A FIRST BOOK IN PSYCHOLOGY

THE MACMILLAN COMPANY
NEW YORK · BOSTON · CHICAGO
ATLANTA · SAN FRANCISCO

MACMILLAN & CO., LIMITED
LONDON · BOMBAY · CALCUTTA
MELBOURNE

THE MACMILLAN CO. OF CANADA, LTD.
TORONTO

A

FIRST BOOK IN PSYCHOLOGY

BY

MARY WHITON CALKINS

PRELIMINARY EDITION

New York
THE MACMILLAN COMPANY
1909

Set up and electrotyped. Published October, 1909.

Norwood Press
J. S. Cushing Co. — Berwick & Smith Co.
Norwood, Mass., U.S.A.

A FIRST BOOK IN PSYCHOLOGY

A FIRST BOOK IN PSYCHOLOGY

CHAPTER I

INTRODUCTION: THE NATURE, METHODS, AND USES OF PSYCHOLOGY

I. The Nature of Psychology

Psychology may be defined provisionally as science of consciousness — of perception, memory, emotion, and the like. Many psychologists find this definition sufficient as it stands, but, in the view of the writer of this book, it does not go far enough. For consciousness does not occur impersonally. Consciousness, on the contrary, always is a somebody-being-conscious. There is never perception without a somebody who perceives, and there never is thinking unless some one thinks. Bearing this fact in mind, we may define psychology more exactly by naming it science of the self as conscious.[1]

Either definition leads at once to a consideration of the meaning of the word 'science.' The scientist is distinguished from the ordinary observer in that he describes exactly and, if possible, explains the objects which both observe. Exact description includes, first, analysis and, second, classification through observed likenesses and differences; explanation consists in linking one fact to allied facts of its own or of another order. A scientist, for example, and an unscientific

[1] Cf. Appendix, Section I. (§ 1). Throughout the book these numerical exponents, beginning anew in each chapter and not always consecutive, refer to the divisions (§§) of a section in the Appendix numbered to correspond with the given chapter.

observer pick up, each, a stone from the roadside. The latter will tell you that he has found a big, smooth, gray stone. The former describes his stone as a smoothed and striated boulder of granite, rich in mica, and explains it as dropped from some glacier. Similarly, the unscientific observer of consciousness tells you that he better remembers Booth's *Hamlet* than Patti's *Lucia*. His psychologically trained friend will describe the memory of *Hamlet* as a case of visual imagination, distinguishing it as more intense than the auditory imagination of Patti's singing; and will explain the difference as due to the fact that he has been trained to draw, whereas he does not know one note from another. In a word, the scientist in each of these cases first describes phenomena, that is, observes them analytically, compares, and classifies them; and he next seeks, if he can, to explain phenomena — in these cases, the stone by the roadside and the vivid memory.

This attempt to distinguish science from everyday observation must be followed by an effort to mark off science from philosophy, for the psychologist, it must be confessed, is sometimes tempted to overstep the border. In brief, the distinction is this: philosophy seeks to discover the ultimate or irreducible nature of any (or of all) reality, whereas a science voluntarily limits itself to one group of facts, takes for granted the existence of coördinate groups, and does not seek to reduce one to the other or both to any deeper kind of reality. The philosopher, for example, asks whether mind is a function of matter, or matter an expression of mind, or whether both are manifestations of a more ultimate reality, whereas the psychologist takes for granted, on the basis of ordinary observation, that minds and material objects exist.

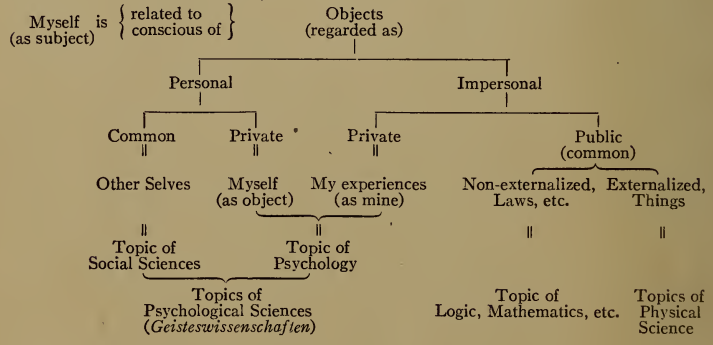
Psychology has been defined as science of the self-being-

conscious; and we rightly therefore ask for a further description, even if only a preliminary description, of the self. The conscious self of each one of us is not a reality which is merely inferred to exist: it is immediately experienced as possessed of at least four fundamental characters. The self as immediately experienced is (1) relatively persistent — in other words, I am in some sense the same as my childhood self; is (2) complex — I am a perceiving, remembering, feeling, willing self; is (3) a unique, an irreplaceable self — I am closely like father, brother, or friend, but I am, after all, only myself: there is only one of me. The self is experienced finally (4) as related to objects which are either personal or impersonal. For example, I am fond of my mother (relation to a personal object) and I am tasting an orange (relation to an impersonal object).

As the last sentences have indicated, a person or an impersonal fact, to which the self is related, is called its object — that of which it is conscious.[2] And every such object, whether personal or impersonal, may be further distinguished as either private or public (common) object. The common, or public, personal object of any self is some other self. For example, President Taft, as he greets me at a White House reception, is my personal object — but my common, not my private or peculiar object, since the sight of him is shared by all the other people in the line behind me. When, on the other hand, I am conscious of myself as, for instance, enchanted to meet the President — I am my own personal and private object; that is to say, I am conscious of myself in a peculiar way in which no one else is conscious of me. Within the class, also, of impersonal objects a distinction may be made between private and common objects,

that is, between (*a*) my experiences — my feelings, for example — regarded as peculiarly mine and (*b*) impersonal objects of anybody's consciousness, such as chemical formulæ and sidewalks. And there is, finally, the important distinction between externalized and non-externalized impersonal objects. Thus, the sidewalk is an externalized object, that is, it is conceived as if independent of any and of all selves. On the other hand, neither my feeling, a private impersonal object, nor the chemical formula, a common object, is externalized. Rather, each is realized as experience — the feeling as the experience which one self has, the formula as the common experience of many selves. It should be added that I am always, inattentively or attentively, conscious of the private, personal object, myself, whatever the other objects of my consciousness.

The distinctions which the last paragraphs have made may be summarized in the following way: —



The establishment of these distinctions between objects of consciousness serves thus to differentiate groups of sciences. It appears that psychology deals with 'private objects,' primarily with my particular, intimately known 'own self,' but

also with percepts, thoughts, and feelings as they appear to me and to nobody else. The concern of sociology on the other hand is with selves as common, or universal, phenomena, objects of anybody's consciousness; and logic and mathematics deal with thoughts — with arithmetical rules and logical axioms, for example — which are public property, parts of common experience. Sharply distinguished from all these are the physical sciences which concern themselves with *externalized* objects — with plants, animals, stones, acids, falling bodies. Psychology, to be sure, since its object — the self — is related to objects of every sort, takes account of all these objects of the other sciences; that is to say, I — as psychologist — study myself as related to other self, to universal principle or thought, and to external object; but psychology has to do with all these objects not in themselves but only in relation to the 'myself.' Sometimes, indeed, the word 'object' is narrowed so as to apply only to impersonal objects of one class or another, and not to the self.

It must be pointed out that certain real difficulties attend this classification of the self's objects. There is, first, the difficulty of conceiving the self as both subject and object. And there is, second, the difficulty involved in conceiving the 'thing,' the externalized object, as independent of all selves, when yet the self is related to it and conscious of it. But both these are difficulties only for the metaphysician. The psychologist who, like every scientist, must accept certain facts, without looking for their ultimate explanation, rests in the first case on the immediate certainty that I am conscious of myself. He avoids the second difficulty in that he does not assert that external objects, independent of all selves, really exist. He teaches merely

that, in perceiving, one uncritically assumes the existence of such independent objects.

This account, brief as it is, of the self as related, provides the outline for our study of psychology. The chapters which follow will develop these distinctions. They will include also some attempt to explain these facts of psychology; and in the effort to explain they will range beyond the domain of psychology proper and will look for facts of physics, of biology, and of physiology, for phenomena of vibration, of adaptation, of anatomical structure, with which to link the psychic changes.

II. The Methods of Psychology

The methods of psychology are, in general, the two methods of every science: description (that is, analysis and classification) and explanation. But besides these fundamental forms of procedure, every science has certain methods peculiar to itself; and the method which distinguishes psychology is that of introspection. This follows directly from what has been said of the subject-matter of psychology. Its facts are not the common, independent, externalized facts of the physical sciences, but the inner facts, selves, and ideas. To observe the psychic fact one has not, therefore, to sweep the heavens with a telescope, nor to travel about in search of rare geological formations; but one has merely to ask oneself such questions as: "How do I actually feel?" "What do I mean when I say that I perceive, remember, believe?"

The method has obvious advantages. It makes no especial conditions of time and place; it requires no mechanical adjunct; it demands no difficult search for suitable material; at any moment, in all surroundings, with no external outfit,

one may study the rich material provided by every imaginable experience. In an extreme sense, all is grist that comes to the psychologist's mill. The apparent facility of introspection is, however, one of its greatest dangers. Nothing seems easier than to render to ourselves a true account of what goes on in our consciousness. We are tempted, therefore, to overlook the need of training in introspection and to minimize its characteristic difficulties. Chief among these is the change which it makes in its own object. To attend to a particular experience actually alters it. If I ask myself in the midst of a hearty laugh, "Just what is this feeling of amusement?" forthwith the feeling has vanished, and a strenuous, serious mood has taken its place. Much the same is true of every form of consciousness. To observe myself perceiving, remembering, or judging is no longer simply to perceive, to remember, and to judge, but to reflect upon perception, memory, and judgment. It is true, therefore, as many psychologists have shown, that introspection is never of the immediate present, but is rather a case of memory, and subject, therefore, to all the uncertainties of memory.

The verification of our introspection is best secured by an important subsidiary method shared by psychology with many of the physical sciences — the method of experiment. To experiment is to regulate artificially the conditions of phenomena in such wise as to repeat, to isolate, and to vary them at will. In a multitude of ways, therefore, experiment aids scientific observation. Repetition of phenomena insures accuracy of analysis, and makes it possible to verify the results of a single observation; isolation of conditions narrows the object of study, and avoids the distraction of the observer's attention; and, finally, variation of conditions makes

it possible to explain a phenomenon exactly, by connecting it with those conditions only which it always accompanies. But because psychic facts differ from physical phenomena in that they can never be repeated or exactly measured, psychological experiment directly concerns itself with the physical stimulation of psychic facts and with the physical reactions to these stimuli. For example, though I cannot measure the vividness of a memory image, I can count the number of repetitions of a series of words which I read aloud to the person on whom I experiment; and I can compare the number of errors he makes in repeating the word-series when he has heard it once only, three times, or five times. In this way I can gain, experimentally, a conclusion about the relation of memory to frequency of experience, and by repeating the experiment many times with the same individual and with others, I may arrive at some trustworthy general conclusion.

III. The Forms of Psychology

This chapter has so far dealt, as this book will mainly deal, with the fundamental form of psychology — normal, introspective psychology, the scientific study of oneself being conscious. Based on this introspective study is a second important, though subsidiary, branch of the science, comparative or inferential psychology, the science of inference from the structure or from the behavior of living organisms, human or merely animal, to the nature of other selves. The objects of normal comparative psychology are animals, children, and primitive men. Its methods are the careful observation of the words or actions of the animals and people whom it studies, and the inference of the conscious experiences which underlie these outer manifestations. Such inference

involves introspection, because it consists in attributing one's own experience, under given circumstances, to other selves; but this introspection, because imputed to others, has not the same value as the study of one's own consciousness. Yet comparative studies of structure and of behavior have usefully directed introspection and have richly contributed to the explanatory side of psychology. The following summary enumerates these different forms of psychology: —

A. Normal Psychology

I. Introspective.
Study of the normal adult self and its experiences.
II. Inferential (Comparative).
Study of the normal consciousness of
a. Animals.
b. Children.
c. Primitive men.

B. Abnormal Psychology

I. Introspective.
Study of the abnormal experiences of the normal self.
II. Comparative
a. Study of deficient and exceptional selves.
b. Study of mentally deranged selves.

IV. The Use of Psychology

A final question still calls for a provisional answer, the question: Of what special use is the study of psychology? The technical psychologist may be tempted to ignore the question on the ground that it should never have been asked, that — rather — the student must assume at the outset the essential importance of all study, the vital significance of knowing anything. But the psychologist, in our sense of the term, has no need to take this ground. He studies the related self; and human conduct is the active relation of self to other

selves. A deeper acquaintance with my own nature may surely, therefore, have a significant influence on my behavior. True, the study of behavior as such belongs to ethics and to pedagogy rather than to psychology; but in studying psychology one may keep in mind the bearing of the science upon practical problems. In more concrete terms: the study of psychology is practically useful in so far as it aids me, on the one hand, to preserve and to develop myself, and, on the other hand, effectively to influence my environment.

CHAPTER II

PERCEPTION AND IMAGINATION

I. Perception and Imagination as Experiences of the Related Self

What am I at this present moment? I am a self, conscious of holding a blue celluloid pen, of looking down upon a white page, of hearing "The Road to Mandalay" whistled by a man who is mowing beneath my window, conscious also of the fragrance of the freshly cut grass and the warmth of the day, and, all the while, imagining a Tyrolese mountain landscape which I have never seen. I am, in other words, a perceiving and imagining self, and though this is certainly no exhaustive account of me, still I may well attempt no more, at this stage of my psychologizing, than the close description and the explanation of perception and imagination, the experiences so far enumerated in the self of the present.*

It will be convenient to begin with the analysis of perception. I notice first that in perceiving pen, paper, and tune I am directly aware of a certain inevitableness and involuntariness in the experience. I must see and touch just this pen; I can-

* Before reading further, and without consulting any book, the student should state, in writing, all the likenesses and the differences which he can observe between (1) his experience as he *perceives* the desk (or rug, or hat) at which he is looking, and (2) his experience as he *imagines* a similar desk (rug, or hat) in some other room. The record of this introspection may profitably be compared with that of other students.

not help feeling warm; I must hear this tune and must smell the odor of the falling grass. I may wish that I held a silver pen, that I were cool, not warm, that I were smelling roses instead of hay; but I am bound down, in my perceiving, to precisely this experience. I am, in a word, directly conscious of myself as receptive. And this direct consciousness of receptivity, prominent in my perception, is wanting to my imagination. In some sense, at least, my imaginings are under my own control. In the present case, for example, I can turn from the inner contemplation of the mountain view to the imagining — let us say — of the prosaic interior of a German psychological laboratory.

A second significant difference between perceiving and imagining is revealed not of necessity during the perception, but as I reflect on it or look back on it. To such reflective observation it is evident that my perception has been shared, or at any rate that it might have been shared, by other selves; whereas I need not, unless I will, share my imaginings. For example, the housemaid dusting the room can see my blue pen and white paper, can hear the whistled melody, and smell the hay and feel the warmth. But the housemaid does not share my imagination of the Tyrolese mountains any more than I read the imagination which has brought a smile to her lips. People share our imaginings in a sense, when they try to reproduce them, yet, evidently, the world of imagination has a privacy foreign to the common world of our perceptions.

From this privacy of imagination follows a third difference. It is this: perception is reflectively regarded as my consciousness of relation to an external or 'independent' object, whereas the object of imagination, though impersonal, is not externalized. The object of perception is thus, from the point of

view of the psychologist, the external pen or mowing-machine, whereas the object of imagination is no external object, but rather the mere image of landscape or of harmony.

