hence the writing tends to proceed along its own lines. A certain stimulus is constantly connected with a certain reaction, and when the stimulus is present, the reaction follows. Just as at first the slightest attention to other matters disturbed the writing, so now on the contrary, it is extremely hard to disorganise this activity. We are so used, while writing, to ignore

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* Robertson (Psychology, 1896, p. 232) expresses the prevalent view when he says: “Habits are ... automatic to the extent to which they are fixed and go on by themselves.” See also Murray, Psychology, 1885, pp. 100-4.
the general stream of thought, *i.e.*, not to allow the least interference with routine, that even thinking at the proper time of the desired change is sometimes not adequate.

Usually we check ourselves, when we think checking desirable, but frequently our resolutions are not re-developed at the right moment. There is an additional cause for this, besides the one we have mentioned. The notion of the correction is not so firmly fixed, nor so ready to pass into action, as the fault we wish to remove. A slight stimulus would therefore, develop the latter and not the former. Such is the normal reason why the correction is often re-membered after the blunder has been made, and why we as frequently fail to re-collect our resolutions.

“At first, and before the habit is acquired, every act is slow, and we are conscious of the effort of deliberation, choice, and volition; by degrees the mind proceeds with less vacillation and uncertainty; at length the acts become secure and precise: in proportion as this takes place, the velocity of the procedure is increased, and as this acceleration rises, the individual acts drop one by one from consciousness, as we lose the leaves in retiring further and further from the tree; and, at last, we are only aware of the general state which results from these unconscious operations, as we can at last only perceive the greenness which results from the unperceived leaves” (Hamilton, *Metaphysics*, 1877, i, p. 370). There is, of course, no room for Hamilton’s picturesque explanation which implies the absence of simplification. “Actions we call rational are, by long-continued repetition, rendered automatic or instinctive” (Spencer, *Psychology*, 1890, i, p. 159); and “the requisite impressions being made on us, the appropriate movements follow: without memory, reason, or volition, coming into play” (p. 458). So far Mr. Herbert Spencer. Stewart (*Elements*, 1868, p. 109) has another fascinating theory. “The wonderful effect of practice in the formation of habits, has been often, and justly, taken notice of, as one of the most curious circumstances in the human constitution. A mechanical operation, for example, which we at first performed with the utmost difficulty, comes, in time, to be so familiar to us, that we are able to perform it without the smallest danger of mistake; even while the attention appears to be completely engaged with other subjects. The truth seems to be, that in consequence of the association of ideas, the different steps of the process present themselves successively to the thoughts, without any recollection on our part, and with a degree of rapidity proportioned to the length of our experience; so as to save us entirely the trouble of hesitation and reflection, by giving us every moment a precise and steady notion of the effect to be produced.” And so Stout, *Psychology*, 1896, i, pp. 199-200: “When we turn to the nervous system itself, we find the tendency towards a stationary condition evidenced by the facts of habit. All automatic actions are the fixed and uniform response to the fixed and uniform recurrence of similar modes of stimulation. Now, we have already seen that automatic action, as such, is action which does not involve attention.”

58.—THE PLACE OF EXERCISE.*

We will now determine the place of exercise, as apart from other influences, in the organisation of the process of writing.

(1) I have for many years been writing. I shall presumebly write for some years longer, say twenty years. I shall, therefore, have an additional twenty years of exercise. Will my handwriting then be better, and shall I

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then hewriting more rapidly, supposing mine be a normal case? Hardly. The probabilities are that twenty years of added exercise will make no difference worth speaking of, nor would fifty years even, apart from the influence of old age or the intervention of death. Exercise has no absolute value. A statement to the effect that “improvement in the quality and the speed of writing is in direct proportion to exercise” would be incorrect, as is also the milder form that “exercise strengthens faculty.”

Practice does not always lead to proportionate growth and perfection of faculty, for it sometimes ends in writer’s cramp and similar deplorable developments. This is the opposite of what we encounter on observing that so-called “gentle” exercise counts probably for nothing. So also chronic pains may grow worse with time; they may become better; or their influence may be considerably diminished. The doctrine of habit, as commonly formulated, is made up of popular generalisations of the loosest possible texture.

(2) In the elimination of what is erroneous and non-essential time rather than exercise is a favouring factor. While the former offers opportunities for the detection of improvements and mistakes, hastening in this way the evolution of organised trends, the latter remains neutral as regards these changes.

(3) Memory is slightly strengthened, and development, to an inconsiderable extent, assisted by means of effortless exercise.

(4) Only effort, persistent in its nature, brings about sensible improvement in primary or in secondary activity. When effort is not strenuous, or is too strenuous, advance in ability is practically out of the question. Nor is constant progress, speaking generally, possible. A river incessantly wears away its banks, and wind and rain never leave off denuding a mountain. Not so with organised reaction. Exercise does not incessantly produce changes in direct proportion to the amount of effort expended.*

59.—The Place of Judgment.

I have described the evolution of a habit. I have sketched the origins of that evolution; but I have not, I hope, suggested that the method is such that all men end in writing alike. The hands of a watch report progress automatically; but the development of an organised trend

* Compare with the above view of the place of exercise that of Stout, Psychology, 1896, n, p. 4: “In learning to read ... association has been so strengthened by repetition that it becomes capable of fulfilling by itself the function of attention”; and that of James, Psychology, 1890, i: “That [habit] is at bottom a physical principle is admitted by all good recent writers on the subject” (p. 105). Dr. Carpenter’s phrase that our nervous system grows into the modes in which it has been exercised expresses the philosophy of habit in a nutshell” (p. 112). Habit “simplifies the movements required to achieve a given result, makes them more accurate and diminishes fatigue;” it also “diminishes ... attention” (p. 112-4). It is plain that James echoes a tradition, without inquiring into its credentials.

One aspect of the results of exercise may be summed up as follows: “Every one knows that in those places where the skin is frequently exposed to pressure, to friction, to hot objects, or to corrosive liquids, there follows an abnormal development of the epidermis” (Du Bois-Reymond, L’Exercice, 1882, p. 100).
is not of such a nature. The use of judgment, of which I will now speak, is a factor which cannot be too highly appreciated.

Suppose a man learns to write without a teacher. He will undoubtedly make numerous blunders, while he will only learn with great difficulty and very slowly. When the routine stage has at last been reached, he will find that, in comparison with those well taught, he writes badly, makes many serious errors, and spends more energy on the writing than is necessary. He will also discover that a variety of problems are met by him unintelligently, and that many movements are not so simple as they might be. Organised reaction, as such, in no wise implies perfection. While one writes a splendid hand, another may have a wretched scrawl. From the point of view of perfection it would be suicidal to consider time, exercise and effort, as the only essentials in intelligent development. There are hosts of aged workers who are stupid, clumsy, slow, in spite of a life spent in a special class of work, while there are others more advantageously situated, who do the same work better and with greater speed, although they have had but a year or two of practice. Efficiency would be almost universally absent if we acted upon the belief that with the lapse of time bad workmanship disappears and good workmanship develops.

Let us assume that a young man whose education has been neglected, is anxious to write well. He procures a tried teacher. Of beginners' blunders many are common, and others are infrequent. His teacher, through foreknowledge, prevents the majority of them from occurring, and speedily reforms the others. Few mistakes are permitted, and none are allowed to strike so deep that they are difficult to uproot. The pupil stands no risk of injuring spine, lungs or eyes. He has not repeatedly to discover that he is on a squirrel track.

Thus far the teacher's help is negative. On the positive side he communicates the shortest, the simplest and the most effective manner of writing. He ensures that there is little to learn and less to unlearn. He reduces labour and perplexity. He knows just what should be done, and insists upon that alone. The consequence is that his pupil acquires the art of writing perhaps with one-third the trouble and in one-third the time expended by another who, though otherwise his equal, has had no teacher or a bad one.

Exercise offers no guarantee that we shall perform a movement in the best way.* In many an organised trend in which the parts are not obvious (and in most they are not), movements are executed circuitously. A lifetime of exercise may make no difference in this respect, for the most direct way is not revealed mechanically and is very often difficult to discern. A careful analysis will thus frequently show that movements are superfluous.

*One stormy day I watched the manner in which various persons carried their umbrellas. Almost without exception the umbrellas were held with the stick at right angles to the ground. Yet the wind was at the time beating strongly from one side! Thus people do not adapt themselves in rainy weather to the precise circumstances, though they have for years been accustomed to umbrellas. So also a person may have reached old age without having learned to adjust his tie properly.
and that sometimes the prevailing method is cumbersome and wastes time, trouble and effort. Hence sound training alone, not mere superficial training, can produce the effect we should aim at. As with circuitous activities, so with the absolute amount of energy expended. Most men employ in organised reaction more energy than is needful; the initially superfluous output becomes the normal output; and thus part of a man's energy is frittered away. Thoughtful analysis alone indicates the proper quantity of energy demanded. Time should never be wasted. We need never cease learning or improving. Alertness, deliberate observation and the study of others engaged in the same or a similar pursuit, all tend towards progress. [Note these three rules.]

Not exercise but judgment is the more desirable. Judgment is also more important than time. Double the former and you quarter the latter. In many an instance half an hour's conversation with the right individual will do more than years of plodding. A wise man will, therefore, learn nothing at haphazard, and will introduce judgment into every activity. The child who learns to write, benefits in every way by the employment of his own and others' judgment. He ought to be taught that exercise alone will not bring him to his goal.

Trends are sometimes established in anything but a deliberate manner. In sitting down, for instance, I chance to lean back in a particular manner, and so feel more comfortable. However, I have but the dimmest notion of the consequences, and I should be surprised if any one were to tell me that I felt more comfortable. A little time afterwards I inadvertently repeat the act. Grain after grain of intelligence is thus sown until after a while, a full-blown trend develops. Even then I may hardly be aware that such a trend exists. When little attention is used, a thing is thought of only in its immediate relations, and in this way much is acquired with slight notice. Similarly, pressure of time, accident, greed, and what not, gradually initiate changes in our activity in a half-perceptible way. It is a crude conception which imagines that our trends-to-be are first conceived in the flaming colours of elaborate resolutions.

60.—Why is it DIFFICULT to influence HABITS?

The learner has ceased to be a learner. The organised trend is fully formed. The apprentice has reached a stage at which he writes without troubling himself about the how of writing. Suppose he arrives at the conclusion that he soon feels tired when writing, while others do not. Suppose he decides to make the necessary changes which shall enable him to write without rapid exhaustion. The ideal procedure in such a case would be, first, to re-member, and then to remove the constant antecedent of the worrying sensation. As we have learnt in sec. 51, this homely method is not open to him. There is nothing in the memory that will suggest the antecedent; all temporal or logical bonds are forgotten; he does not know what is followed by what; he cannot re-member what he learnt or how he learnt. Hence he is bound to investigate. Oblivion makes it difficult to introduce changes in routine.

He proceeds, then, to inquire. Perhaps one movement needs changing, perhaps two, perhaps three, perhaps twenty. Possibly the immediate
source of discomfort is the result of the foolish position of some one part of the body. What is it, and which is it? He will not find it easy to decide. Perhaps one seemingly well-calculated change is introduced, and nothing satisfactory follows. Perhaps some unexpected effect results. Perhaps the change makes matters worse, and he writes more awkwardly than before. He tries a fresh position or movement and still another, but without success. Perhaps he remedies the evil, and introduces a greater in its place. No horoscope can be cast as to what will or what will not happen. He is dealing with what he cannot understand until he has observed its effects. [Deliberately drop some habit and observe.]

As a further illustration, let us take an example with larger outlines. Strolling about in a poorer portion of London we may notice that the heels of those we are watching are worn painfully low on one side. Suppose one of these people wished to remedy the defect. Merely to make a resolution that he would walk properly would be useless. If he tried to think of his walk he would most likely find nothing that suggested a solution. The same would probably happen if he proceeded to observe himself or others. Being baffled, he decides on experiment. He walks somewhat differently from his usual style, but there is no apparent result. He alters his walk again; it seems to him that the change is an improvement. He advances a further step; matters are worse than they were to commence with. He may thus go on experimenting for years and not achieve his purpose, or he may spoil his walk in other ways. It is not that he is wholly unaware of what baffles him, but he cannot effectively recall its normal antecedents. In moving a step there are a multitude of motions with their accompanying sensations. These sensations are noted. If he is attentive enough he learns their presence; but he cannot fix them steadily or re-develop them at will, except after special practice. Even then, as one motion determines the succeeding ones, only the development of a series would be of assistance. Such a feat would be too much for a trained psychologist; it is still more so for an average man not practised in introspective analysis. Hence men, as a rule, do not experiment much. They discover how troublesome it is, and almost invariably decline the invitation.