Three differences have thus been emphasized as distinguishing perception from imagination: (1) my immediately realized receptivity, or passivity, in perceiving; (2) the reflectively realized community of my perception with the experience of other selves; (3) my relation in perception to an object which I regard as independent and external. But these distinctions must not obscure the likenesses. Perception resembles imagination in at least three ways. (1) Both are known (to reflection, if not immediately) as impersonal consciousness, in the sense that in perceiving and imagining I am not predominantly conscious of selves. I perceive or imagine pen, paper, tune, but I do not perceive or imagine you or myself. In the second place, (2) both perception and imagination are forms of particularizing consciousness. I do not, for example, perceive or imagine pens in general, or even the class of celluloid pens, but rather this particular, individual pen. A final, highly important likeness of perception and imagination is the following: (3) Both are chiefly sensational experiences concerned with vision, touch, and hearing rather than with feeling or with the consciousness of relation. This consideration will lead us to a psychological analysis different from that already attempted. It is expedient, therefore, to summarize our results. Perception has been described as sensational, passive, impersonal, externalizing, and particularizing consciousness reflectively realized as common to other selves. Imagination has been described as sensational, impersonal, and particularizing, but as lacking the consciousness of passivity, of externality,

and of community. To the detailed study of perception and imagination as sensational we must now turn.

II. Perception and Imagination as Sensational

The conscious self is, as we have seen, persistent, unique, related, and complex. If now we arbitrarily drop out of account the persistence, the uniqueness, and even the relatedness, we are still conscious of complexity. The mental reduction of this complex experience to its lowest terms gives what are called the structural elements of consciousness. These apparently irreducible constituents seem to fall into three main classes which have been called 'sensational' (or 'substantive')*; (2) 'attributive' (sometimes called by the name of the chief subclass 'affective' elements); and (3) 'relational.' To illustrate from the experience which we are studying: My consciousness of *blueness* is a sensational element; my consciousness of the *unpleasantness* of the warm day is an affective element; and, finally, my consciousness of the *contrast* between the blue of the pen handle and the blue of my account-book cover is a relational experience. It is evident that my experiences may be distinguished according as one or other of these elemental kinds of consciousness predominates; and it is equally evident that, from this point of view, perception and imagination are both chiefly sensational in character, distinguished mainly as the consciousness of colors, sounds, and fragrances.

Between perception and imagination as sensational complexes three further distinctions may ordinarily be made. If I close my eyes, and then imagine the oval gilt frame

* On all this, cf. Appendix, Section III., § 29 ff.

which stands on my desk, and if I then reopen my eyes and compare perception with imagination, I shall find that the imagination differs from the perception, first, in that it is sensationally less intense — the gilt of the imaged frame is duller; second, in that it is less complex — I lack altogether the consciousness of certain details of the frame; and finally, in that it is more evanescent, more readily displaced by other imaginings. And yet there are cases of imagination which lack one or more of these characteristics. The perception of one's bodily attitude, for example, may be less intense, less accurate, and less permanent than the visual imagination of a face or the auditory imagination of a melody; one's perception of an unknown substance, which one merely tastes or smells, may be less vivid, also, than one's visual imagination of a bowl of strawberries or of a roasted duck. All this proves that intensity, detail, and stability are merely common and not necessary characteristics of perception. Indeed, the only invariable distinctions are those enumerated in the preceding section of this chapter.

In perception and in imagination alike, my sensational experiences are of different sorts: I see, hear, smell, and touch. And one way of classifying both perception and imagination is according to predominant sense-elements. Such a classification is, however, of most significance as applied to imagination, for, as has appeared, my imagination is in some degree controllable; and I may therefore make practical use of the discovery that my imagination is chiefly visual or auditory. In what follows we shall study imagination as sensational, but we must remind ourselves that all the distinctions which are made are equally, though less fruitfully, applicable to perception.

Concrete imagination — that is to say, the imagination of things, scenes, and events — must, in the first place, be distinguished from merely verbal imagination. Concrete imagination may belong to any sense-order, but it is in the main either visual, auditory, or tactual; or else it belongs to a 'mixed' type, including elements of several kinds. Every student of psychology should undertake an introspective study of the sense-type of his imagination by the use of some such questionary as the following: * —

a. In imagining a pink rose,
   1. (*a*) Do you see its color and the green of its leaves?
      (*b*) Are the pink and green as vivid as those of a real rose?
   2. (*a*) Can you see its shape?
      (*b*) Is it as distinctly outlined as the objects now before you on the table?
   3. Can you smell it?
   4. Can you feel the smoothness of its petals and leaves?
   5. Can you feel the coolness of its petals and leaves?
   6. Can you feel the prick of its thorns?

b. In thinking of the words of "My Country, 'tis of thee,"
   1. Can you see them printed?
   2. Can you hear yourself say them?
   3. Can you hear yourself sing them?
   4. Can you feel yourself form the words in your throat and with your lips and tongue?
   5. Can you hear the organ play "America"?

c. Arrange the following experiences in order of the distinctness (*i.e.* clearness or vividness) with which you can remember (or imagine) them: —
   1. A triangle drawn with black lead on white paper.
   2. A plane surface of lemon-yellow.
   3. The hum of a mosquito.
   4. The crack of a whip.

* Condensed from a questionary formulated by Professor Gamble and used in the Wellesley College Laboratory since 1898–1899. These questions should be answered, in writing, before the student reads further.

5. The 'feel' of soap.
6. The 'feel' of dough.
7. The heat of a hot plate.
8. The smell of peppermint.
9. The smell of onion.
10. The taste of salt.

It is obvious that one who 'sees' the pink and green and shape of the rose has a visual imagination, and that visual imaginations differ according as colors or forms are more distinctly visualized. The person with auditory imagination can 'hear' the sound of the organ and the crack of the whip; and, in similar fashion, the other types of concrete imagination are tested by these questions. It should be noted that, in many experiences, visual imagination supplements the perception of pressure and of sound, as when we 'localize' a touch by imagining the look of wrist or of forehead, on which it falls, or imagine the puffing red motor-car at sound of its bell.

There is no character in which individuals differ more widely than in the prevailing sense-type of their imagination. In recalling, for example, the balcony scene in "Romeo and Juliet," some people see with the eye of the mind the shadowy form of Romeo and the figure of Juliet, clear-cut against the lighted window, the 'stony limits,' the cypresses, statues, and fountains of the Italian garden, and the "blessed moon . . . that tips with silver all these fruit-tree tops"; others, like Juliet, may "know the sound of that tongue's utterance," and may hear, in imagination, Romeo's deep-voiced love-making and the "silver-sweet sound" of Juliet's replies "like softest music to attending ears." Still others, finally, may image Romeo's movements as "with love's light wings" he "did o'erperch these walls."

The study of an imaginative writer often reveals the predominant sense-order of his imagination. His pages may glow with color or thrill with music or quiver with rhythmic motion. The blind poet, Philip Bourke Marston, for example, describes a garden ravaged by "winds in the night, without pity or pardon," in verses which contain no color-word, though they make mention of the garden's 'scent and sound,' and are full of striking images of pressure and of cold: —

"All my song birds are dead in their bushes —
Woe for such things!
Robins and linnets and blackbirds and thrushes
Dead, with stiff wings.

"Oh, my dead birds! each in his nest there,
So cold and stark;
What was the horrible death that pressed there
When skies were dark?

"What shall I do for my roses' sweetness
The Summer round —
For all my Garden's divine completeness
Of scent and sound?

This colorless garden stands in sharp contrast to Shelley's forest, swept by the

". . . wild West Wind, thou breath of Autumn's being,
Thou, from whose unseen presence the leaves dead
Are driven, like ghosts from an enchanter fleeing,
Yellow, and black, and pale, and hectic red."

Sometimes, indeed, a poet's lines seem to disclose to us his peculiar delight in special colors or sounds. So Shelley, once more, seems most readily to imagine the greens and

blues and purples of nature. He looks off upon wide landscapes, and

> "Beneath is spread like a green sea
> The waveless plain of Lombardy."

He looks downward, from his boat, and sees

> ". . . the deep's untrampled floor
> With green and purple sea-weeds strown."

He looks outward to far horizons and

> "Blue isles and snowy mountains wear
> The purple noon's transparent might."

He does not see the "legion'd rooks" who "hail" the rising sun as black, but compares

> "—their plumes of purple grain
> Starr'd with drops of golden rain"

to clouds "fleck'd with fire and azure." Even his gardens are full of "tender blue bells," of "flowers azure, black, and streak'd with gold," and of "broad flag-flowers, purple prank'd with white."

The most common type of concrete imagination probably is the visual, for, in spite of individual differences, most people can imagine objects in some vague outline and in some dull color. Every sculptor, painter, or architect who sees his vision before he embodies it has visual imagination. The inventor also 'sees' his engine or his dynamo in all its parts and connections, before he enters upon the actual construction of it; and the well-dressed woman sees the end from the beginning, the completed gown within the shapeless fabric. Above all, visual imagination is the endowment of the geometer and of the scientist. The one imagines the projections and intersections of lines and planes; the other beholds the planets

moving in their courses, peoples the earth with the forms of animals long extinct, or makes of every common object a palpitating dance of atoms and subatoms. Even a poet's imagination may hesitate before the challenging hypotheses of science, for it is said that Wordsworth once exclaimed, "I have not enough imagination to become a geologist."

Yet in spite of the value of visual images to artists, inventors, and mathematicians, it must at once be acknowledged that, even to them, the visual type of imagination is not indispensable, but that it may be replaced by what we know as the tactual-motor type, the imaging of the movements by which one traces the outlines of figures or of designs. Galton found, as result of careful inquiry, that "men who declare themselves entirely deficient in the power of seeing mental pictures — can become painters of the rank of Royal Academicians." And James says of himself, "I am a good draughtsman and have a very lively interest in pictures, statues, architecture, and decoration, and a keen sensibility to artistic effects. But I am an extremely poor visualizer, and find myself often unable to reproduce in my mind's eye pictures which I have most carefully examined." * In these cases, a quickness to recognize and to discriminate colors and forms is combined with the inability to imagine them. Evidently, visual imagination is here replaced by pressure imagination — imagination of the motions necessary to the production of sculpture, machine, or figure: a sculptor of this type reproduces in imagination the movements of his chisel, and the geometrician draws his figure or indicates by imaged movements the sweep of orbits and the intersection of lines.

Külpe discovered, experimentally, the same lack of visual

* The "Principles of Psychology," Vol. II., p. 53.

imagination.* He tested the color-imagery of several students by pronouncing in a darkened room the names of colors and requiring them to describe the resulting experiences. One of these young men proved utterly incapable, with the strongest effort, of imagining any color whatever. Another historic example is Charcot's patient, a man whose visual imagery was impaired through nervous disease. "Asked to draw an arcade, he says, 'I remember that it contains semicircular arches, that two of them meeting at an angle make a vault, but how it looks I am absolutely unable to imagine.' . . . He complains of his loss of feeling for colors. 'My wife has black hair, this I know; but I can no more recall its color than I can her person and features!'" †

The auditory type of imagination is unquestionably less common than the visual, and it is almost always closely combined with imagery of the motor-tactual sort. It is the image-type of the great musicians, of Beethoven, for example, who composed his symphonies when totally unable to hear a note of them. But though less significant to most of us than the visual images, the concrete auditory imagination belongs, at least in some degree, to all people who are able to recall voices and melodies. The prevalence of auditory imagery is suggested by the ordinary ruse of violin players, who produce the effect of a *diminuendo*, lengthened beyond the actual sound, by continuing the drawing motion of the bow when it no longer touches the string.

The most significant type of tactual (or pressure) imagination is frequently called the tactual-motor type — the imagination of the pressures, often internal, which are originally

* "Outlines of Psychology," Section 27, 9.

† Cf. James, *op. cit.*, Vol. II., p. 59.

due to bodily movements; the imagination, for example, of one's shortened breath as one is running. Imagination may be, also, of some other dermal sense-type, that is, of pain, of warmth, or of cold. Such experiences are perhaps rare, but they unquestionably occur. Keats, for example, vividly images the coldness of

> "a draught of vintage, that hath been
> Cooled a long age in the deep-delvèd earth."

One must carefully distinguish between such imagining and the corresponding peripherally aroused sensation. The vivid account of a wound or a physical injury may excite, through the connection of cortical neurones through motor neurones with organic reactions, the actual, visceral pressure-sensations which constitute the feeling of faintness, and it may even excite the pain end-organs. In the same way, I grow actually hot over a remembered mortification and I shiver with cold at a revived fear.

Smell and taste imagination are relatively infrequent and their occurrence is, indeed, often denied. It is said that when we imagine objects fragrant in themselves, such as roses or cheese or coffee, we imagine their look or their feel without imagining their odor; and that when we suppose ourselves to imagine tastes, we are really imagining the colors and the forms of food. It will be admitted that from our dream dinners we are apt to wake before tasting anything, and that poetic descriptions of banquets dwell chiefly on the color of 'dusky loaf' of 'golden yolks' and 'lucent syrops,' and on the texture of 'fruit . . . rough or smooth rined' or of 'jellies soother than the creamy curd'! Yet no one will deny that the poet must have imagined odors, and not colors, when he writes in the fifth stanza of the "Ode to a Nightingale": —

"I cannot see what flowers are at my feet,
Nor what soft incense hangs upon the boughs,
But, in embalmed darkness, guess each sweet
Wherewith the seasonable month endows
The grass, the thicket, and the fruit tree wild;

. . . . . .

And mid-May's eldest child,
The coming musk-rose, full of dewy wine."

Besides this unintended evidence from imaginative writers we have well-attested instances of the smell and taste imagination, both in waking experience and in dreams, of well-trained observers. An inquiry among fifty Wellesley College students, somewhat trained in introspection, disclosed the fact that thirty-one were sure that they could imagine the odors of certain substances, such as burning tar, burning sulphur, and mignonette.

More common than any of these classes of concrete imagination is that to which we have already referred as the 'mixed type.' The imagination of any object is likely, in other words, to include elements of more than one sense-order: it is not wholly visual and still less is it entirely auditory or tactual. Either the visual or auditory elements may predominate, but the imagination — of a dinner-party, for example — is rarely a mere complex of the colors and forms of dresses, faces, candles, flowers, foods, nor yet of the sounds of conversation, laughter, and service, but it includes both visual and auditory images, perhaps with a pressure image also of the 'feel' of linen or of silver, and a gustatory or olfactory image of the taste of beef or the odor of roses.

Contrasted with all these classes of concrete imagination are the verbal types, which are far more prevalent than any

one, save the psychologist, realizes. In the experience of many people these altogether crowd out concrete imaginings. We suppose ourselves to be imagining the Heraion at Argos, the "Madonna della Sedia," or Liszt's "Hungarian Rhapsody," when, as a matter of fact, we are mainly saying to ourselves the words 'Heraion,' 'madonna,' 'rhapsody.' Of course this is an artificial state of affairs. Words are conventional symbols, not instinctive reactions; they play no part at all in the imaginative life of animal or of baby, and little part in that of the savage. The civilized being, however, is born into a world of people whose most characteristic activity is neither eating, walking, nor fighting, but talking. At first, through pure imitation, and afterwards because he recognizes the utility of language, he largely occupies himself with words, first heard and spoken, and later read and written. And as habits fall away through disuse, so, little by little, in the experience of most of us, word-images take the place of concreter images of color, sound, and the like. It is unnecessary to dwell on the immense utility of verbal imagination, for we are already victims of what Mr. Garrison calls 'the ignorant prejudice in favor of reading and writing,' and, he might have added, 'of talking.' Words serve not only as the means of communication, and thus as the surest method of social development, but — by their abstract, conventional form — as an aid to rapid memorizing and to clear reasoning; they are indispensable parts of our intellectual equipment; yet they are in themselves but poor and insignificant experiences, and they work us irreparable harm if they banish, from the life of our imagination, the warm colors, broad spaces, liquid sounds, and subtle fragrances which might enrich and widen our experience.

We have ample proof that this is no purely fictitious danger. Galton's most significant conclusion from his statistical study of imagination is that the "faculty of seeing pictures, . . . if ever possessed by men of highly generalized and abstract thought, is very apt to be lost by disuse." Many of the 'men of science,' whose imagination he tested, had "no more notion" of the nature of visual imagery "than a color-blind man . . . has of the nature of color. 'It is only by a figure of speech,'" one of them says, "'that I can describe my recollection of a scene as a mental image that I can see with my mind's eye, . . . I do not see it . . . any more than a man sees the thousand lines of Sophokles which under due pressure he is ready to repeat.'" Every mixed figure is in truth a witness to the common lack of concrete imagery. The earnest preacher who exhorted his hearers to water the sparks of grace, and the fervid orator who bewailed the cup of Ireland's misery as 'long running over, but not yet full,' were, of course, without the visual images which their words should suggest. Doubtless, most of their hearers received these astounding statements without a quiver of amusement — not, primarily, because they lacked a sense of humor, but because they failed to translate the words into visual imagery.

The study of the varying forms of verbal imagination discloses the fact that, like the forms of concrete imagination, they belong usually to a visual, an auditory, a tactual, or a 'mixed' class, though they may conceivably be of other sense-types. The good visualizer images his words as they are printed on a page, reading them off, sentence by sentence or verse by verse, recalling the precise part of the page on which a given word or sentence appears. Galton tells of a statesman who sometimes hesitates in the midst of a speech, because

plagued by the image of his manuscript speech with its original erasures and corrections. Even musicians may be helped by symbolic imagery and may play by mentally reading their scores. Again, verbal imagination may be of words as heard; and such masters of musical verse as Sophokles, Tennyson, and Swinburne must have auditory verbal imagery. One may 'hear' words spoken by oneself or by others, one may listen in imagination to conversations between different people, or one may recall whole scenes of a play in the characteristic intonations of different actors. "'When I write a scene,' said Legouve to Scribe,* 'I *hear* but you *see*. In each phrase which I write, the voice of the personage who speaks strikes my ear. *Vous qui êtes le theatre même* your actors walk, gesticulate before your eyes; I am a *listener*, you a *spectator*.' 'Nothing more true,' said Scribe; 'do you know where I am when I write a piece? In the middle of the parterre.'"

One's verbal imagery, finally, may be of the tactual-motor type; one may imagine oneself as speaking, or, less often, as writing the words. A simple proof of the frequent occurrence of these motor images was suggested by Dr. Stricker: † the attempt to imagine a word containing several labials — such a word as 'bob' or 'pepper' — without the faintest imaged or actual movement of the lips. Most people will be unsuccessful in such an experiment, which brings to light the presence, in verbal imagining, of the imagination or perception of movements of the throat and lips. Even the distinct effort to visualize words may result in tactual-motor images. James, for example, "can seldom call to

* Quoted by W. James, *op. cit.*, Vol. II., p. 60, from Binet.

† "Studien über die Sprachvorstellungen." Cf. James, Vol. II., p. 63.

mind even a single letter of the alphabet in purely retinal terms. I must trace the letter," he says, "by running my mental eye over its contour."

The various phenomena of aphasia, the cerebral disease affecting the word-consciousness, confirm these results of introspection. They show that verbal imagery is impaired by injury to the visual, to the auditory, or to any tactual-motor centre, or by injury to the neurones connecting these areas, and that corresponding with these different pathological conditions there may be independent loss of words as read, as heard, as spoken, or as written.

Several general conclusions follow from the study of the sense-orders of our images: the impossibility, first of all, of supposing that any normal person is unimaginative. Since imagination is not of necessity an artistic impulse, a lofty soaring in empyrean isolation from the everyday life, but merely, as we have seen, the imaging of colors, sounds, pressures, odors, tastes, or even of words, it follows that everybody who is conscious of anything whatever, in its absence, is in so far imaginative. When I am conscious of the hat which I yesterday bought or of the dinner which I shall eat to-day, no less than when I muse upon the picture I shall paint or of the world I shall discover, I am, in a strict sense, imaginative. Our study, furthermore, makes it clear that almost everybody is capable of inciting himself to vivid and accurate imagination of one sort or another. If, try as he will, the colors are washed out and the outlines indistinct in his visual images of an opera or of a country outlook, he may hear, in imagination, the varying parts of strings and horns in the orchestral prelude, the melodies of the songs and the harmonies of the choruses, or the liquid bird-notes, lapping

waves, and murmuring leaves of the summer afternoon. Even the minor image-types may be well developed, as the experiences of many defectives show. Helen Keller, who has been blind and deaf from earliest childhood, so that she can have neither visual nor auditory imagination, none the less imagines with peculiar vividness and detail pressures, movements, and even tastes and smells. A passage from her "Story of My Life" illustrates this lively and accurate imagining and may fitly close this chapter: —

"Everything," she says, "that could hum, or buzz, or sing had a part in my education — noisy-throated frogs, katydids, and crickets held in my hand till they trilled their reedy note. I felt the bursting cotton bolls and fingered their soft fibre and fuzzy seeds . . ., I felt the low soughing of the wind through the corn stalks, the silky rustling of the long leaves, and the indignant snort of my pony . . . as we put the bit in his teeth. . . . Ah, me! How well I remember the spicy, clovery smell of his breath."

CHAPTER III

THE SENSATIONAL ELEMENTS OF PERCEPTION AND IMAGINATION

In the second section of the preceding chapter, imagination — and, by implication, perception — have been described according to sensational content. But the sensational elements themselves have been only incidentally considered. To repair this neglect, it will be well to recur to our initial example — I am writing with a blue pen on a warm summer's day within sound of a gardener's whistling. My present consciousness includes, therefore, the experiences of blueness, of whiteness, of tone, of warmth, and of pressure. These sensational elements of my consciousness may be studied in any order. In this chapter, the first to be considered are

I. Elemental Visual Experiences

a. ENUMERATION

1 (*a*) *Visual Qualities: Experiences of Color*

Here we come at once upon a curious fact. An elemental consciousness of color, the experience of green, for example, is utterly indefinable. Every normal person realizes, yet no one can tell, what it is. I may say, "I am conscious of green in looking at the trees;" or, "my consciousness of green is produced by a mixture of blue and yellow pigments;" but these are statements about the consciousness of green, not

descriptions of it. In truth, such descriptions are inherently impossible because description, or definition, involves an analysis of content, whereas an elemental experience is irreducible, that is, further unanalyzable.

It follows that very little may be said, in terms of mere description, about the sensational color-qualities, that is, the elemental kinds of color-consciousness. At least four sensational color-qualities (that is, kinds of color experience) are admitted by almost all psychologists as unanalyzable, or elemental. These four are the consciousness of red, of yellow, of green, and of blue; they are often described, also, as 'principal colors,' and for the following reason: If we have a succession of color-experiences in the spectrum order, we are certain to recognize that the series naturally divides itself into four shorter series, consciousness of red to consciousness of yellow, consciousness of yellow to consciousness of green, and so on; and that the experiences nearest to each end term differ from it by being like one or other of the contiguous end terms. For example, my consciousness of yellowish orange differs from that of yellow by being like both the consciousness of red and the consciousness of yellow; whereas my consciousness of olive differs from that of yellow by being like both the consciousness of yellow and the consciousness of green. We rightly, therefore, distinguish between the elemental experiences of red, yellow, green, and blue, and the other color-experiences, each of which is like two of the elements or 'turning-points' of the color-square. Some psy-

FIG. 1. — The Color Square. Adapted from G. E. Müller.

chologists believe that only the four 'principal' color-qualities are elemental and that all the others are analyzable into two or more of the four. Other psychologists hold that there are as many elemental as distinguishable color-experiences. Into the details of this rather academic discussion we need not enter.

(*b*) *Visual Qualities: Experiences of Colorless Light*

Besides our experiences of color — of red, green, blue, and the like — we have also the introspectively different experiences of colorless light, that is, of white, gray, and black. There is wide diversity among psychologists in their account of the relation of these experiences. Some reckon the consciousness of gray as a complex experience analyzable into that of white and of black; others hold that there is but one colorless light quality — the consciousness of gray, and that the experiences of white and of black are really experiences of light and dark gray.* A third view enumerates among the colorless light elements the consciousness of white, of black, and of all distinguishable grays. A fourth view recognizes three colorless light qualities (the consciousness of white, of black, and of gray), explaining the differences in sensations of gray as distinctions in intensity. It is unnecessary and perhaps impossible to choose between these accounts. The important point is to note the evident distinction between the 'colorless-light qualities,' the consciousness of white, of gray, and of black on the one hand, and the 'color-qualities' on the other. Significant also is the fact that though one may have the colorless-light consciousness without the color-conscious-

* For experiment, cf. Sanford, "Experimental Psychology," 140*a*. (References throughout the footnotes to "Sanford" are to this book; and the numerals refer to his numbered experiments.)

ness — in other words, though one may see white, gray, or black untinged by color — one is never conscious of color without colorless light. In the terms of physics: we never see an absolutely pure or, as it has been called, a 'saturated' blue or red. Most of our colors, indeed, are decidedly 'unsaturated,' that is to say, they seem to be mixed with colorless light.

All told, we are capable of an indefinitely large number of visual experiences. Besides the consciousness of colorless light we have first (1) the principal color-qualities; next (2) experiences of hue — the consciousness of greenish-blue, for example — of which each is like two of the principal color-elements; (3) experiences of 'tint' — such as the consciousness of straw-color or pink — of which each is like some consciousness of color (or of hue) and the consciousness of light gray or white; and (4) experiences of 'shade' — for example, that of bottle-green — each of which resembles both the consciousness of color or hue and that of dark gray or black. An admirable way in which to represent to ourselves this wealth of our visual experience is by the figure known as the color pyramid.* The base of

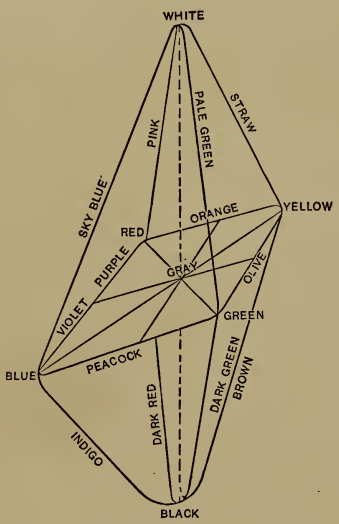


FIG. 2. — The Color Pyramid. (From Titchener, with altered wording.*)

* Cf. Titchener, "Primer of Psychology," 1898, § 17, for the first form of the color-pyramid; "Experimental Psychology, Instructor's Manual,

this symbol represents the experiences of most saturated color — those in which there is least consciousness of white, of gray, or of black. Its rectangular form suggests the fact that the consciousness of red, of yellow, of green, and of blue are, as has been shown, turning-points in the color-quality series. The dotted vertical represents the experiences of white, of gray, of black. Toward the top, the surface of the pyramid represents the experiences of pale green, of straw-yellow, of sky-blue, and of pink; toward the bottom the experiences of indigo-blue, of brown, of dark red, and of bottle-green, are represented. "All these tones," to quote Titchener again, "are the most saturated possible, the most coloured colours of their kind," but "if we peel the figure" (like an onion), "leaving the black and white poles untouched, we get precisely what we had before, save that all the colour tones are less saturated, lie so much nearer to the neutral tones."

2. *Visual Intensities: Experiences of Brightness*

One cannot be conscious of a color, a red or a blue, for example, or of a colorless light, a white or black or gray, without being at the same time conscious of brightness. The experience of brightness as well as that of color or of gray, is a distinct and unanalyzable element of consciousness. It cannot, of course, be separated from the consciousness of colorless light with which it is combined, but it may be perfectly distinguished from it. The visual intensities are, as every one admits, indefinite in number. They are furthermore distinguished from sensational qualities of color and of

Qualitative," p. 5, for the quoted sentences; and "Experimental Psychology, Student's Manual, Qualitative," p. 3, for the outline of the figure.

colorless light, by their capacity for direct and simple serial arrangement.* [31] But, partly because our practical and æsthetic interests are concerned only with extremes of intensity, we are not interested in naming the experiences of brightness as we are in naming those of color. For these reasons, the visual intensity-elements are estimated by comparison with each other, and not with reference to absolute standards; and the intensity-series can be indicated only by words: "bright — brighter — still more bright, etc."

3. *Visual Elements of Extensity*

Always along with our consciousness of color we experience a certain bigness, or extensity.* [32] This, too, is an elemental sensational consciousness, an unanalyzable experience quite distinct from every other. In the words of James, it is "an element in each sensation, just as intensity is. The latter every one will admit to be a distinguishable though not separable ingredient. . . . In like manner extensity, being an entirely peculiar kind of feeling indescribable except in terms of itself, and inseparable in actual experience from some sensational quality which it must accompany, can itself receive no other name than that of *sensational element*."

b. THE ATTEMPTED EXPLANATION OF VISUAL EXPERIENCES

1. *The Physical and Physiological Conditions of the Consciousness of Color and Colorless Light*

(*a*) The Physical Conditions of the Visual Consciousness

We have so far enumerated and, though roughly and partially, have classified our sensational visual experiences. We

* All numerical exponents refer to Appendix, Section III., pp. 285 ff.

have next to seek some explanation of them. A brief reflection will convince us that this explanation cannot be in terms of psychology, for very evidently it does not depend on me whether my present experience includes consciousness of green or of blue, of bright or of dull. The accepted explanation of every sort of sensational consciousness is in terms of physics and physiology, and the explanation of the color-consciousness is somewhat as follows: I have the sensational consciousness of green, let us say, because green light, namely, ether vibrations nearly six hundred billions to the second, are refracted by the lenses of my eye to the retina, and there excite a physiological process which is propagated by the optic nerve to the occipital lobe of my brain. Thus the physical condition of our consciousness of *color* is ether-vibrations. The ether is described by physicists as an 'incompressible medium' of extreme tenuity and elasticity which is supposed to pervade all space and to penetrate within the molecules of material substances. So impalpable a material has never been actually observed, but its existence is hypothetically assumed, because it offers the only plausible explanation of many physical phenomena. Because the ether pervades all bodies, it must be thrown into motion by their vibrating molecules, and its periodic, transverse vibrations are assumed to be the physical stimuli which condition the sensational qualities of color. Thus the colors vary according to the number of ether vibrations in a given time. The slowest vibrations, about four hundred and fifty billion each second, condition the retinal process which accompanies the sensational quality 'red'; and the swiftest vibrations, about seven hundred and eighty billion each second, form the physical stimulus to 'violet.' The following table includes these

figures for five colors, naming also the length of the ether-waves, that is, the distance from wave to wave. It is evident that the longer the waves the smaller the number which can be propagated in a given time: —

Consciousness of	Fraunhofer Lines	No. Vibrations per Second (n)	Wave-lengths (λ)
Red	*B*	450 billions	687+ millionths of a millimeter
Yellow	*D*	526 billions	588+ millionths of a millimeter
Green	*E*	589 billions	526 millionths of a millimeter
Blue	*F*	640 billions	484 millionths of a millimeter
Violet	*H*	790 billions	392+ millionths of a millimeter

The external conditions of the consciousness of *colorless light* are more complicated. Two sorts of relation between stimulus and consciousness must be distinguished; the consciousness of white, gray, or black is due either (1) to a mixture of colored lights or (2) to a single colored light.

(1) Not every combination of colored lights produces the colorless-light consciousness, but for every colored light another may be found such that, if the two be mixed and if they fall simultaneously on the retina, a consciousness of colorless light will result. Color-stimuli which stand in this relation to each other are called complementary. Furthermore, a mixture of three, of four, and of more color-stimuli, rightly chosen, will produce the consciousness of colorless light; and daylight, which is physically a compound of ether-waves of all wave-lengths, of course has the same effect.* (2) But

* For experiments, cf. Sanford, *op. cit.*, 148*c* and 149*a*; Titchener, "Experimental Psychology, Student's Manual, Qualitative," § 8. (Footnote references to "Titchener" are to this book.)

the colorless-light consciousness results not only from mixture of colored lights; it is sometimes excited by a single stimulus. The three most important cases in which one colored light, falling on the retina, is seen as gray are (*a*) in the faint light or twilight when, as the saying is, "all cats are gray"; (*b*) in color-blind eyes [15] to which some one color (most often red or green) or even all colors appear as gray; * (*c*) when the colored light falls on the peripheral or outer edge of the retina. If, for instance, a small colored object be brought toward the field of vision from the right side, while the left eye is closed and the right eye firmly fixated on something directly in front of the face, it will be found that the colored object at first seems gray, and that it is seen in its true color only as it approaches the centre of the eye.†

(*b*) The Physiological Conditions of the Consciousness of Color and Colorless Light

Even the attempt to offer a physical explanation of our visual sensations has led us, thus, to refer to physiological retinal conditions. We must now undertake a completer enumeration of these physiological conditions of vision. And it will be convenient to describe together the conditions of the color-consciousness and the colorless-light consciousness.