Ordinarily, then, when it occurs to any one that he might improve his method of writing, he lightly passes over the suggestion. Perhaps he pictures to himself the labour it will occasion before he achieves his purpose. Perhaps, and this is more likely, he dismisses the thought because he has dismissed similar thoughts before.

Suppose, again, that a man does know what tires his hand in writing, or what attitude is the most desirable. He has not therefore surmounted all difficulties. He must forget the old way, and learn the new. Now we have seen how independent a habit normally is of other habits or of the general current of thought. Hence he has no mean task before him. Each time he wishes to write, and all the time he is writing, he must be thinking of the alteration he intends making. If he neglects to do this, he
fails to work himself out of the old rut. Speaking generally, so firmly established are the existing arrangements that often months or years pass before they are forgotten and the new method is assimilated.

Other difficulties arise. He may be preoccupied and forget the experiment on which he had embarked. When a favourable occasion again offers, the experiment is not thought of and he unknowingly treads the old windings. Perhaps months afterwards he re-collects that he has had a notion of introducing some alteration. He repeatedly forgets his aim for hours, days or weeks, as the case may be. Hence the hope of success recedes, and this induces a lowering of interest, despair of final victory, and disgust. But grant that he perseveres and succeeds. The gain is not patent. If each fault he wished to grapple with took a long time to overcome and entailed much trouble, he could at best correct very few slips during a lifetime. Besides, he could not think of altering several faults at a time. And one more difficulty. Suppose a man makes up his mind to go to bed at 11 p.m. He carries out his resolution. In due time, as explained, the resolution is forgotten. Then some opportunity presents itself to stay up later, and slowly and unnoticed the time of retiring is changed again. Such reversion to old habits is frequent, and must be reckoned with.

Though sweeping changes in adults are almost out of the question, and though innumerable organised trends can only be transformed at the cost of much time and trouble, there are yet exceptions to this rule. Many an action which we have persisted in for years, as we shall see, may have its character altered at once, while various activities may give rise to little trouble in the changing. In some instances an intelligent method rapidly produces far-reaching effects, and the introduction of a particular trend may scatter a multitude of objectionable activities.

Changes in habits are, as a rule, hard to accomplish. The lesson to be derived is elementary, indeed. We must at the outset ensure that we do a thing well. We must prevent the ripening of objectionable activities, and we must foster the development of such habits as mature reflection would approve. In practice, taking life as a whole, the alternative to obviating the growth of bad habits is to bear with them stoically when they are formed. Attempts at general reform have failed and must fail.

61.—Early Education.

To avoid the necessity of having to recast a multiplicity of activities, we must begin rational education with the infant; for by the time the child is of school age, the general outlines of his nature are fairly settled, and it is then, for many reasons, hard to change his character or to remove serious defects. Only the most thoughtful and the most thorough-going attempts

* "Let any one try for the first time to write or draw while looking at the image of his hand and paper in the mirror, and he will be utterly bewildered. But a very short training will teach him to undo in this respect the associations of his previous lifetime" (James, Psychology, 1890, ii, p. 182).
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will successfully counteract the neglect of the previous six or seven years. The reasons for laying special stress on the first three or four years of life are as follows: (1) A child is physically, intellectually and economically dependent, and we possess, therefore, undisputed freedom to place him under conditions favourable to the development of desirable activities. (2) A child’s memory is weak. Even when he is compelled to do a thing, he soon comes to do it spontaneously, having forgotten the grievance of compulsion. (3) A child forgives as easily as he forgets. He nurses no resentment. (4) The child is not sufficiently ingenious to plot against its educators. (5) For the same reason he can seldom understand or foretell the educator’s intention. (6) A child has no deep-seated objectionable activities. (7) A child easily acquires desirable activities, and as easily shakes off objectionable ones and vice versa. (8) When an activity has been formed early in life it displays the maximum capacity of developing into strength and efficiency, and such activity is very difficult to unsettle in later life. The opportunities for early training being so numerous, the earliest period should be made the most fruitful for educational purposes. It does not follow from the above that a human being’s plasticity draws to a close at the age of six or seven. The plasticity passes slowly, and can hardly be said to cease when we reach maturity. The skill, which is acquired with slight effort at fifteen, is unattainable by the man of thirty-five,—compare for instance the respective capacities of these two ages for shorthand. Again, what the child of six can learn with little trouble, the boy of fifteen may be debarred from acquiring,—efficiency in violin playing is of such a nature. In the evolution of routine the stage of general development must be allowed for. As we grow older, deeper changes or fundamental acquisitions become less and less possible. Not by any means an insignificant factor in this staidness of age is the type of individuality which the mature man develops and the conditions under which he lives. Where the circumstances and the type are similar to that of the young child, there we expect and find similar results.*

62.—Each Habit is Based on Others of its Kind.

In analysing the development of the child’s power of writing we assumed that we were starting with a non-organised process and ending in an organised one. At the commencement, we were face to face with complexity; at the end, with simplicity. There seemed to be a definite initial stage and a definite winding up. These various assumptions are far from being defensible. Strictly speaking, as we shall see at once, there was no beginning.

(1) In writing we make certain movements which, as we have previously noted (sec. 50), are guided by re-collection. If we neglect the general muscular memories, there remain only random movements; but we do

*As to the importance of acquiring good habits early in life, see Carpenter’s Mental Physiology, 1876.
not start with such in learning to write. We are consequently making use of existing systems in the formation of a new one. Organised trends, in other words, are only new to a certain extent.

Let us realize this more completely. A person is not used to lifting weights. One moment he exerts more energy than is needed, the next less. He sees a weight, but being ignorant of the precise effort required for lifting it, he mistakes the probable result of his efforts. Yet, after missing knowledge he almost always puts forth the proper strength. A glance develops the appropriate effort, and the merest attempt at lifting suggests the weight. Picking up a piece of aluminium, the specific gravity of which we are not acquainted with, we find we have exerted ourselves too much. Moving a paper mache table we note, owing to our mistaken notion of its weight, a peculiar feeling due to its unexpected lightness.

The weight of an object we measure off by memory (sec 50). The output of energy is graduated according to past outputs. Very early in life the child learns to know the resistance implied in tactile systems, i.e., how much labour it requires to move them or to raise them. When the child then begins learning to write, the majority of muscular efforts which will be required are already part of many organised trends. This knowledge he incorporates solidly into the action of writing. He has not to experiment anew, for experiments have been long done with. If the knowledge of every movement had to be freshly acquired, the process of learning to write would assume monstrous proportions. Still, as in the instance when we lift a piece of aluminium for the first time, we have in learning to write a few special reactions. These are the new constituents in the trend; though they themselves are based on previous acquirements.

(2) As with effort, so with ingenuity. Previous to learning to write, the child had years of training in skillfulness. The intelligence required in that branch of knowledge is only specialised intelligence—the old skill, plus a fragment of new skill. Various tasks which demand little art and resemble previous exploits, are performed accordingly by a simple reference to memory, while other activities, necessitating much specialised ability, are only partially assisted by older acquirements. In any case, a set of general principles which result from growing knowledge helps in the solution of each difficulty. Thus, for one person, a problem will be hard to unravel, while for another the solution is given immediately by memory.

(3) A like criticism applies to the part played by suppression. The child, urged by needs, has from a tender age suppressed uninteresting thoughts and dwelt upon interesting ones, and this power of shaping a habit is, therefore, not a new power, being itself organised and capable of improvement. If it be well developed, thoughts are more easily dwelt upon or dismissed. It is constantly being affected by what happens. Hence it has nothing new to perform when we are learning to write. It is an established activity, more or less polished by use, memory and judgment. In a somewhat fresh application, the old mechanism is microscopically improved in a certain direction.
The argument may perhaps be forcibly brought home by considering the following instance. One man is in splendid condition as regards strength, skill and judgment. Another man is not in good condition at all. Both are set to learn a business in which the three qualities mentioned are required. The former will learn it with ease; the latter with difficulty. The former already possesses much of what is required in the business, the latter does not. The former recognises much that is not new to him, the latter very little. Countless difficulties have been overcome by the former in other connections, and thus many perplexities do not exist for him.

It is only in an arbitrary sense that the developed mode of writing can be said to have had a beginning. The mass of what is organised was so before the child learnt writing, and remains organised alongside of the special capacity we are considering. We cannot, therefore, consistently speak of beginning to learn to write, or, rather, when we so express ourselves, we must understand clearly that we are utilising the components of other organic trends, and that we are contemplating a compound of new and old tasks. In the new activity we have a specialisation of old activities.

An average adult so readily forms primary and secondary combinations and is so swift to adapt himself to an immense variety of circumstances that nothing but miracle seems to explain his activity. A saner view, however, results when we pry into the history of these combinations. We find then that steady growth in adaptation accounts for the fertility of resource. The infant learns with irritating slowness to use his senses, and in the course of instinctively determined movements he gradually acquires the physical skill which the adult so readily applies. Only by protracted stages do the senses come to act together, and only in this manner does the child come to use his hands for the purpose of grasping. As with primary combinations, so with secondary ones. Under the pressure of needs more and more complications of a primary and a secondary character develop until we have the unique rapidity of adult life. Here the muscular and the neural systems have reached their greatest efficiency. Since we, then, can observe the factor of growth, we have no option but to regard the secondary, like the primary, world as a highly organised system of combinations. In other words, the thoughts and actions of adult existence are intelligent and varied because they are the product of a long process of natural selection. Habitual process, therefore, if it is regarded as organised process, is a fact that embraces all primary and secondary combinations without exception. For the same reason, spiritistic theories, placing as they do an unanalysed man behind the man, must be unprofitable to the student who wishes to understand the facts of adult life. The study of evolution alone yields an intelligent account of the human machine.

63.—Each Habit forms a Basis for Others of its Kind.

In learning to write we start with organised reactions. Naturally, when we have learnt to write, this new trend (the strength, skill and knowledge acquired) forms a partial basis for other trends. Thus a sign painter or lithographer profits from knowing how to write; the position we place ourselves into when writing may be advantageous for many purposes; the way we hold the pen may assist us in drawing; and writing itself might possibly be considered a department of drawing. We conclude,
then, that the mechanism of writing is not self-contained, since it pre-supposes organised reaction and serves as a basis, or forms a department, of other such processes.

64.—What is a Habit?

We have analysed at full length a particular example. In the last two sections we saw that an organised trend is not self-contained (if we allow that writing is a fair type of it). How then is a habit to be described? What are its distinguishing marks? Is it a bundle of such habits? Or is there no such thing? Or is the notion of a trend a mere generalisation of convenience?

A man wishes to know the time, and he pulls out his watch and looks. The hand points to two o'clock, while the hour must be about eight. Then he collects that his watch has stopped for some days. The compass of this trend is very limited, and its development must have been correspondingly simple. As there is but one complicated movement, and that one common to other movements, he has had next to nothing to learn. Even the fact that he takes hold of the watch by the ring, is matched by similar reactions. What is new is that he accustoms himself, in the manner explained in sec. 55, to look at his watch without allowing the action to interfere with the general current of thought. Even this is overstating the case. The element alluded to can hardly be called a new one. The whole process is primitive. We are constantly engaged in doing with but the slightest interference what might be called fresh things, so that all we have new in this action is the somewhat greater ease with which the attention is divided. The obviousness of feeling accompanying the suggestion of the act is reduced to an inconsiderable extent.

We may speak of climbing over a stile as an acquired habit, yet that action embraces perhaps not one new feature. A man climbs over a stile as he has been accustomed to surmount similar obstacles. Thus fifty different activities might be considered as fifty distinct sets of organised reactions when there is in reality but one. In the instance of the stile we are considering, not at all a simple one, there is, roughly speaking, no learning, no mistake, no oblivion, no effort of attention. A person scales the hundredth stile with perhaps no greater ease than the first.

Consider a man's general bearing. May he speak of it as organised? Perhaps he has seen some one bow in a certain fashion. He admired the elegance of the gesture, and when he had to bow, he re-called his model. Or as he grew up he bowed as his sister or brother did, without deliberation. Or he adopted the various portions of the bow from various persons, not connecting in thought the different movements he has imitated.

Thus with the smile present on his lips; the manner he holds his head; the way his eyes meet others' eyes; the normal expression on his face. In short, he may speak of his total bearing as a definite settled whole; as acquired deliberately and in a logical order of which he is precisely aware. As a matter of fact, a mass of independent units are probably included in
our bearing. A small portion of it, such as the way in which we bow, may have been, as shown, acquired at different times and independently. But further than this, the bow is perhaps not a stable quantity. Parts of it may vary, or the whole of it change, as the outcome of a multiplicity of factors. So with the whole of a man's bearing. From the point of view of a careful analysis he cannot speak of his bearing as one trend, acquired and fixed in a deliberate order. He has before him rather an indefinite complex. A habit is not bound by any dimensions; it is not independent of other habits; it may consist of a single elementary reaction or of a multiplicity of reactions.