In brief, the main physiological conditions of vision are the following: (1) A specific retinal process; (2) an excitation of the optic nerve which connects retina and brain; (3) an excitation of the visual brain centre — probably the cortex of

* For experiments, cf. Sanford, 135.

† For experiments, cf. Sanford, 137*a*; Titchener, § 9; C. E. Seashore, "Elementary Experiments in Psychology," Chapter III. (Footnote references to "Seashore" are to this book.)

the occipital lobe. Besides these antecedent, or conditioning, physiological processes, there occur always (4) accompanying and following movements of eyes and head.

In considering the nature of the retinal process which excites color-vision, it is necessary to have in mind the structure of the human eye.[10] Roughly speaking, it is a sort of spherical *camera obscura*, protected by a shutter, the eyelid, and containing a compound lens whose refractiveness (or ability to focus light-rays) changes, so that clear images now of near and now of far objects may be thrown upon its plate, the retina. More literally, the eyeball is a sphere, moved by six strong muscles, composed of three membranous layers enclosing certain transparent substances, and pierced, from the rear, by the optic nerve. The outside layer of the eyeball is an opaque, whitish membrane, the sclerotic, which in its forward part becomes transparent and is called the cornea. The forward portion of the second, or choroid, coating of the eyeball is the iris, which we see as the 'blue' or 'brown' of the eye. It is a sort of 'automatic diaphragm' with an opening, the pupil, which grows larger in faint light and smaller in bright light. Behind the iris is the crystalline lens, most important of the transparent substances of the eye. By an automatic muscular contraction it becomes more refractive when near objects are fixated. The third coating, the retina,[11] covers the posterior two-thirds of the inner surface of the eyeball. It is composed of several layers, and the ninth of these layers consists of minute structures, of two types, known as rods and cones. These are so arranged that there are many cones and few rods in the centre, and many rods on the outlying portions of the retina. The rays of light from an object are refracted by the lenses of the eye, pierce through

the inner layers of the retina, and excite the rod and cone layer. The activity of rods and cones stimulates the optic nerve, and the optic nerve, in turn, transmits this excitation to the occipital lobes of the cerebral hemispheres.

The retinal processes which condition the color and the colorless-light consciousness are very probably the following:[12] (1) Colored light — for example, red light (that is, ether waves four hundred and fifty billion to the second, six hundred and ninety millionths of a millimeter long) — partially decomposes a chemical substance on the cones of the retina. There are four possible phases of the decomposition of this cone-substance, and corresponding to them are the sensational experiences of red, of yellow, of green, and of blue.[13] (2) A mixture of colored lights totally decomposes this same cone-substance, and the consciousness of colorless light follows. (3) The consciousness of colorless light due to a single color-stimulus is excited by the decomposition of a similar, but less complex, chemical substance found on the rods of the retina. Any light stimulus suffices to break up this substance, and it is decomposable not in separate stages but only all at once. The three cases, already named, in which colored light excites colorless-light consciousness are thus explained: (*a*) When, as in twilight, the colorless-light stimulus is very faint, it lacks the intensity necessary to excite the processes of the cone-substance, whereas the rod-substance is particularly sensitive to faint light.[14] (*b*) When a colored light falls on the outlying, or peripheral, part of the retina, it excites only the rod-substance, since this part of the retina contains no cones. (*c*) In partial color-blindness the cones of the retina may be supposed to be only partly developed, and the cone-substance to be decomposable in only two of the normal four stages.

In total color-blindness (if due to retinal and not to brain conditions) it may be supposed either that the retina contains only rods, and not cones, or that the cone-substance is as undeveloped as that on the rods.[15]

2. *The Physical and Physiological Conditions of Visual Brightness and Extensity*

By a little amplification this account of physical and physiological processes may be expanded so as to explain also the consciousness of brightness and of visual extensity. The visual qualities are conditioned by the length, and the corresponding number per second, of the ether waves; the visual intensities, that is, the brightnesses, are conditioned by the wave amplitudes; the visual extensities, or bignesses, are conditioned presumably by the diffusion of the waves in space. The physiological conditions of these elemental visual experiences are probably the following: The 'qualities' (experiences of color and of colorless lights) are conditioned by the *mode* of the retinal excitation (partial or total decomposition of a retinal substance), whereas visual intensities are conditioned by the *degree* of excitation; and visual extensities are conditioned by the *number* of nerve-elements excited.[30]

It must be noted, in conclusion, that color sensations stand in more constant relation to physiological than to physical conditions. The phenomena of color contrast offer an admirable illustration.[16] If one look fixedly for ten to twenty seconds at an illuminated green window and then look off at a neutral background, the background will appear not white or gray, but pinkish-purple; or, if the illuminated window is blue, the background will appear as yellow. That is,

if a brightly colored object has been fixated, gray light falling on the same part of the retina results in the complementary color sensation — a case of successive contrast.* Here the objective stimulus, colorless light, occasions a sensation not of gray but of a color. The explanation, in terms of the special case, is the following: the green light has exhausted, temporarily, a part of the photochemical substance in the retina, so that the process normally resulting in sensation of green does not follow. When, therefore, the retina is stimulated by colorless light (a combination of ether-waves of all vibration rates), the green constituent of the white light is ineffective, and its remaining constituents excite the processes which condition the consciousness of purple.

Cases of simultaneous contrast also occur: that is, gray objects, seen on a colored background, appear to be of color complementary to the background.†

II. Elemental Auditory Experiences

a. enumeration

We have so far analyzed into its visual elements my perception of the moment. But I am a hearing as well as a seeing self: I am listening, it will be remembered, to "The Road to Mandalay" whistled to the accompaniment of a lawn-mower; and my experience includes at least one tonal quality, my consciousness of a pitch, say C, and a second auditory experience, perhaps elemental — my consciousness of a whirring noise. The consciousness of pitch is the character-

* For experiments, cf. Sanford, 124; Seashore, Chapter I.; Titchener, § 11, Exps. (7) and (8).

† Cf. Sanford, 152, *b*, *c*, *d*; Seashore, Chapter II.; Titchener, § 10, especially Exps. (1), (2), (3).

istic factor of my consciousness that a tone is high or low, that a voice is soprano or alto. The most notable character of the pitch-qualities (experiences of pitch) is their capacity for arrangement in recurring series, the octaves. The number of these tonal qualities (of pitch) is variously stated. On the ground that the trained hearer can distinguish about eleven thousand different tones, most psychologists assume an equal number of pitch-qualities. But on the ground of the close resemblance between a tone and its octave it has been urged that there are only as many pitch-qualities as there are distinguishable elements in an octave.* [22]

Psychologists are not agreed about the nature of our consciousness of noise. Many teach that it is a mere conglomerate of many pitch-qualities; and in favor of this view it may be urged that in most if not all noises — in the roar of the streets, and in the hum of insects — we detect what we call pitch. Other psychologists hold that a consciousness of noise, even when complex, includes some characteristic noise-quality — as, for example, the consciousness of puff, of thud, or of rumble.† These alleged noise-qualities have been distinguished as continuous or momentary, but have been, on the whole, insufficiently studied. On the other hand, experiences of pitch have been the object of minute consideration as forming an important factor of the æsthetic consciousness.

The elemental consciousness of a sound-quality, a pitch or a noise, is always fused, or combined, with the elemental experience of an auditory intensity, or loudness: that is, one is conscious of every sound as more or less loud or soft.

* For experiments, cf. Sanford, 67–68; Titchener, § 12 (1).

† For experiments, cf. Sanford, 65; Titchener, § 12, (2) and (3).

And according to many (though not to all) psychologists, the consciousness of quality and of intensity are fused also with that of auditory extensity, or bigness.[32] This auditory extensity, or voluminousness, is the predominant factor in our distinction of one instrument from another — 'cello from organ, or flute from violin — when both are playing at the same pitch and intensity.

To sum up the results of the preceding paragraphs: the following auditory, sensational elements of consciousness occur: (1) auditory qualities (pitches, or tonal qualities and, perhaps, noise-qualities); (2) loudnesses, or auditory intensities; (3) auditory extensities. A fusion of loudness and voluminousness with predominating pitch-quality is a tone. A fusion of loudness and voluminousness with noise-quality is a noise. (Or, if the occurrence of specific noise-qualities is denied, a noise may be defined as a complex of tones without any one prolonged or emphasized pitch-quality.)

b. ATTEMPTED EXPLANATION OF ELEMENTAL AUDITORY EXPERIENCES

The main explanation of the specific nature of the auditory elements of consciousness is, once more, physical and physiological.

1. *The Physical Conditions of Auditory Sensation*

We shall find it convenient to consider the physical, and therefore secondary and remote, conditions of pitch and noise-quality, before regarding the more immediate physiological antecedents. The physical condition of the auditory consciousness in general may be described as oscillation of air-particles, producing rarefactions and condensations of the air. A rarefaction followed by a condensation is called an

atmospheric wave. (*a*) The consciousness of pitch is, in all probability, occasioned by a succession of simple and regular atmospheric waves. The experience of noise is probably due either to a momentary unperiodic vibration, or to a combination of air-waves of nearly identical length — for example, to the complex of air-waves which are set into vibration when one simultaneously strikes a great number of piano keys. Different qualities of pitch are found by experiment to correspond to the varying length of the atmospheric waves. The swifter the atmospheric vibrations, that is, the greater the number and the shorter the length of the air-waves in any second of time, the higher is the pitch-quality; and, on the other hand, the slower the vibrations, that is, the fewer and longer the air-waves in a second, the lower or deeper is the pitch-quality. This is the principle on which all stringed instruments are constructed. The shorter strings of the piano are struck to produce its higher notes; and the violinist's finger divides his string to obtain from the swifter air-vibrations, propagated by the motion of each half, a tone an octave higher than that produced by the slower vibration of the entire length. As, therefore, a definite number of ether-vibrations corresponds with each experience of color, so each consciousness of pitch has its air-vibration number: the consciousness of low c, for example (in what is called the small octave), is produced, through the excitation of nerve-endings and brain-cells, by one hundred and twenty-eight vibrations; and that of its octave, c′, is excited by exactly twice as many, or two hundred and fifty-six vibrations. (*b*) The amplitude of an atmospheric wave, that is, the length of the extreme excursion (one way or other) of each air-particle is the condition of our consciousness of sound-intensity; and the wave diffusion (the

number of waves of given length and amplitude) probably explains our consciousness of sound-extensity.

But these physical phenomena are conditions of the auditory consciousness only indirectly as they bring about physiological processes.

2. *The Physiological Conditions of Auditory Sensation*

Air-waves pass from the outer ear,[18] through a short tube, and strike upon a stretched membrane (the tympanic membrane) at the entrance to the middle ear. This membrane is thus thrown into vibration and transmits its motion to a series of three small bones, which serve to transform amplitude into strength of vibration. The foot of the 'stirrup,' or inmost of these bones, fits into an opening in the inner ear; and the inner ear is a complex of bony tubes, lined with membrane and filled with liquid, embedded in the temporal bone of the skull. Probably only one of the three main divisions, namely, the *cochlea*, of the inner ear has to do with sensational elements of sound. The cochlea contains a structure, the basilar membrane,[19] made up of fibres graded in length so as to correspond to vibrations of different periods; and the auditory nerve has its ending in certain cells supported by these fibres.

The process which conditions hearing is, according to the theory of Helmholtz, the following:[21] The tympanic membrane, set in motion by an air-wave, say of one hundred and twenty-eight vibrations per second, communicates this motion to the bones of the middle ear and thence to the liquid contained in the inner ear. The movement of this liquid excites those only of the fibres of the basilar membrane whose vibration number is exactly, or approxi-

mately, one hundred and twenty-eight. If several basilar membrane fibres are excited by a compound vibration, the complex consciousness of a clang, or chord, follows. The consciousness of noise is perhaps best explained as due to the excitation of basilar membrane fibres in which "one fibre does not vibrate more strongly than the rest." * This explanation covers not only cases in which the consciousness of noise is excited because "a considerable part of the basilar membrane is thrown into uniform vibration" by a complex of air-waves of closely similar vibration-number, but also those in which the consciousness of noise is due to an unperiodic stimulus which "lasts for an exceedingly brief time." For, in both cases, there is "no well-defined point of maximal stimulation."

It should be added that the air vibrations which produce very high and very loud sounds may be directly carried to the cochlea by the bony walls of the skull. Very high and very loud sounds are therefore audible to persons who have lost the organs of the middle ear. But however the cochlear process is stimulated, and whatever is its nature, it excites the auditory nerve terminals in the basilar membrane cells, and the excitation is conveyed to the auditory centres in the exterior temporal lobes of the brain.[7] As in the case of visual stimulation, such excitation always passes over into outgoing motor nerves, and bodily movements, especially head movements, result. Characteristic among these movements, in the case of the higher vertebrate animals, are adjustments of the outer ear such as we know so well in the dog and in the horse. Most human beings have lost the capacity for ear movements.

* C. S. Myers, "A Text-book of Experimental Psychology," pp. 55–56.

III. Elemental Consciousness of Smell (Olfactory Experiences)

While listening to the mower's whistling I am, it will be remembered, faintly conscious of the odor of freshly cut grass: that is, my sensational experience includes smelling as well as seeing and hearing. In purely descriptive technical terms, there seems little to be said about the elements of smell-experience. I can in truth discriminate many odors, which means that my smelling includes different sensational qualities and intensities; but nobody has succeeded in analyzing the experience into irreducible elemental qualities, fixed by definite names.[24] Complex smell-experiences are named, ordinarily, from objects to which they belong; or are known simply by the feeling which accompanies them, as pleasant or unpleasant.

Little is known of the external conditions of smell. The smell stimulus must be gaseous in form, and it affects end-organs lying in the membranous lining of the upper part of the nostrils.[24] The nostrils open into the pharynx; and thus the smell end-organs may be excited by way of the mouth cavity, and it is also true that particles may reach the mouth through the nostrils. The following section will call attention to one result of this close connection between smell and taste-organs. The cerebral centre for smell is in the median side of the temporal lobes,[7] and the excitation of this brain centre is normally followed by characteristic movements.

IV. Elemental Taste Experiences

We are familiar already with the psychologist's method of approaching every experience, — the analysis of it into

its ultimate elements. The method has now to be applied to the experiences which we know as tastes.

The ordinary individual, asked to name what he had 'tasted' at dinner, might answer that he had tasted beef-bouillon, roast duck, potato, onion, dressed celery, peach ice, and coffee. But the psychologist would conclude at once that some of these experiences were complex, made up of simpler elements. And the experimentalist would go farther: he would take means to isolate, so far as he could, the conditions of taste, so that other sense-elements should be shut out from consciousness. To this end he would select, if possible, as subject of the experiments, an anosmic person, that is, one without smell-sensations, or else he would close the subject's nostrils, so as to eliminate most of these smell-sensations; and he would certainly blindfold the subject, to prevent his seeing the articles which he tasted. These substances would be presented to him at an even temperature, and the solids would be finely minced so as to be indistinguishable in form. Judging by the results of actual experiments, in particular those of Professor G. T. W. Patrick, the results of such a test, as applied to our suggested *ménu*, would be the following: the blindfolded and anosmic subject would as likely as not suppose that he had tasted chicken broth, beef, potato, an unknown sweetish substance, another unknown material mixed with a thick, tasteless oil, a sweet unflavored substance and a slightly bitter liquid — perhaps a dilute solution of quinine. A normal person, also blindfolded, but without closed nostrils, would recognize the onion, the peach, the coffee, and often the olive oil; but would be likely to confuse the beef and the duck; whereas, if these were unsalted, the anosmic subject would fail to recognize them

even as meats. Certain substances, on the other hand, for instance, the different sorts of bread, of white, graham, and rye flours, would be better discriminated by the anosmic subject.

These results are easy of interpretation. What we know as tasting is a complex experience 'made up' of experiences of odor, of pressure, and of pain — not to speak of visual elements — in varying combination with a limited number of distinct experiences of taste. (1) The consciousness of odor is the significant factor in 'tasting' egg, fruit, wine, onion, chocolate, coffee, and tea. Tea and coffee are, indeed, undistinguished from quinine, when the odor-elements are excluded, and are differentiated from each other only by the slight astringency of the tea, that is, by the peculiar pressure-experience, the 'puckering,' which it incites. (2) The experience due to tasting nuts, vegetables, or grains forms a second class, for it consists, in large part, of pressure-sensations excited by stimulation of the tongue. It follows that because of his trained attention to degrees of roughness, smoothness, hardness, and softness, the anosmic person can distinguish better than the normal person, if both are blindfolded, breads made of different grains. (3) The experience of pungent taste, in the third place, is largely distinguished by sensational elements of pain and perhaps of heat. (4) And finally, in another kind of tasting, the important feature is visual, as is proved by the fact that the varieties of meats and of bread are so frequently undistinguished by the blindfolded observer.

But, though so-called tasting is thus proved to contain the sense-consciousness of smell, of pressure, and of color, it is characterized also by certain distinctive elemental taste-

experiences. According to experimental introspection, there are four taste-qualities: sweet, salt, sour, and bitter, besides an indefinite number of sense-intensities. Some psychologists believe there are also taste-extensities, that in eating roast beef, for example, one has a consciousness of bigness, absent from the consciousness of lemon. It should be noted that the taste-qualities, the experiences of salt, sweet, sour, and bitter, do not introspectively order themselves either (like the color-qualities) in an articulated series, or (like the auditory qualities) in a periodic series. Like the color-qualities, however, they are capable of contrast effects — for example, lemonade is very sour after ice-cream.*

Concerning the external stimulus of taste, little can be said. Chemically distinct substances may even arouse the same sensational quality; for example, both sugar and acetate of lead give a 'sweet' taste. The stimulus must, however, be in liquid form; for, if the top of the tongue be carefully dried, a grain of sugar or of quinine placed upon it will not be tasted till the tongue becomes moist again. The physiological end-organs of taste are minute structures contained in the mucous membrane of mouth and of throat, especially in the papillæ (or little hillocks) of the tongue.[25] The cerebral centres are probably near the smell-centres,[7] and the characteristic motor accompaniments are movements of the tongue.

V. Elemental Pressure Experiences

a. Pressure experiences through external excitation

I am, it will be remembered, not only listening to the mower's whistling, looking down at my desk and scenting the

* For experiment, cf. Titchener, § 26; Myers, *op. cit.*, p. 365, Exp. 79.

new-mown hay, but I am conscious of grasping my pen. My sensational consciousness certainly includes the experience of tactual quality, of tactual intensity, and of tactual bigness. Everybody admits that there are indefinitely many pressure intensities and extensities, and it has been thought that as there are many qualities of color and of pitch, so also there are many pressure-qualities — the experiences, for example, of contact, of hardness and softness, of roughness and smoothness, and of wetness. On close inspection these turn out, however, to be complex (though relatively simple) experiences in which pressure-quality is the essential component. Thus, the consciousness of contact is that of faint pressure; the experience of smoothness seems to be that of uninterrupted pressure; and the alleged sensation of hardness is a complex whose chief constituent is the sensation of intense pressure due to excitation of end-organs in the joints. The experience of wetness seems, at first thought, unambiguously elemental and unanalyzable, but it is really a complex of warmth or cold consciousness combined with the experience of smoothness and, often, with a visual image of the liquid stimulus. This is proved by the fact that one often cannot tell the difference between dry or wet hotness or coldness. One does not know, for example, by the mere 'feeling' of them, whether one's feet are wet or merely cold; and whether a hot compress is dry or wet.

The physical stimulus of our pressure-sensations is mechanical. As it affects the skin, it must produce an actual deformation; and we therefore feel the surface pressure of a large object only at its terminal lines: for example, if the hand is plunged in water, the pressure is felt only where the wrist emerges. But contact with the skin does not always result

in pressure-sensation. For, contrary to our usual view, the skin is not, as a whole, sensitive to pressure stimuli.[26] If I am blindfolded, and a small blunted point of cork or wood is drawn gently over the surface of any part of my body, for example, of my arm, I shall feel it as touching my skin at certain points only — usually at the roots of the hairs of the skin, but in hairless spots also.* This shows that certain minute structures embedded in the skin are end-organs of pressure; and it has been found that these organs are of two sorts: (1) hair-cells and (2) more developed structures known as Meissner's corpuscles.[27]

b. EXPERIENCES, MAINLY OF PRESSURE, THROUGH INTERNAL EXCITATION

End-organs of pressure are found not only in the skin but on the joint-surfaces, and perhaps embedded in the muscles.[28] Pressure-sensations through bending the joints are, indeed, strong and readily discriminated. One may readily convince oneself of their occurrence if one lower a weight by a string attached to the forefinger till it strikes floor or table. At the moment when it strikes, one experiences a sensation, evidently of pressure, which can only be due to the backward movement of the lower upon the upper joint-surface of the arm.†

Besides these admitted pressure-sensations, there are several other sensational experiences due also to internal excitation, of which, probably, or possibly, pressure-sensations are the main constituent. These internally excited sensations are (1) the alleged sensation of strain. This is occasioned by

* For experiments, cf. Sanford, 21; Seashore, p. 88; Titchener, § 21.

† For experiments, cf. Sanford, 39, 40; Myers, *op. cit.*, p. 352, Exp. 42.

lifting weights and by assuming rigid bodily attitudes. A simple way to excite it, for example, is to clench the hand firmly, but in such wise that its surfaces do not touch each other. No external pressure can then be felt, but the resulting experience is said to include, not only a weak sensation of pressure from the moving of the surfaces of the finger-joints on each other, but also a new experience, that of strain, regarded by some as elemental, by others as a complex consciousness of pressure and of pain. It is specifically due to excitation of the tendons.

(2) A second alleged sensation from internal excitation is that of dizziness, due to excitation of the semicircular canals.[18] What is known as dizziness is probably either a complex experience or a mere pressure-sensation. It includes, or is closely accompanied by, moving visual images of objects and figures rotating slowly, or slipping and swimming about in one's field of vision. It is furthermore sometimes, though by no means invariably, accompanied by the feeling of nausea. For the rest, it seems to consist of a pressure-sensation 'located' within the head.

(3) So-called 'organic' sensations are more evidently complex experiences. These include (*a*) the so-called sensations from excitation of the alimentary canal, hunger, thirst, nausea, and (*b*) the so-called circulatory and respiratory sensations. Carefully analyzed, each of these, in the writer's opinion, will disclose itself as complex, and not, in any sense, elemental. Thirst, for example, is a complex of pressure and warmth sensations; it is due to a drying of the mucous membrane of the mouth-cavity, which becomes a poorer conductor of warmth. The chief element in hunger, also, is probably that of pressure, brought about by some chemical

action on the lining of the stomach. What is called nausea is a still more complex experience, but its essential ingredient is pressure, due to the antiperistaltic reflexes of the œsophagus.

The alleged respiratory sensations, such as breathlessness, suffocation, and stuffiness, are evidently experiences including several elements: first, and most important, pressure-sensations; often also, sensations of strain, as when one holds one's breath; and, finally, for most people, a visual image of the part of the body — chest or throat — which is affected. The 'circulatory' sensations are either, like itching and feverishness, compounds of warmth and pressure-sensations, or else they are the massive pressure-sensations from difficult breathing or from abnormally strong heart-beat.

These 'organic' experiences, though seldom attended to, are nevertheless of great significance, for they may form part of our most complex ideas and moods. Emotions are, as we shall see, especially rich in 'organic' sensations. When, for example, I am afraid, my heart flutters; when I am grieved, my throat is choked; when I am perplexed, there is a weight on my chest. And though I concern myself little with these seemingly unimportant experiences, they none the less effectively color my moods.*

The cerebral condition of pressure-sensation, whether from external or from internal excitation, is, in the view of most physiologists, excitation of the region about the fissure of Rolando.[7] From this centre, motor nerves spread outward and downward to all muscles of the body (and limbs) and pressure-sensations are, therefore, normally accompanied and followed by bodily movements of all varieties.

* Cf. Chapter XII., pp. 200 ff.

VI. Elemental Pain Experience

The pin point which, gently applied, excites first a sensational experience of pressure, may bring about, an instant later, a very different sort of consciousness, that of pain. This is evidently distinct from all other sensation-elements through stimulation of the skin, and no good observer confuses the pressure-consciousness with the pain due to a heavy weight. But it is perhaps less easy to realize that the consciousness of pain is quite distinct from that of unpleasantness. It is unpleasant, for example, not painful, to discover that one has given to the deck steward twice too large a fee; and the sight of the rose-pink gown of the lady with auburn hair is unpleasant and not painful. The confusion is mainly due to the fact that the sensational experience of pain is always accompanied by unpleasantness. In the case of apparent exceptions, as of the slight pain which we intentionally inflict upon ourselves to see how it will feel, the pleasantness is probably that of the novelty, not of the pain. But it does not follow from the fact that pains are always unpleasant, that unpleasantnesses are always painful, still less that the two are identical. Our first conclusion, therefore, is that painfulness, an experience which follows upon the burning, bruising, or cutting of the skin and upon certain internal changes, is different from unpleasantness or disagreeableness.

Some psychologists believe that there is one quality of pain, as of pressure, and that the experiences which we differentiate as acute, dull, stinging, gnawing pains are qualitatively the same, though differing in intensity, perhaps in extensity or bigness, and in steadiness. Professor Ebbinghaus, on the other hand, teaches that there are two pain-qualities, the

consciousness of acute (*stechend*) and of dull (*dumpf*) pain.*

When we ask for the physical condition of pain we are met by an unusual relation. For every other form of sense-quality we have found a definite, even if vaguely characterized, physical stimulation. In the case of pain, however, it is obvious at once that no specific form of energy occasions it, but that the same stimuli which excite sensations of pressure, warmth, and cold, and possibly even those which excite visual and auditory sensations, may bring about painfulness also, if only they are very intense, long-continued, or often repeated. Hard or long-continued pressure, intense heat and cold, and possibly blinding lights and crashing sounds may be called painful; whereas excessive sweetness and heavy fragrance are merely unpleasant.

It used to be held that just as, physically, pain seems due to high degrees of mechanical and thermal stimulus, so, physiologically, it must be referred to excessive functioning of pressure (perhaps, also, of warmth and cold) end-organs. But this is disproved by the fact that certain anæsthetics destroy the sensitiveness of the skin to pain stimuli, whereas other drugs make the skin insensitive to pressure. If the oculist treats one's eye with cocaine, one is distinctly conscious of the contact of his instruments, but feels no pain; a similar use of saponin annihilates pressure-sensations and leaves pain. Furthermore, 'pain-spots' have been found on various areas of the skin † — whereas, from other parts, large areas of the cheeks, for example, they are lacking. When these spots are excited by any stimulus, mechanical or thermal,

* "Grundzüge der Psychologie," 1902, I., § 36.

† For experiments, cf. Sanford, *32 a*; Seashore, p. 85; Titchener, § 22.

electrical or chemical, consciousness of pain without pressure results. Either, then, the skin must contain special end-organs of pain [27] — as most physiologists now hold — or, as Goldscheider the discoverer of pain-spots suggests, pain is physiologically due not to the activity of any nerve end-organs in the skin but to a transformation, in the gray substance of the spinal cord, of nerve-excitations conveyed from especially exposed pressure-organs.

Pain-sensation, like pressure-sensation, may be excited within the body; yet the abdominal organs are, in the main, insensitive to mechanical and thermal stimulation, "may be handled, pinched, or cauterized," as Foster says, "without pain or indeed any sensation being felt." The consciousness of pain is, however, conditioned by excitation of the external peritoneum and the lining of the abdomen, and by pressure against the diaphragm. No special cerebral centre of pain is known. Movements of avoidance and withdrawal accompany the experience.

VII. Elemental Experiences of Temperature

Experiences of warmth, cold, and hotness are grouped together because of apparent similarity. Nobody questions that the consciousness of warmth and that of cold are elemental experiences, further unanalyzable and radically different from other sorts of sensational consciousness — from the consciousness of pain or of pressure, for example. It is less easy to classify, introspectively, the sensational experience of hotness. Clearly, it is not, as is often assumed, merely an intenser consciousness of warmth. But whether it is a third elemental experience or a complex of warmth and

pain consciousness is harder to determine. Evidently many intensities of warmth, cold, and hotness are distinguishable.

No direct relation can be discovered between the degree of the thermometer and the cold, or warmth, or heat sensation. In other words, we are not always warm when the thermometer registers a high degree, and cold when it stands at a low figure. On the contrary, the room which seems warm to me as I enter it after a brisk walk seems chilly an hour later, though the height of the mercury is unchanged; and if I warm one hand and cool another, the same lukewarm water will seem cool to the first and warm to the second.* These experiences, and others like them, seem clearly to show that the surface sensation of warmth or of cold or of heat is not determined by the actual temperature of an organ, but by the relation between the temperature of an organ and that of its environment. When the physical temperature of the organ exceeds that of its environment, the sensation is of cold; and, on the other hand, when the temperature falls below that of the environment, one has the experience of warmth, changing — as we have seen — at a certain point to that of heat.

The thermal stimulation of the skin is occasioned in two ways: by radiation of heat from outer objects and by muscular activity, which means loss of energy in the form of heat. I may grow warm, for example, by basking in the sun, or by swinging dumb-bells. Not the skin as a whole, however, but certain definite end-organs are affected. This is shown by applying warm and cold surfaces of very small extent to different parts of the body. A bit of metal may

* For experiments, cf. Sanford, 16; Titchener, p. 53, end.

be moved along for some little distance on the surface of the body, without rousing the experience of cold, which, however, will suddenly occur as the stimulus reaches one of the 'cold spots' over an end-organ of cold.. There are fewer of these than of pressure or pain spots, and the warmth-spots are least frequent of all and most scattered.* The cornea of the eye is sensitive to cold, but not to pressure; and both warmth and cold spots are found within the mouth-cavity where no pain-spots have been discovered. Most of the inner surfaces of the body, however, seem to lack warmth and cold end-organs. Even the mucous lining of the mouth-cavity is less sensitive than the outer skin, so that one may drink, with perfect comfort, coffee which seems unbearably hot if it touches the lip.[27]

The specific end-organs of warmth and of cold have not been definitely determined. But experiment seems to show quite conclusively that I feel hotness when end-organs for cold and for warmth are simultaneously excited. No special cerebral centre is known, and no peculiarly characteristic movements follow.

With this consideration of our sensational consciousness of warmth and of cold we have come to the end of our merely structural analysis† of perception and imagination into sensational elements. Two points must be touched upon, in conclusion. It must be noted in the first place that a sensational quality always occurs in close combination with an intensity and often with an extensity. One is, for example, simultaneously conscious of bigness, brightness, and blueness as one looks at the summer sky. The fusion of quality

* For experiments, cf. Sanford, 13; Seashore, p. 83; Titchener, § 19.

† Cf. above, p. 14.

with intensity (and with bigness) is called sensation. Some psychologists treat the sensation as unit of perception and describe the qualities, — of color, pitch, and the like, — the intensities — brightnesses, loudnesses, and so on — and the extensities, not as sensational elements but as attributes of sensation.[29]

The succeeding chapter will speak further of fusions. In the meantime, a word must be said of the physiological conditions of perception and imagination. In ordinary perception, some sensational elements are excited through stimulation of end-organs (that is, 'peripherally' excited), whereas all sensational elements in imagination are conditioned by brain excitation ('centrally' excited). So, when I imagine the Theatre of Dionysos, at Athens, only my occipital lobe is excited, but when I look out at Symphony Hall, my retina is excited as well; when I imagine the flute-like song of the hermit thrush, only my temporal lobe is excited; but when I hear the telephone bell ring, the inner organs of my cochlea are in vibration.