The exact turning at which an activity becomes organised cannot be decided, mainly for the reason that no such turning is imaginable. Its hold even varies. Looking at a hat, we recognise it instantly as being a hat.* How far a set of reactions can be simplified and apparently detached from general thought and control is a moot point. A trend, especially when the organism is predisposed to it, might require very little effort in the acquiring. The apparently mechanical opening and closing of the eyelids, for instance, resembles an activity such as writing. In simple routine the stimulus may be so faint that though it be recognised sufficiently to be acted upon, yet it is too faint for clear recognition. Moving the eyelids with or without deliberation yields apparently indistinguishable results. This we should expect, for the process is so elementary that deliberation or absence of deliberation makes no appreciable difference. Opening and shutting my eyelids deliberately as I am writing, I cannot discover anything in the action that would differentiate it from a normal trend. No distinct feeling of effort is traceable. There is only the feeling which accompanies the movement. [Footnote: There is present probably under average circumstances, a feeling of fatigue which is relieved by shutting the eyes. This feeling is very faint; but ordinary organised reactions have often no more distinct feelings accompanying them. In the case of moving the eyelids, there is every reason to believe that the act is initiated at birth, currents of energy being easily discharged in that direction. How far respiration and other similar processes may be classed as routine, the reader must decide for himself.]

*The learning of every word in a language, of every fact, argues organised reaction, and every word or fact so acquired implies an established trend. From week to week, perhaps from hour to hour, we are building up and breaking down temporary habits. Let me transcribe from my notebook: "A certain noise made by boots. I recognise the noise and the purpose; but there is nothing present except a sense of familiarity and such feelings as might go with verbal and other images. Then, as expected—here again there is but a feeling—I feel a tap on my arm. Then a voice says, 'Are you ready?' I knew what was going to be asked of me, and so I at once quietly nod my head.' Observe the total absence of verbal and other imagery. Essentially I react as I had reacted before. The creaking boots were familiar, so was the implication, so was the tapping, so was the short speech, and so was my nod. The noise of the boots was expected about that time. The moment I heard the voice, I did not so much know what was coming as felt it purpose. In this way we act according to innumerable habits more or less transitory, attention being reduced whenever a thing is thought, or said, or done a second time. Thus the way I turn over the pages of a book is a distinct trend, the manner in which I open and shut the door, the fashion in which I read, and the like.
Probably no distinct boundary exists. The mere absence of traceable effort, even the absence of an observable evolution in the action, applies to many processes which would not be looked upon as inherited. Every trend, by the very fact of its existence, must be considered as implying at least a modicum of predisposition. Hence the difficulty of drawing a line of demarcation.

If habitual actions tend, in one direction, to merge into bodily functions, they tend to merge into deliberateness in another. What, indeed, is to divide these classes? As we reflect we become convinced that a vast number of actions are repeated, that the majority of our activities resemble each other, that the various new tasks we perform are new but to an insignificant degree, and that certain principles elaborated in the school of life lie at the foundation of activity as a whole. It would be safe to state that the overwhelming mass of what is new is more or less routine in character. Again, not all routine processes require little effort. So great are the variations in this respect that while some activities scarcely make a call on our intelligence or our energy, others exclude nearly all unrelated effort and are most fatiguing.

Repetition of a process is no trustworthy guide as to the extent of the stability of an established line of action. The following illustrates one extreme. A man is required to do something which he has not attempted before, a similar cycle of actions having to be attended to about every three minutes. An instrument which he needs he puts in an awkward place. During the first quarter of an hour the mistake is pointed out to him. He agrees that he is wrong. He appears anxious not to repeat the blunder. Though only three minutes intervene between the time he is corrected and the time he is to correct himself, he yet persistently errs. Often he declares he will put the instrument in the right place, and perhaps a second or two afterwards he becomes completely unaware of his declared intent. Though his eyes sweep across the object lying in the wrong place, he does not notice it. Many like instances might be cited proving the fact that mere repetition, or extent of time, are not essentials in the growth of particular habits. The argument becomes self-evident when we reflect that present activities are based on preceding activities, and that all action is more or less organised.

While the slightest exercise, as we have just noted, may firmly establish an activity, sometimes years of constant exercise will not accomplish that object. I performed for years, and day after day, a certain action in a certain manner. Then I observed some one proceeding more intelligently, I resolved to imitate and found no difficulty in breaking with a settled custom. The next day a new era was inaugurated. No effort was requisite. No relapse ensued.

The relative ease with which an organised trend can be removed is not in proportion to the number of times the action has been repeated. For scientific purposes this must be understood. For practical purposes it is nevertheless well not to forget that habits require normally a certain
time to grow, and that a vast aggregate of activities, once they become 
fixed, are simplified, require little effort, and are hard to remove. Though 
no rigorous and comprehensive statement can be drawn up, it is advisable 
to note the general drift of the conclusions here arrived at.

A widely-prevalent mistake must be touched upon here. Ward (Psychology, 1886, p. 
49, col. 1) incidentally remarks: 'Use we know blunts feeling and favours intellec
tion, as we see in chemists, who sort the most filthy mixtures by smell and taste without dis-
comfort.' See also Bain, Emotions and the Will, 1875, pp. 80-2; Boullier, Du Plaisir, 
1865, pp. 21-2; Destutt de Tracy, Idéologie, ch. 14; Dumont, De la Sentiment, 1875, 
pp. 77-8; Dumont, De l'Habitude, 1875, p. 344; Girtacap, De la Mémoire, 1869, who 
says that 'the principal law of habit reads in effect that, in repeating itself, that which par
takes of the nature of passion becomes enfeebled and effaced, and that which partakes of 
the nature of action becomes strengthened and tends to reproduce itself' (p. 205); Hoff 
 ding, Wiederholung, 1883, p. 323; Horwitz, Analysen, 1872, i, p. 360; Jodl, Lehre, 
1896, p. 388; Ravaissin, De l'Habitude, 1838, p. 27; Rümelin, Reden, 1881, i, pp. 
162-3; Sully, Human Mind, 1892, ii, p. 33; Titchener, Psychology, 1896, p. 97. These 
authors, and many others, hold that use blunts feeling. Needless to say that the opposite 
is just as true—as when filthy mixtures become more and more objectionable—and that both cases are to be explained teleologically. We come to love our country, our parent,
our habitual resorts, our avocations, in the same manner as we come to grow negligent of objects. Indeed the whole tendency of this chapter is to prove that use blunts intellect 
and decomposes it when needs are in opposition or lend no support. In this manner 
familiar objects whose details are of no importance grow more and more indistinct because we 
attend to them less and less. Thus the chapters of this book become meaningless to 
me through incessant re-reading.