It should be noted that this account of the physiological condition of perception does not hold in the case of the hallucination. The hallucination, like the illusion, is a perception which does not directly correspond with any external object.* Both hallucination and illusion are perception — that is, involuntary and predominantly sensational experience, reflectively attributed to other people, of objects regarded as impersonal and external. But whereas the illusion includes peripherally excited elements, a hallucination contains only centrally excited sense-elements. The dream or delirium

* On Illusions, cf. Chapter IV., pp. 72 ff., and Appendix, Section IV., (1). On Hallucinations, cf. Appendix, Section XVI.

image of a ghost, for example, is a hallucination, because it is not excited by any external object, whereas the traditional confusion of window-curtain with ghost is an illusion. Evidently, therefore, the hallucination, though a form of perception, is not distinguishable, by physiological condition, from imagination.

There is perhaps a danger lest this long, though at every point abbreviated, study of ourselves as sensationally conscious may retard our apprehension of the essential nature of our perceiving and imagining. We run the risk of not seeing the woods for the trees — of missing the figure for the details. For this reason, we shall here again summarize the basal conclusions of the two preceding chapters without special reference to the structural analysis undertaken in this chapter. According to these conclusions, perception, like imagination, is the complex and predominantly sensational consciousness of a particularized impersonal object in relation to myself. But the perceiving self differs from the imagining self (1) in that it knows itself to be involuntarily conscious; (2) in that it may later regard itself as having shared its experience with unparticularized other selves; and (3) in that it regards its impersonal object as external, that is, independent of itself. The imagining self, on the other hand, to some degree controls its experience, which, accordingly, is regarded as more 'private' and as normally unshared; and its objects are not externalized. To recur to our initial example: I am sensationally conscious both of the desk which I see and of the Tyrolese landscape which I imagine; but I realize that I am inevitably conscious of an external desk, whereas I may direct my attention away from my mountain-

image; and (as I later reflect), I share my consciousness of the desk with the housemaid who dusts it, whereas she does not know that I am imagining snowy mountains any more than I know what enthralling image brings the smile to her lips and diverts her attention from the dustiest corner of the desk.

CHAPTER IV

PERCEPTION AND IMAGINATION AS COMBINATION AND DIFFERENTIATION OF ELEMENTS

A. Perception and Imagination as Fusion and Assimilation

It has appeared, in an earlier chapter, that perception and imagination are analyzable into irreducible sensational elements. It is necessary now to emphasize the fact that in ordinary perceiving and imagining one is not aware of these elemental constituents of consciousness, the different qualities, intensities, and extensities. Such analysis is the reflective work of the psychologist, not the immediate experience of the perceiving self. Thus, one's immediate consciousness of a tone is an undistinguished, unitary consciousness, and is *not* an awareness of a pitch, an intensity and a timbre, though tone-consciousness is analyzable, in after reflection, into these factors, and though it is due to distinguishable physical and physiological conditions. Similarly, the immediate consciousness of a tone sounded simultaneously with its octave is rarely an experience of two tones as distinguishable from each other, though united; indeed, it is often difficult to differentiate these tones even by an effort of attention.

The unity of an experience, in this merely negative sense of the absence of differentiation, is often known as fusion.[1] *

* These Arabic numerals, throughout this chapter, refer to numbered divisions (§§) of the Appendix, Section IV.

By fusion is meant, therefore, the absence of discrimination in an experience which is nevertheless (1) due to several end-organ excitations, and therefore (2) analyzable in after-reflection into distinguishable elements. The combination, for example, of the C and G, the loudness, and the volume of a given chord, is a case of fusion; and so is the combination of the experiences of redness, yellowness, colorless light, brightness, bigness, odor, coolness, pressure through joint and skin stimulation, and of pleasure, from an apple which one is rolling about in one's hand. Each one of the combined or fused elements must be directly excited by the stimulation of an end-organ, and not merely indirectly excited through the stimulation, by connecting fibres, of the corresponding brain-centres.

Fusions differ from each other only in the degree of closeness with which the diverse elements are connected, and this is tested by the difficulty of the analysis in different cases. The closest fusions which we know are those of the different elements invariably connected in a sensation, the quality, intensity, and extensity.* Almost, if not quite, as close as this fusion is that of a color with colorless light: this is the closest combination which we know of different qualities. Other examples are the fusion of taste and smell in many so-called tastes, of the experiences of pressure and of temperature in what is named touch, and of the consciousness of extensity and pressure in the experience of smoothness or of roughness.

Assimilation is the negative unity, that is, absence of discrimination, in an experience reflectively analyzable into simpler experiences of which one (at least) is a recurring

* Cf. Chapter III., p. 59.

consciousness, cerebrally excited. As I look, for example, at a polished marble or at a velvet cloak, I get (besides the experiences of color and form, light and shade) a distinct impression of its texture, even though I do not touch it. Such a texture-feeling is, of course, cerebrally excited (for the end-organs in my fingers are not stimulated), and I explain it as due to my past simultaneous experience of similar light-effects with feeling of roughness or of smoothness. Every adult perception is an assimilation as well as a fusion of simpler experiences. I perceive the automobile, — that is, I am conscious of its color, form, and motion, — though the only experience peripherally excited is the auditory consciousness of puffing and ringing. And I perceive the orange which the child in the street-car seat behind me is eating, — I am conscious of its color, and roundness, and rough, cool 'feel,' — though only my olfactory end-organs are excited. The reason in both cases is that I have often before received simultaneously the different sorts of impression. It follows, of course, that every perception is the result not only of present stimulation but of past experience: that a man perceives more than a child, and a child than a savage. The baby, for example, burns his hand because his visual perception of flame does not include the assimilated consciousness of heat; and the West Indian negro carries the wheelbarrow on his head because his perception of it does not include the assimilated consciousness of its being wheeled.*

* The term 'assimilation' is used, in this section, as equivalent to 'simultaneous association.' For the distinction often made between these expressions, see Appendix, Section VII. (§ 1). For discussion of Successive Association, see Chapter VII.

B. Perception and Imagination as Realized Combination and Differentiation

Perception, like imagination, is sensational consciousness, and is, thus, a unity in the negative sense that the perceiver fails to differentiate elements of consciousness which are distinguishable to after-reflection. But both perception and imagination include also a certain consciousness, very often vague and unemphasized, of the connectedness, the harmony, the 'together-ness' (to borrow a term from Dickens), and at the same time of the distinctness, of sense-elements. These experiences of unity and of distinctness may be called forms of elemental relational consciousness. They are more prominent in recognition, in thought, and in will than in perception and imagination; and the detailed discussion of them will consequently be postponed to later chapters.* Yet the consciousness of combination, or together-ness, and of distinctness, or apartness, form a part of certain experiences so predominantly sensational that they are best treated as forms of perception and imagination. Three such experiences form the topic of this chapter, but only one of these, the consciousness of space, will be considered in any detail.

I. The Consciousness of Space

a. The Elements of the Space Consciousness

My consciousness of space is analyzable into elements of three sorts: first and foremost, the sensational consciousness, visual or tactual, of mere extensity or bigness; second, certain relational experiences of distinctness and unification; third, the sensational experiences, mainly tactual, due to move-

* Cf. Chapter VIII., pp. 127 ff.

ment of my limbs, or eyes, or body. The elementary consciousness of extensity or bigness is fused with our visual consciousness of color and colorless light and with our tactual consciousness of pressure. That is to say, we are conscious both of colors and of pressures as extended.[2] The consciousness of this blue or of this heavy object as more or less extended is, however, an indefinitely less complex experience than that which we call the consciousness of space. Such a consciousness of 'mere extensity' — a constituent, we may suppose, of the experience of the new-born child when his retina or hand is stimulated — is not a consciousness of precise size, of definite form, or of exact position; it is not even a consciousness of surface or of depth; it is a vague, unrelated, elemental consciousness, to be compared, perhaps, with such spatial consciousness as a grown person has when opening his eyes in a dark room. Yet the elemental consciousness of extensity is the centre and core of the complex experiences of spatial form and position.

b. The Consciousness of Distance, or Apartness

The simplest form of my complex spatial consciousness is the experience, visual and tactual, of apartness or distance.[3] I see, for example, that my ink-bottle stands apart from my paper-weight; and I am conscious, with closed eyes, that the collar and the cuff which chafe me are apart from each other. Some psychologists have regarded the experience of apartness as an elemental consciousness incapable of further analysis, but careful introspection will disclose that it is made up of a consciousness of the two-ness, or duality (of sense objects or qualities) fused with a consciousness of intervening extensity. Thus, when I perceive that a red dot lies apart from

a blue dot, I am simultaneously conscious (1) of the redness and the blueness, (2) of their distinctness, and (3) of a certain extensity (that of a portion of the sheet on which the dots are written) as (4) condition of the distinctness of the dots. I am conscious, in other words, of extensity intervening between two colors. And when, with eyes closed, I am conscious that a warm object lies, at some distance from a cold object, on my arm, I experience the cold and the warmth, the distinctness, or two-ness, of them, and, once more, an intervening extensity. The nature and conditions of this complex experience of apartness must be studied in somewhat more detail. To begin with the experience of two-ness: light-stimuli falling about .004 to .006 millimetre apart on the retina are realized as two.[4] With cutaneous stimulation the case is different. Experiment has shown that the consciousness of two-ness does not follow on a two-fold stimulation of closely contiguous spots on all parts of the skin. If two points be placed upon any surface of the skin, some distance may be found at which they will excite the consciousness, not of two pressures, but of a single one. This distance varies in different localities, and is smaller on the mobile organs: about one millimetre, for example, on the tongue, two millimetres on the finger-tips, and sixty-five millimetres on the middle of the back. The areas within which two points are felt as one are called 'sensory circles,' and it is important to notice that they are relatively, not absolutely, defined. That is to say, the skin is not mapped off into definite portions, such that a point near the edge of one portion is felt as distinct from a very near point which, however, is over the border of the given 'sensory circle.' On the contrary, the distance between any two points felt as one

must be virtually the same in neighboring regions of the skin.*

The condition of the consciousness of two-ness is evidently, therefore, double excitation of skin and retina (providing always that the stimulating objects be at sufficient objective distance from each other). The consciousness of an extensity as separating or intervening between these distinct stimuli cannot be so simply explained. It will be convenient to consider first the cutaneous and next the visual intervening extensity. (1) There is no objective, or physical, stimulus, of the experience of an extensity 'between' two pressures: two separated points touch my skin, and the intervening surface is not stimulated. Yet I am conscious of intervening extensity. The explanation is probably the following: When two points touch my skin, I not only perceive the pressure and the two-ness, but I imagine the extended pressure of an object stimulating the intervening extensity. This imagination of an intervening extensity is probably to be explained by the fact that the two pressure organs have most often been excited not by separate points, but by a single object exciting both at once.† On the physiological side, the explanation probably is the following: Nerve excitation spreads from the place of excitation to contiguous nerve-tracts, especially to those which have been frequently excited together. Therefore, the cerebral excitation due to the stimulation of separated points of the skin tends to rouse the cerebral excitation corresponding to the frequent stimulation of the intervening area of the skin.

(2) The case of the visual consciousness of intervening

* For experiment, cf. Sanford, 7; Seashore, pp. 74 ff.; Titchener, § 49; Myers, *op. cit.*, Exps. 103–104.

† Cf. above, p. 65.

extensity appears more simple. The extensity which is realized as separating the red and the blue dots is that of the white background; and in retinal terms, end-organs or substances, between those stimulated by the red and blue light are excited by white light. The problem, here, is to explain why — when the whole retina is stimulated by the white light from the paper background — just this particular part of the stimulating background should be realized as in especial relation to the red and the blue dots; in other words, why this particular part of the total consciousness of extended whiteness should be combined with the consciousness of distinct red and blue. Again the explanation may be given in terms of habitual experience. We are accustomed to the sight of objects with edges in accentuated color; and we see the 'middle ground' of these objects as extensity intervening between the two borders. We therefore gain the habit of regarding that part of a background which lies between lines, or even between dots, rather than any other part of the background, as related to these lines or dots.

c. The Consciousness of Form

1. Of Two-dimensional Form

My spatial consciousness is more than a mere awareness of extensity and apartness. I am at this moment, for example, conscious not only that my letter-paper has bigness and lies apart from my penwiper, but also that the paper is oblong and the penwiper round; and I am furthermore conscious that the paper is flat and the ink-bottle cubical. I am conscious, in other words, of two-dimensional and of three-dimensional form.

The consciousness of form differs from other sorts of spatial

consciousness in that it explicitly includes the experience of unification of points. 'The point' is 'the apart'; the form is a unification of points. The consciousness of two-dimensional form is almost certainly due, in part, to the movements made by eyeballs or hand in outlining or tracing an object; and probably, also, includes a vague consciousness of these outlining movements. Such movements are instinctively performed as one perceives an object.* When I am visually conscious of my paper as rectangular and then of my pen wiper as round, my eyeballs make two series of movements, characteristically and markedly differing from each other. If with closed eyes I am tactually conscious of these objects, my finger makes (or starts to make) in the one case a broken movement, in the other a sweeping movement, as it follows their outlines. Such outlining movements, whether of eye or of hand, may be more or less completely executed. The baby, who is finding out that the plate is round, continues the outlining, exploring movement of his finger all about its circumference. The grown person may make merely the first part of the movement; or he may make a slight and unnoticed movement; or, finally, he may have merely a tendency to movement, that is, an excitation of motor neurones, without any actual muscular contraction. But without doubt these movements (of eyeballs, hands, and tongue) play an important part in the development of the space-consciousness. The unattended-to experience of such movements (whether performed, and thus perceived, or merely imagined) probably constitutes a part of my complex consciousness of two-dimensional, or surface,

* For experiment, cf. L. Witmer, "Analytic Psychology," Exp. XVII., pp. 61 ff.

forms. The experience of surface-form may, thus, be described as a fusion of (1) the sensational experiences of extensity and of sense quality due to excitation of end-organs by stimulating object; (2) the relational experiences of distinctness and of unification; and (3) the experiences, also sensational, due to the instinctive movements of the eyeballs and hand.

A study of geometrical illusions [5] testifies indirectly to the importance, in our consciousness of form and direction, of the unattended-to consciousness of pressure due to eye movements. Illusions due to overestimation of small angles furnish a good example. The straight line, *a–b*, for instance, seems to run upward slightly from each end toward *c*, and the parallel lines *fg* and *hi* seem to diverge in the middle of the figure. This is presumably because the smaller angles, *acd*, *bce*, *fkl*, *hmn*, and the others, are overestimated; and this overestimation seems to be due to an attraction of the eye, as it follows the horizontal line inward toward the oblique lines. An inattentive consciousness of these movements seems to be part of a consciousness of form.

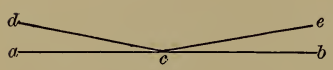


FIG. 3.

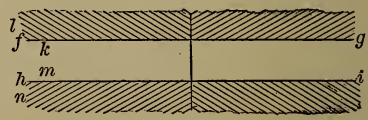


FIG. 4.
A variation by Hering of the Zöllner figure. (From Sanford, after Ladd.)

2. The Consciousness of Three-dimensional Form

The consciousness of three-dimensional or depth form has still to be discussed.[6] I am conscious not only of rectilinear and circular figures, but of cubical and spherical forms. Our present problem concerns the nature and the conditions

of this experience of depth. Some psychologists hold that it is an elementary experience, differing from the consciousness of surface-extensity somewhat as the consciousness of red differs from that of green. The more usual and, in the view of the writer, the truer opinion is the following: The consciousness of depth-form is not an elementary and unanalyzable experience; rather, it is a consciousness of two-dimensional form fused with a very complex but very vague consciousness of the bodily movements necessary for apprehension of the object. These movements are either movements of the body-as-a-whole, or (in the case of such three-dimensional objects as are within grasp) movements of arm and hand outward from the body. Thus, the consciousness of the three-dimensional form of a house includes a consciousness of my body moving toward it and around it; and the consciousness of the depth-form, the specifically cylindrical character, of a barrel probably includes a dim consciousness of the movements by which I explore its form, as outward from my body. The notable feature of the consciousness of solid or depth-form is thus *not* the occurrence or consciousness of bodily movements, — for this belongs also to the experience of surface-form, — but the realized character of these movements as either motions of the body-as-a-whole or as movements of one of the limbs from or toward the rest of the body.