65.—All Thought is Organised.*

We have analysed a particular routine case. We have attempted, in a 
general survey, to arrive at a conclusion as to its essential nature. Now 
it must be evident that organised reactions cover an enormous area in the 
province of muscular action; but what position, if any, do they occupy in the 
more exclusively neural realm? I have reserved the answer to this 
question. The example chosen, were, generally speaking, such as implied 
motion, and purposely so, in order to avoid prejudging the problem which we are about to consider.

Let a man imagine himself walking along a lane, playing with a ring 
on his finger, scanning the scenery around him, and secondarily rehearsing a poem. When he first endeavoured to repeat the poem could he have repeated it as easily as now? Not if he was a normal individual. Some practice was necessary, equivalent to that detailed in the analysis of writing, before the verses could be repeated with so little effort that there 
was not even a suspicion of rehearsing them. We have here a routine 
act, similar to that of writing, but there is an important new element. The 
immediate stimulus and the reaction are both present in the secondary 
realm. The verses proceed within. One secondary system suggests or is followed by another such system. When we first thought of rehearsing a poem inaudibly we could not help re-membeimg irrelevant, unessential

* This problem forms the subject of ch. 4.
and erroneous topics. By a process previously explained these have been eliminated. We encounter here also development, and the poem, as we might expect, runs smoothly, without interruption, and without much demand upon the attention. [Learn to recite some poem.]

Organised quality is still more clearly evinced in arithmetical practice. When I am asked "What are five times five?" I answer from immediate memory and without delay "twenty-five." So in adding up columns of figures, not only is there no hesitation, but I add three or four figures at once with a like ease. When I was a child things did not proceed so smoothly. I employed my fingers, my buttons, etc., to assist me in doing a simple sum, and even then I was more often wrong than right. Immense effort yielded little satisfaction then; but to-day little effort harvests immense results because every possible instance of a certain type has been memorised.

When I want to know what 1 and 1 are, I do not cast about for a reply, I answer forthwith, 2. Similarly with rules referring to mathematics generally: solutions of often met difficulties become matters of organised memory. [Do some mental arithmetic, and observe.]

We have seen that in a bodily trend we do not always obtain so elementary a solution as we desire. The same thing happens, and is of special import to us, in matters of thought. Suppose a man is asked "What are 18 times 19?" (We will assume that he does the sum silently.) He starts 10 times 18, 180; 9 times 10, 90; are 270; 9 times 8, 72; are 342. or 20 times 18, 360;—18, are 342. Though the answer is reached circuitously, the successive steps are yet rigidly connected. Every move in the total act is developed like the moves in any common bodily habit. There is no halt between point and point, whether we have two steps or ten. They follow each other uninterruptedly. Their number does not affect the nature of the process.

There are many occasions in secondary as in primary routine when we take a fixed but relatively round-about course. Some one asks how many days September has. His question is scarcely finished when I begin (unheard) "Thirty days hath September," (aloud) "Thirty days." I do not ponder, nor do I answer directly. There is neither doubt nor certainty present—only what has been described.

We shall revert to these links, but meanwhile we wish to take a more general view. Do organised reactions enter into thought proper? Is there a growth of lines of thought? Does the process of judgment evolve like the process of writing? Are observation and imagination subject to training? Does the training, if such there be, pursue the same lines as the training involved in trends such as writing? However bold it may appear, we must answer the questions in the affirmative. Let us consider the reasons which induce us to take this course.

* "Soundness of judgment is gradually and progressively developed, all newly acquired knowledge being by degrees added to the stock of discernment, by means of whose advancing ramifications the task, which was at first difficult, and often fruitless, comes at last to be performed with the ease of a seemingly innate faculty." (Lotze, Metaphysicus, tr., 1885, i, p. 176).
Suppose a man thinks that it would be best to dismiss certain impracticable thoughts, immediately they occur, by turning his attention into other channels. An opportunity arrives, he re-members his resolution, and carries it out. After a period of practice the resolution is forgotten or not referred to; but whenever anything impracticable suggests itself he dismisses it immediately. The resolution now forms no link between the objectionable thought and the act of dismissal. As that thought appears, so it is thrust back. There may be, after a time, entire ignorance that certain thoughts are dismissed. The man may, for instance, either deny that such is the fact, or he may give some plausible but inaccurate explanation. As with primary activities, so with secondary ones, a resolution need not be verbally conceived, nor need it be, at first, of wide application, nor need the sum of the consequences be apprehended. Much of a man's thought is as dim as the twilight, and hence there is often hardly anything definite to re-develop. An organised trend, such as the one just described, is an essential in thinking, and yet there is no appreciable difference between it and a physical activity of an organised nature.

Consider another example. Some one notices that when authors say, "There are three (or four, or more) ways of accounting for this fact," they are frequently wrong. So he makes it a rule to question every numerical statement. After a time his resolution forms no part of the thought process. Whenever he chances to meet such an expression, he ignores it, or quietly turns to investigate its correctness.

Let us suppose that a man thinks it important to observe things directly, carefully, minutely, repeatedly, for a prolonged period, and under differing conditions; and to compare the observed things, in the same manner, with different things of an apparently like nature. He may also have decided to extend cautiously any simple proposition which he draws up or any general fact. He may have determined to consider in discussion one item judiciously rather than skip from subject to subject (sec. 136). He may have made other wise or stupid resolutions for the conduct of his understanding; or he may have been taught these at home or at school; or perhaps he has gathered one detail here and one detail there; or perhaps he has imitated what appeared to him to be the method of his tutor's thought. In any case, the act which will follow the adoption of these resolutions will be of the same nature as that described when we traced the growth of writing. The road of development will be strewn with many difficulties and will pursue a devious course. In the end much of this man's reasoning will be performed in a quasi-automatic manner. The proposition or fact will be exploited in the fashion referred to. He will attend keenly, feeling perhaps a great strain without knowing it, and disputing the fact of his procedure a minute afterwards. Re-collection of theories stands in the way of rapid thought as of rapid action. Much of our limited energy would be wasted by developing them.