It is important to realize that this consciousness of the body, which is so inherent a part of the consciousness of depth, is not instinctive but, rather, very gradually developed. I, grown-up person, feel — let us say — the pressure of one hand which I lay upon the other. The little baby may make a precisely similar movement of his hand and may gain a pre-

cisely similar touch consciousness. But he has not yet consciousness of his hand or of his body; that is to say, he does not connect the visual consciousness (the 'look') with the tactual consciousness (the 'feel') of his hand at rest; nor does he connect the tactual consciousness, due to excitation of joint and muscle, of his moving hand with the visual appearance of it. Indeed he does not realize the identity of hand at rest with moving hand; and still less is he conscious of any connection between hand, foot, and head. Not till the baby becomes conscious of all these experiences as related, and as relatively permanent, or reproducible, has he a consciousness of his hand; and in similar fashion he must gain the consciousness of other parts of the body, and of the body as a unified whole.

An important condition of the depth consciousness is the occurrence of right and left eye images differing slightly. The experience of closing first one eye, then the other, when looking directly at a solid object, will convince every one that the right 'sees' slightly more to the right of a given object, the left eye rather more to the left of the object. The facts of stereoscopy [7] prove that the simultaneous occurrence of such images is followed by the depth consciousness; for in looking through a stereoscope with eyes unmoving and parallel, pictures drawn separately for right and for left eye fall upon the two retinæ; and I see the pictured object as single and solid.* The occurrence of right and left images is not, however, an essential or invariable condition of the consciousness of tridimensional form, for experiment shows that, with one eye closed, I may perceive depth. In this case a muscular change in the accommodation, and thus in the

* For experiments, cf. Sanford, 212 ff.; Seashore, p. 53; Titchener, § 42.

refractiveness, of the eye may condition the depth experience; or some visual character, perhaps the distribution of shadow on the object, may suggest it.*

d. Localization: The Consciousness of Position

My spatial consciousness includes, finally, the consciousness of position. I am conscious not only that the paper is oblong and the ink-bottle cubical; but also that the ink-bottle lies behind the paper and to the right of the letter-scale. I am conscious also that the date of my letter is written above the signature; I am conscious that the palm of my hand is touched near the thumb by a heated object, and touched near the little finger by a cold object; finally, I am perhaps conscious that a piano is being played above me.

It is evident that cases of localization fall into two classes: of three-dimensional and two-dimensional localization, as we name them. The experience of the horizon or of the stars or of the outgoing ship as far away from me, and the experience of the ink-bottle as behind the paper, or of the desk as beyond the chair, are cases of three-dimensional localization. Experiences of the signature as below the date, or of the cold object as inward from the warm object, are instances of the consciousness of two-dimensional position. Localization of either sort differs from the consciousness of form, in that it emphasizes apartness rather than unification. Yet localization, the consciousness of position, is more than mere consciousness of apartness, for one is sometimes conscious of objects as apart without being conscious of their position. One is sometimes conscious, for example, of the spatial distinctness of two stimulated points of the skin without

* Cf. below, pp. 77 ff.

being able to designate either one as above or below, right or left, of the other. In truth, the consciousness of position includes, besides the bare realization of apartness, a specific consciousness, emphasized or unemphasized, of the body or of parts of the body. Thus, 'up' means 'near the head,' and conversely, 'down' means 'near the feet.' 'Right' means 'toward the more readily moving hand.' 'Out' and 'in,' 'in front' and 'behind,' are terms used with reference to the body as a whole in its relation to the field of vision.

The difference between the two sorts of localization has been suggested in the last paragraph. Three-dimensional localization — the consciousness that the mountain is far away, that the sound is behind me — is a consciousness of the apartness of an object from my body, and includes the consciousness of a movement imagined, initiated, or completed, of my whole body (or of a limb 'outward' from my whole body). Thus, the consciousness that the sky is over me includes a vague consciousness of my body floating upward, and the consciousness that the cake plate is in front of me includes the movement, or tendency to movement, of my arm toward the cake plate. In its developed form, three-dimensional localization involves a consciousness of three-dimensional space, an image gradually built up by the imagined addition of distance to distance, in all directions, from my body. Two-dimensional localization, the consciousness, for example, that the red stripe of the plaid is above the blue one, is conditioned by movement (complete or incomplete, imagined or perceived) of eye or of hand; but this movement is not an outward movement, and the consciousness of body-as-a-whole and of space-as-a-whole is lacking.

Three-dimensional localization in space — the conscious-

ness of objects as near or far from my body, as in front or behind, to right or to left of me — is of great biological significance. An animal able to react promptly and accurately to the sight, sound, or touch which reveals the presence of dangerous foe, of friend, or of mate is evidently favored in the struggle for existence. It follows that the localizing reactions, and the consciousness of them, must have been advanced by the extinction of poor localizers and by the preservation and propagation of good ones.

Visual localization is conditioned by muscular changes, chiefly of two kinds. When (within certain limits) an object is moved nearer or farther from the eyes, there is first a change in 'accommodation,' [8] that is, in the contraction of the ciliary muscle, such that the crystalline lens of the eye either bulges farther forward or is more flattened, thus becoming more or less refractive as the object is nearer or farther; there is, second, a change in the convergence of the two eyes such that the angle of convergence is more or less acute according as the object is farther or nearer.[9] As I look, for example, from the sail on the horizon to the rosebush at my window-sill, my eyes converge.

Other conditions of the consciousness of visual distance are, first, the occurrence of differing retinal images,* and second, a number of so-called 'signs' of distance, notably: (1) the distribution of shadows, (2) the apparent interference of intervening objects, and (3) mistiness of the atmosphere. The significance of these factors may be shown in many ways. Thus, a mask, hollow side to the observer, if so placed that

* Cf. p. 75, above; and note that changes in accommodation and convergence may condition consciousness of the depth-form as well as of the position of an object in space.

no shadows are cast inside it, will seldom look concave; the arch in the design here outlined seems to lie behind the pillar; and, since far-away objects appear hazy, hills and trees and houses look farther away on a misty day, while the horizon line seems almost to strike one in the face on a very clear day. That is, indeed, a reason why painters love foggy days and misty landscapes more than the high lights and brutal frankness of phenomenally clear atmospheres. In no one of these cases is the consciousness of shadows, of intervening objects, or of haziness a constituent of the experience of depth. Rather, these experiences have so often accompanied the depth consciousness that they at once excite, or suggest, it.

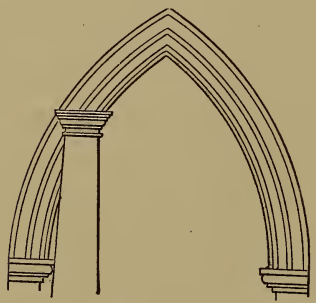


FIG. 5. — (From Sanford, "Experimental Psychology," p. 205.)

Auditory localization has next to be considered — the experience, for example, that a mosquito is buzzing behind me or that a street-car is approaching from the right. Such localization may be described as consciousness of the position of a sounding object as above or below, before or behind, to right or to left, of my body: it includes a vague consciousness of a more or less incomplete movement toward the sounding object. Recent experimental investigations have concerned themselves with the nature and the conditions of auditory localization.[10] It has been experimentally established that sounds from the right or from the left are most readily and most correctly localized, that sounds from in front are constantly confused with sounds from behind, and that sounds at the back are localized with greatest difficulty. These facts

are best explained by the hypothesis, experimentally tested, that the chief condition of the consciousness of auditory position is the comparative intensity of sounds as stimulating the right and the left ears. A sound from the right stimulates the organs of the right ear strongly, those of the left ear faintly; and it calls out a movement or tendency to movement of the head toward the right. On the contrary, sounds from exactly in front, and also sounds from behind, stimulate right and left ears with equal intensity and, for this reason, are readily confused. The peculiar difficulty of localizing sounds from behind may be due to the fact that every animal instinctively turns to face objects of attention, and has consequently little experience in localizing sounds at his back. The measurement of the mere distance or apartness of sounds from my body is mainly, as experiments have shown, an inference from the greater or less intensity of the sounds; though the consciousness of differences in *timbre* may contribute also to the distance consciousness.*

The main results of this chapter may well be summarized in a concluding paragraph: The significant elemental constituents of the space-consciousness have been found to be: first, the sensational consciousness of extensity; second, relational experiences primarily of distinctness and of unification; third, the tactual sensational experiences due to movements of the body. The successive stages of the spatial consciousness,[2] it has appeared, are, first, the consciousness of mere apartness — a consciousness of extensity intervening between two colors or between two pressures; second, the consciousness of form, or unification of separated points; third, the consciousness of position either of objects apart

* For experiments, cf. Seashore, Chapter V.

from the body or of objects apart from each other. The consciousness of one's body and, in particular, of bodily movements has been shown to be an important factor in the consciousness of position and of depth.

The discovery of the importance of movement as condition of the space-consciousness, with the realization that a consciousness of movement is part of many spatial experiences, has given rise to a mistaken analysis of the consciousness of space — a denial of the occurrence of any elemental consciousness of extensity. According to this view, the consciousness of color or of pressure as 'extended,' 'big,' or 'spread out' consists solely in a consciousness of bodily movements gained by experience of the colored or tactual objects. This 'empiricist' account of the spatial consciousness must, however, be rejected.[2] In the first place, it contradicts introspection, to which the bigness, or spread-outness, of an object surely is as distinct and unanalyzable a character as its blueness. The empiricist doctrine is in opposition, also, to the results of experiments on persons who have recovered, through operation, from total congenital blindness. Such persons are able to recognize at once a difference between round and square objects, seen and not touched. The empiricist theory — that the extensity consciousness consists in the consciousness of eye or of hand movements — is founded on a correct analysis of our consciousness of form and of position, and on the correct observation that we learn, by experience only, to estimate sizes and to measure our movements to the actual distances of objects. But the proof of the significance of movement and the consciousness of movement, in our complex and developed consciousness of space,

is no disproof of the occurrence of the elemental experience of extensity.

II. The Consciousness of Harmony

A second perceptual experience of combination with differentiation — a consciousness, as Ebbinghaus calls it, of 'unity in diversity' — is that of auditory harmony.[11] This consciousness of the differentiated unity of tones must be distinguished carefully from tonal fusion. When one vibrating body, a string, rod, or plate of some musical instrument, is set into motion, the untrained listener is conscious of a tonal fusion, a sound in which he does not distinguish different elements of pitch, but hears only the one pitch. The tone which he hears may, to be sure, be different from that which he would hear if the string vibrated only as a whole; but he knows this difference (if, indeed, he is aware of it at all) as voluminousness or timbre, not as a combination of different pitch-elements.* The trained listener, on the other hand, is conscious of a unity of differentiated elements; and among these he recognizes not a single pitch, but several. These distinct elements of pitch are due to the fact that the vibrating body vibrates both as a whole and also (more swiftly) in sections.†

It thus appears that, for the trained listener, consciousness of harmony, that is, of a unity of different pitch-elements, is produced by the vibration in sections of a single vibrating body. In place of a fusion he experiences that combination of a lower, stronger tone, the fundamental, with one or more higher tones called overtones, partials, or harmonics. The

* For experiment, cf. Sanford, 87 *a*.

† For experiment, cf. Sanford, 88.

lowest of these overtones is always at least an octave higher than the fundamental, that is to say, its vibration-rate is twice as great. For example, if the C-string of a violin be vibrated, the trained listener *may* hear a combination of the pitch-element C, its octave c, the g above the octave, and the c, e, and g of the next higher octave.

(2) But untrained as well as trained listeners are conscious of harmony when, in the second place, combinations of air-waves are due to the simultaneous vibration of several different bodies, instead of being due to the sectional vibration of a single body — string, rod, or plate.* The consciousness of harmony is, in fact, physically conditioned by a combination of air-waves such that their vibration numbers stand to each other in uncomplicated ratios as 1 : 2 or 2 : 3. The vibration ratios of the modern musical octave are: —

C	D	E	F	G	A	B	C
8	9	10	$10\frac{2}{3}$	12	$13\frac{1}{3}$	15	16

The so-called perfect intervals are accordingly: the octave (C–c), the fifth (C–G), and the fourth (C–F), with vibration ratios of 1 : 2, 2 : 3, and 3 : 4, respectively. (To the untrained listener the octave, even when produced by the vibrations of different bodies, is ordinarily a fusion, not a harmony — in other words, the two pitch-elements are not distinguished.)

Besides these perfect intervals or experiences of harmony, there are also the 'imperfect intervals' conditioned by the major third (C–E), the minor third (C–♭E), the major sixth (C–A), and the minor sixth (C–♭A), with vibration ratios,

* For experiment, cf. Titchener, § 45. For consideration of beats and combination-tones, cf. Appendix, Section III., § 20.

respectively, of 4 : 5, 5 : 6, 3 : 5, and 5 : 8. In these experiences the consciousness of the difference of the tones is relatively emphasized. When this consciousness of difference obliterates, or almost obliterates, that of unity, the agreeableness characteristic of the consciousness of harmony disappears, and we have the experience of discord or disharmony, conditioned by the union of air-waves of complicated vibration-ratios.[19] The principal discordant intervals, with their vibration-ratios, are the major second (C–D), the minor second (C–♭D), the major seventh (C–B), and the minor seventh (C–♭B), with the vibration ratios 8 : 9, 15 : 16, 8 : 15, 9 : 16.

The nature of the physiological processes, excited in the end-organs of the ear by these combinations of air-waves, and the nature of the cerebral processes, assumed to condition the experiences of unity and of difference, are still topics of conjecture rather than of established hypothesis. The occurrence, however, of the consciousness of the harmony of different tones is indisputable.

III. The Consciousness of Rhythm and of Melody

One is conscious of rhythm[12] in dancing, reading poetry, playing an instrument, and in watching the dance and listening to poem or to music.* Such an experience of rhythm is a consciousness of the regular alternation of temporally distinct sense-phenomena, either bodily movements or sounds. It is based on the alternation of regularly varying bodily processes — in particular, on the alternations of short inspiration with long expiration, and of strong with weak pressures in walking. To quote from Professor Titchener: "As we run

* For experiment, cf. Titchener, § 46; Myers, *op. cit.*, Exps. 145–146.

or walk, the legs swing alternately, and with each leg swings the arm of the opposite side. Here we have the basis of the idea of rhythm; a strong sensation-mass from the leg whose foot rests upon the ground, the leg that carries the weight of the body, followed at equal intervals by a weak sensation-mass from the leg that swings through the air. . . . As the leg swings, the arm swings; and at the moment that the foot is set down, the arm pulls with its full weight upon the shoulder. . . ." *

These natural tactual rhythms are, however, mere alternations of two bodily phases. Dance-rhythms and auditory rhythms — regular alternations of sounds, weaker and stronger, longer and shorter, are capable of much greater variation and are consequently far more complex. The unit of musical rhythm is a measure; measures are combined in phrases; and phrases are grouped in musical periods. The unit of word-rhythm is a poetic foot; and verse and stanza are progressively complex combinations of poetic feet. The consciousness of these more complex rhythms is an experience of group within group.

It is important to observe that auditory and motor rhythms are normally combined. The chorus-dance, out of which the drama developed, is an expression of this close relation between the sensory and the motor nerve structures, which we illustrate whenever we keep time, with hand or foot, to music.

The consciousness of melody is a complex experience of a rhythmic series of harmonious tones in which the harmony is successive, not simultaneous. As in the case of the rhythm-consciousness, the unified terms are temporally distinct.

* "A Primer of Psychology," revised edition, 1899, § 47.