The preceding examples show that stimulation and training influence both primary and secondary activity. From infancy onwards a multitude
of habits develop and these make up our character as practical men or as theorists. Apart from such activities it would be as impossible to think of intellectual labour as of bodily labour. Efficiency in thought depends on properly developed trends. Given reflection of a primitive kind in the child, and the course of events inevitably transforms that activity into an organised complex. Our modes of thought are thus necessarily organised.

It will be said: Granted the existence and the importance of secondary trends, we still know that they are the result of non-routine activity. The business of thought lies in forming these. They themselves are but the lifeless tools of the "ego."

Analysis is not satisfied with that answer (sec. 103). We have seen how in physiological matters one routine act really grows out of others of its kind, and how physical activity as a whole is organised. We must, therefore, urge that every secondary trend is the offspring of other trends, which simplify as we retreat to infancy.* Let us make sure of the meaning of this statement. In a secondary series where we blunder along, vexed with doubts and difficulties, do we encounter nothing but organised reaction? When we learn our algebra or our geometry, is there in the process of acquisition as much routine as when we know them well? However paradoxical it may appear, we answer Yes. [Experimentally observe such cases.]

We have already observed that the number of links in an act leaves the question of their possessing an organised basis unaffected. Rationality is no fixed attribute of such an act. This we have seen holds true of physiological activities. Now all that we have to face in a difficult secondary combination is a large number of steps. A man is asked, "How many days has September?" He answers promptly, "Thirty." Or he says perhaps, "Let me see. September, did you say? I don't think I remember. I'll try, though. I believe there is a doggerel verse that might help. Confound it; I can't recall the verse. Yes, I can. 'Thirty days hath September.' I thought I could recall that verse. September has thirty days, my friend." It would be of the greatest interest to analyse exhaustively, if that were possible, such a string of thought. (See, however, the next chapter.) Here we can only state that every turn enumerated is of a kind and class that we have employed in our reflective excursions times without number.

To wonder, to be surprised, to doubt, to feel convinced, are all phases which have their place in general routine. The wonder follows immediately on something it has followed before, link on link, as we should expect. The multiplicity of links raises no problem, nor does the failure of the act to attain its end affect the matter. The fact that we have been

* This disposes of Carpenter's argument that "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" (Mental Physiology, 1876, p. lii). Psychologically speaking, we are, at every moment, what the previous moments have made us. No one who has closely watched the growth of children from birth onwards can put his finger on a period and say "Here began the formation of the child's character." (Sec. 274.)
thinking for years makes it evident that thought as a whole is a tangle of organised complexes. We doubt, as we have been accustomed to doubt. We show implicit faith, as we have done on previous occasions. We meet the various facts of life from settled, often from contradictory, points of view. Occasions being similar, we tend to react similarly. The cast of a person’s character is partly traceable to this fact.

It will be said that active “consciousness” is not organised when we are aware of observing something.* Why not? Are there not degrees of consciousness? Is it not the past which decides whether we shall be aware or not? May we not be clearly conscious, and be quite unconscious that we are clearly conscious? Do we not frequently attend closely, and yet, because of routine, forget the fact almost instantly? What does consciousness imply at most? That what we do is thought of in relation to other things; a conspicuous feeling and increased concentration which makes re-collection of what is observed easier; a notion of self; one combination co-existent with and referring to another; a directing a part of the attention to something we are or have been attending to. Active consciousness is consequently liable to become part of an organised whole, and since every thought and action is an organised whole, active consciousness enters into everything more or less. For the same reason, man’s self-consciousness varies with training and with environment, as is evident when we consider the distance between the infant and the man.

It may be thought that the possibility of being freely re-membered is not predicable of organised processes. This is a mistake. There are few settled tendencies of which a part cannot be re-membered independently of repeating the process, and many there are, such as the case of known melodies, where the whole is necessarily membered secondarily. Some physiological routine processes are often of a nature demanding re-collection, while, on the other hand, we find that the thought machinery as a whole is only open to scientific research.

Surely it will be urged, an obvious difference remains to be accounted for. To this I agree. While holding that all activity, secondary or primary, is organised, we may yet distinguish. There are, broadly speaking, certain trends whose business it is to elaborate others—tools to create articles, or tools to create tools with. When we desire to arrive at a conclusion, the machinery starts with the very need. Sometimes the mechanism succeeds, sometimes it fails. As the machinery is brought to perfection, so the product is turned out with ease and certainty. Just as the process of writing is perfectible and gains by the judgment expended upon it, and this by virtue of its organised character, so the secondary processes are perfectible, gain by the judgment (which itself is routine) expended on them, and this by virtue of their organised character. From the point of view of special problems one kind of process may be called routine, and the other not, for it depends whether we are viewing a product as

* On the meaning of the words consciousness, awareness, knowledge, belief, doubt and certainty, see secs. 43 and 99b.
machinery or as the result of machinery. Thus, for convenience sake, some combinations may be called specifically organised, and such are activities connected with trades, professions, amusements and individual pursuits generally. These trends, because they are not acquired by all, have first attracted the attention of observers. Trends which are less open to scrutiny may be dubbed non-specific trends.*

65a.—Habit and Thought.

A study of any habit will give an insight into the nature of thought in general. For instance, I have had much to do with slips of paper, on which, in various handwritings, appear, together with some other detail, the names of different persons. If I cannot decipher a name, I look to see whether the name occurs on that slip a second time, and, if unsuccessful, I seek for similar letters on that slip or on others I can conveniently lay my hands on. When I observe one certain mark, I look for a corresponding one somewhere else. As a rule, I also carefully scan the whole slip, and that more than once. I almost always verify several times what I have presumably read. When a doubt arises, I think of similar cases to the one before me. I question everything unhesitatingly. The slightest hint or suggestion sets me thinking at once. When mistaken, I instantly halt; when more vigour is required, it is at once put forth. Most difficulties, having occurred before, are solved as soon as they develop. Even in the more persistently recurring combinations, the circumstances are scarcely ever alike, and hence readjustment is normal to the routine work spoken of.

As we analyse the foregoing analysis, it becomes progressively more evident that in every habit we have an example of thought in general; that thought in general is an example of habits; and that all habits or thoughts are more or less organised secondary complexes. A particular habit merely indicates a specially organised process. Naturally enough we re-remember readily what we are frequently re-membering, and obviously enough the fact that difficulties occur insures a methodical solution. For the same fundamental reason, our individuality, both as to character and intellect, differs generally from habit to habit, e.g., while flawless in our mathematical reasoning, we are probably careless in reasoning out ordinary affairs, or while a child is obedient to its teacher, it may be disobedient to its guardian (sec. 45).

Such actions as eating, walking, dressing, as well as sports like cricket, or trades and professions, are exemplifications of habit, or congeries of organised complexes. If we now ask ourselves seriously what thought is, in all its shapes, we seem bound to admit that we are here also face to face with a tissue of organised complexes. Extraordinary questions are thus organically connected with a sceptical attitude; a boastful statement is met with depreciation; an interesting event is eagerly retailed and conned over; if something is not understood, fuller inquiries are made; and the like. Each situation has its organised reaction, and most situations are of common occurrence; thus courtesy and boorishness, thoughtlessness and thoughtfulness, diligence and laziness, are, in all their forms and developments, examples of habits. For this reason alone do we feel at home in the world, and for this reason alone do we pour forth torrents of words with the greatest ease. Where the difficulties to be overcome are great, there the habits are more tortuous and unsatisfactory. Hence given that situations repeat themselves—and this cannot very well be doubted,—and it follows that the whole form of thought is adequately explained by the existence of primary and secondary complications, and that any other explanation is inconsistent with what we are most intimately acquainted with. (Sec. 415.)

* Egger (La Parole Intérieure, 1881, p. 287) distinguishes between special and general habits. To-play-one-piece-on-the-piano-well, he says, is a special habit, to-play-the-piano-well, a general habit. This division is open to the objection that playing the piano well is a lower form of doing things generally well, a form not to be ignored.
As against what precedes, men have argued that the "ego" thinks, wills, and acts; and that the "ego" is the thinker. This doctrine is not easily sustained. First, the facts require no "ego" to explain them; for, as we have seen, they explain themselves. The "ego," as conceived by some, is a relic of the Middle Ages, and ranks with the essences and substances so fitly ridiculed by Molière and by Locke. One might as well speak of a stony substance underlying stones as of a thinking substance in thoughts: the one as little as the other promotes a better understanding of the facts of existence. On scientific grounds we can see why thought flows in certain particular channels; but if we restrict ourselves to the "ego" theory, it becomes in any given instance a hopeless riddle why one combination emerges rather than any other.

It might perhaps be thought that the instance analysed is an exceptional one. To obviate such an objection I wish to say that I have for periods together carefully watched my habits and my actions generally, and that the above analysis contains but the barest outline of what is the result of very many observations. The advanced student can do no better than follow in this case the example set, and occasionally watch his activity from morn till night, observing himself walking, talking, dressing, hearing, seeing, masticating, using his tongue, teeth, jaws, hands, and fingers, and reacting to the innumerable situations in which he is thrown day by day. If he then wishes to understand how he came to react so readily, let him watch the development of an infant.

66.—The Psychological Method.

If our analysis of organised reaction be correct, then we are obliged to draw important conclusions as to the proper psychological method of investigation. An organised trend means a simplified trend—one where almost everything unessential is rejected and forgotten, where effort is reduced nearly to a minimum, where the present is treated in the light of the past, where the bonds of time and order are absent, and where reaction accompanies its customary stimulus. When, therefore, we speak of reasoning and thinking, or imagining and willing, or feeling and pleasure-pain, and allow that they are routine activities or developments, it at once follows that, by themselves, these processes—though they adequately serve their respective purposes—lack intelligibility from a psychological standpoint, just as the fully developed process of writing does. They can only be explained organically and with regard to the past. Whatever they were in their earlier stages, they are now entirely transformed. To expect to find in them connected and self-consistent wholes, such as our ill-guided imagination might create, is out of the question. Hence careful observation alone can offer a clue to the various modes of reflective activity. To deduce these modes from principles not based on the previous study of the special facts is as disastrous as thus to deduce the functions of the brain. The explanations which have been proffered must, accordingly, be interpreted so as to include the requirements of children, savages and animals, as well as the highest flights of genius and all normal thought and action.

67.—A Bird's Eye View.

The struggle for existence and comfort solves the riddle of the evolution of animal life.* Had each species possessed in plenty what it required,

*The notion that evolution follows from the struggle for comfort rather than from the struggle for existence, is elaborated by Klop, Biologische Probleme, 1882.
the raison d'être of transmutation would have been absent. So is it with the evolution of organised thought. If attention energy were indefinite in quantity, all combinations might develop peaceably side by side, except those which are in their nature opposed to each other. There would be no organised reaction. We should take an interest in everything and forget nothing. But attention energy is limited, while our desires tend to be boundless. Hence a struggle for the field of attention ensues, as the result of which thought is simplified.* On the widest view, therefore, the existence of organised forms of activity is explained by the struggle of varying interests for the narrow field of attention.

Additional References.—Angell, Habit and Attention, 1898; Beaunis, De l'Habitude, 1856; Radestock, Habit, 1886; Rümelin, Ueber das Wesen der Gewohnheit, in his Reden und Aufsätze, 1881; and Vogt, Ablenkbarkeit und Gewöhnungsfähigkeit, 1899.

*Science has been termed an economy of thought, a shorthand of knowledge, a simplified view of things, a compressed formulation of facts, a brief statement of what is observable, and the like. If this very plausible standpoint be correct, we have in it a striking illustration of the principle of economisation. According to our reading of the facts the following happens in the evolution of truths. Surrounded by innumerable interesting things of most varying aspects, we try hard to comprehend them. Since little time is at our disposal, we make desperate attempts to reach the simplest possible formulation of the world of facts, and in these attempts lies defined the object, motive and method of science. Apart from the process of economisation, therefore, science, with all its implications, has no meaning; and, for the same reason, every truth, every statement, and every generalisation, owes its existence solely to the process described in this chapter. (On the nature of science, see Pearson, The Grammar of Science, 1891; Mach, Beiträge zur Analyse der Empfindungen, 1886; and especially Avenarius, Philosophie als Denken der Welt gemäß dem Prinzip des kleinsten Kraftmasses, 1876.)