Fundamental, therefore, to both experiences, that of rhythm and of melody, is the consciousness of time, an unsensational experience which will later be discussed.*

C. Perception and Imagination as Combination of Limited Groups of Sense-elements

The study of all these forms of perceptual unity shows clearly that in perception and imagination the consciousness of unity and of difference is combined with a limited group of sense-elements — that is, with a part only of the total sensational experience of the moment. Another way of stating this contrast between the sensational experience as undifferentiated total and perception as limited complex is in terms of the object of each. The merely sensational consciousness conditioned by any combination of physical stimuli has *an object*, the undistinguished mass of colors, sounds, pressures, and the like. The perceptual consciousness conditioned by the same stimuli has *differentiated objects*.† The distinction may be illustrated by comparing my consciousness at this moment with that of the baby whom I am holding in my arms. His sensational consciousness may be as rich as my own, for he is sensationally conscious of a totality of colors, brightnesses, bignesses, tones, and noises; but he has not yet the perception of objects. The object of his consciousness is, rather, in the often-quoted words of James, a 'great, blooming, buzzing confusion of undistinguished colors and sounds.' This is an experience which the adult occasionally approximates — for example, when he enters from the dark a brightly

* Cf. Chapter VIII., p. 131.
† Cf. Chapter V., p. 88.

lighted room and no object stands out from the dazzling confusion of light and color;* or when, in his first waking moments, he is vaguely conscious of colors, warmth, pressures, and sounds which, as he slowly wakens, seem to range and round themselves into wall, furniture, bed-coverings, and knock-upon-the-door. In a word, perception, like imagination, is the consciousness not of an undifferentiated totality but of differentiated objects. And the differentiation, the realization of different groups of qualities as making up each distinct object, is plainly due to the habitual occurrence of certain experiences in close connection. So, when the experiences of wetness, whiteness, warmth, and sweetness have often enough coincided, the baby has the consciousness of milk; and when the experiences of redness, softness, woolliness, and roundness have often enough occurred together, he is conscious of the ball. The outcome of this chapter is, then, to amplify the account of perception and imagination by regarding each as the fusion and assimilation of a limited group of sense-elements with the consciousness of unity and of difference.

* Cf. Judd, "Psychology: General Introduction," p. 172.

CHAPTER V

THE BODILY REACTIONS IN PERCEPTION AND IMAGINATION

Of all so-called external objects, my body stands in closest relation to myself. It is related also in a twofold fashion to other external objects: through its sense-organs and ingoing nerves it is affected by them; through its outgoing nerves and muscular contractions it affects them. Indeed, the physiological process initiated by the excitation of a sense-organ is unfinished until it is terminated in a muscular contraction; in other words, a complete physiological process is neither sensory nor motor, but sensori-motor.*

It was shown in Chapter III. that the different modes of sensational experience — visual, tactual, and the rest — are marked off from one another not only by the excitation of different end-organs and of different cerebral areas, but by the characteristic bodily movements — of eyeball, hand, and tongue — which accompany them. This chapter will treat of perceptual bodily reactions and will describe them

* The student is advised to read, in connection with this chapter (1) on sensori-motor reactions: J. R. Angell, "Psychology," Chapter III. (2) On habit: W. James, "The Principles of Psychology," Vol. I., Chapter IV., or "Psychology, Briefer Course," Chapter X. (3) On instinct: C. L. Morgan, "Animal Life and Intelligence," Chapter XI., or "Comparative Psychology," Chapter XII., or James, "The Principles of Psychology," Vol. II., Chapter XXIV., or "Psychology, Briefer Course," Chapter XXV.

as coördinated, habitual, relatively immediate, and impulsive.

(1) The perceptual reaction is distinguished as coördinated, or unified, from the merely sensational movement. The significance of this distinction will be clear if one contrast the behavior and the probable consciousness of a little baby with that of an older child in the presence of a visual object — let us say, of a woolly red ball. The older child fixes his eyes upon the ball, follows it, if it is moved toward one side, by his eyes and his turning head, and seizes hold of it if it is within reach. The week-old baby, far from fixating it, does not even converge his eyes upon it, for each eye still moves more or less independently of the other; he does not turn his head toward it if it is moved away; and though his hands move aimlessly and may accidentally strike the ball, the two hands do not meet on the ball, and there is no coordination of the complex movements necessary for seizing it. Yet the baby is reacting to the ball: his eyeballs make more movements, his hands flap more wildly than before the ball was held and moved before him. Such a reaction, sometimes called an 'excess-reaction,' is due to the diffusion of incoming nerve-impulses over outgoing nerves and muscles. It differs as widely from the unified and coördinated movement characteristic of perception as the sensational consciousness of redness differs from the perception of a red object.*

(2) Perceptual and therefore coördinated bodily reactions tend, in the second place, to be repeated, that is, to become habitual. My reactions, at different times, to the same object or class of objects are closely alike. I make the

* Cf. Chapter IV., p. 85.

same jaw-movements whenever I eat, and I hold and move my pen in the same fashion every day. These habitual movements are, it should be noticed, of twofold origin — instinctive or acquired.[1]* My pen-movements have been acquired, that is, learned. The movements which I make in eating are, on the other hand, instinctive; and this means that they are not acquired. So, a baby instinctively moves its hands and eyes, but it acquires the movements of convergence and of grasping with both hands; and a duck instinctively enters the water, but learns by imitation to drink. Instinctive reactions are racially hereditary and are severally characteristic of different animal groups. By far the greater number of them become habitual, but some instinctive acts — for example, the egg-laying of certain insects — are but once performed. Instinctive reactions may be classified, further, as movements of withdrawal or of approach; and movements of approach are either antagonistic or coöperative. Acquired reactions are of two main types: movements learned by imitation and reactions learned through purely individual experience.[2]

(3) From the habitualness of the perceptual reaction follows a noticeable character: its relative immediacy. The reaction which accompanies not only perception but also many forms of imagination, and even certain kinds of thinking, is relatively immediate as compared with the reactions distinguishing reasoning and choice. The distinction between immediate and delayed activity is, to be sure, relative and not absolute, but is readily made between extremes of the two classes. Hold out an apple — or, for that matter, a caterpillar — to

* These Arabic numerals, throughout this chapter, refer to numbered divisions of the Appendix, Section V.

a baby of eight months: he will promptly seize it and carry it to his mouth. Offer the same dainty to a three-year old: he will hesitate. Memories of disagreeable tastes or of sharp penalties vie with the impulse to grasp at every object; his response, whether of advance or of withdrawal, is hesitating and delayed. Or again, shut away in a high cupboard the lunch of a hungry dog and of a hungry little boy. The dog's response is immediate: he barks, he leaps up into the air, he runs madly around the room. For several minutes the boy makes no obvious motion; then he slowly piles footstool into chair, climbs up and tries to open the cupboard door — again a case of delayed as contrasted with relatively immediate reaction. These are examples of advantageously delayed reactions. In many situations, on the other hand, immediate perceptual reactions, to dangerous or to momentarily favorable environment, are of crucial importance for the individual and for the race.

(4) The observation that the perceptual reaction is relatively immediate must not lead to a confusion of it with the reflex reaction. A reflex act is an act which follows on a stimulus without intervening consciousness. It may be consciously performed; in other words, it may be accompanied by consciousness, but it is not excited, or invariably preceded by, consciousness. I sip my coffee at the sight of the brimming cup and I move my fan to the sound of the music, that is to say, a unified consciousness of the object precedes my reaction to it. In technical terms, my perceptual reaction is impulsive, not reflex; although the consciousness of reaction is a constituent of the complete perception.

This statement leads to a final distinction. A perceptual reaction, though impulsive, is not volitional. To pick up one's

handkerchief when one has dropped it is an impulsive act following on the consciousness of it as it lies on the ground; to throw one's handkerchief to the lions (after the fashion of the lady in the poem), that one's lover may risk his life to snatch it from them, is a volitional act. Or, again, to pick up my cards from the table is an impulsive act, whereas to discard from a strong and not from a weak suit is a volitional act. The distinction is readily stated. Both perceptual and volitional reaction are conditioned by consciousness; in technical terms, both are ideo-motor acts. But only the volitional, not the perceptual, act is planned or anticipated. I do not say to myself: "I will drink this coffee, or move this fan," but the bare sight of coffee or of fan excites the habitual reaction. The perceptual reaction is sometimes, indeed, opposed to my will. For example, I may drink the coffee in spite of having definitely planned to delay coffee-drinking until after taking my tonic; and I may find myself moving my fan, even though I am deeply principled against keeping time to music.

A tabular summary of bodily reactions may conveniently conclude this chapter: —

BODILY REACTIONS

A. Reflex Movements

(Immediate: following on stimulus without intervening consciousness.)

I. Uncoördinated reactions } Performed. *a.* Without consciousness.

II. Coördinated reactions } Performed. *b.* With consciousness.

1. Once performed (Instinctive).
2. Habitual (or Repeated).
   (*a*) Instinctive.
   (*b*) Acquired.

B. Ideo-motor Movements

(With antecedent consciousness; coördinated; repeated.)

I. Impulsive movements.
   (Unpremeditated; relatively immediate.)

II. Volitional.
   (Premeditated; delayed.)
   a. Simple.
   b. Deliberative.

CHAPTER VI

ATTENTION

I. The Nature of Attention

Every one knows that there is a distinction between attention and inattention.* Our special problem, at this stage of our study, is the nature of attentive perception and imagination; but even now we realize that attention is a factor also of other experiences. We may profitably begin our study by an illustration of perceptual attention. Suppose that I am perched on a rock, on a sunny September afternoon, lazily looking off upon a quiet sea, dotted here and there with gleaming sails, some near the shore, others on the horizon. I am awake and open-eyed, receptively and sensationally conscious. In a word, I am perceiving. Now suppose that a sloop comes into view around the rocky headland at my left. I am no longer impartially conscious of sea and of boat; nor do my eyes wander idly from horizon to shore and from shore to horizon again. Rather I bend forward and fix

* Before reading farther, the student should answer, in writing, the following questions: (1) Name two things to which you naturally (without training) gave attention. (2) Name two subjects to which you have learned to attend. (3) What bodily movements and attitudes characterize your attention to a faint sound? (4) What bodily movements and attitudes characterize a dog's attention to a faint sound? (5) Describe, in full, your attentive consciousness (*a*) of the irregularity in contour of the period at the end of this sentence; and (*b*) of the boundaries of the state of New York (as you now, in imagination, bound the state).

my eyes upon the sloop; or, to use the everyday expression, I concentrate my consciousness on the boat and, so long as it remains in view, I am not in the same way conscious of anything else. In other words, I attend to the boat. And tomorrow, when I am altogether unable to tell whether the rocks in the foreground were brown or gray and whether the sky was clear or cloudy, I shall remember that the boat was a yawl-rigged schooner with a black hull.

But though it is relatively easy to describe an attentive experience, its bodily accompaniments, and its psychic effects, it will be found impossible to define that special factor of the experience which is known as attention.[1]* Rather, as most psychologists implicitly admit, attention is an elemental, a further unanalyzable and an indescribable sort of consciousness. We realize it best by contrasting it with the inattentive consciousness, for example, with the drowsy consciousness, or with our normal consciousness of objects which stimulate only the outer zones of the retina. But we cannot define attention or reduce it to more elemental constituents. Attention — is just attention.

One further statement may be made. Attention, though elemental, seems not to be sensational.[2] On the side of physiological condition it is distinguished by the lack of any specific end-organ; and, apart from this physiological distinction, attention differs from sensation by being sometimes present, sometimes absent, from our consciousness. In other words, we sometimes attend and, again, we are inattentive, whereas we are always sensationally conscious even when, as is usual, we are more-than-sensationally conscious.

* These Arabic numerals, throughout this chapter, refer to numbered divisions of the Appendix, Section VI.

We take account of these differences by calling attention an attributive element of consciousness.*

II. The Objects of Attention

Since attention is elemental, — and since, therefore, we cannot describe attention, even though we know what it is, — our further study will turn out to be mainly a study not of attention itself but of its objects, conditions, and results. We may well begin by considering the objects of attention; and three important statements must be made about them. (*a*) We may attend, in the first place, to objects of any kind — personal or impersonal, public or private, externalized or non-externalized, sensational, affective, or relational.[3] In more concrete terms: my attention may be centred on myself or on my friend — personal objects, the one private, the other public; again, my attention may be directed to Botticelli's "Pallas," or to the emotion with which I regard the picture — both impersonal objects, the second private and non-externalized, the other public and externalized; I may attend, finally, to the binomial theorem or to my lead pencil — both impersonal and public objects, but the last only externalized. It follows that all kinds of consciousness, perception and emotion, thought and will, may be 'attentive,' accompanied by attention. Certain forms of consciousness are indeed, as will appear, necessarily and inherently attentive.

(*b*) The object of attention is, in the second place, always a relatively stable, or persistent, object. In inattentive perception, my eye moves from object to object; in inattentive imagination, one image follows on another in a swift succes-

* Cf. Chapter XI., p. 173; Chapter XII., p. 223; and Appendix, Section III., § 34.

sion. In attentive perception, on the other hand, my eyes are fixed on the unmoved object and move only to follow the moving thing; and in attentive imagination I linger over the imaged object or scene. In apparent opposition to this teaching, stress is sometimes laid on a fluctuation in objects of attention: it is asserted that one cannot attend longer than a few seconds to any sense-object. But though it is true that the fixated color grows alternately bright and dull, and that the sound to which I listen is now loud and again soft, yet these phenomena, classed as fluctuations of the objects of attention, are really only fluctuations in the intensity of sounds, colors, and the like. Such fluctuations are partly explained, perhaps, by oscillations in the contraction of the muscular apparatus of sense-organs, but are mainly due to 'the oscillatory character of psychophysical processes in general' * — to the rhythmic changes, for example, in blood pressure.

It should be added that the object of attention may be stable, or prolonged, while yet attention may be relatively unstable. The object of attention is always stable in comparison with a similar object of the inattentive consciousness — for example, if I attentively observe a tree from a carriage, I turn my head and prolong my view of it. But my attention during this drive may well be more unstable, that is, interrupted by inattention, than the attention with which I sit rapt by some great picture. In its extreme form, prolonged attention is absorption, a complete merging of oneself in the object of one's consciousness so that the restless flow of consciousness is checked and the world narrows to the observing self and this one object. Æsthetic, logical, and purely

* C. S. Myers, "Text-Book of Experimental Psychology," p. 321.

personal experiences are characterized by attention in this supreme form, and such attention is always a relatively enduring consciousness.

(*c*) The object to which I attend is, in the third place, a part only, not the whole, of the total object of my consciousness at any moment. Thus, to recur to our initial example, I do not attend simultaneously to rock and ocean and sloop. On the contrary, while I attend to the bellying, flapping canvas I am inattentively conscious of the sea and of the rock. Or, to take another example, I attend not to the whole side of the room but to the desk; perhaps not to the desk but to the polished brass inkstand; or, finally, not even to the whole inkstand but to its carved griffin-top. I may even attend to a single inseparable element or factor of a given object — to the redness of the rose, to the novelty of my surroundings, to the pleasantness of my emotional experience, to the causal connection between stimulus and movement.

No exact limits have been so far set by experimental observation to the complexity of the object of attention. In general, any group of terms which can be unified can be attended to. Experimenters, as well as every-day observers, have concerned themselves with this problem, and have proved abundantly that small objects, too numerous to be separately attended to, are attentively perceived if combined into a pattern or scheme. If, for example, one drop a screen for less than one quarter of a second (an interval so short that it excludes eye-movements), thus exposing a surface on which five or six small crosses have been drawn, in irregular order, one will find that attentive observers often fail in telling the number of the crosses, whereas they can reproduce the figure

made by the crosses. This shows that the observers attended not to the single figures (the crosses) but to the complex figure, or scheme, composed of all the crosses.* About half a dozen small objects can thus be unified and attended to. Some psychologists believe that we may attend also to two (or at most to three) independent objects; and to the introspection of the writer this seems true. One may train oneself, for example, to attend simultaneously to a fixated visual object and another object seen in indirect vision; and it is impossible to unify these. Most cases, however, of so-called 'divided' attention are either instances of the simultaneous occurrence of attentive consciousness and a merely reflex action, — as when one writes a letter while one mechanically hums a tune or repeats a series of numerals, — or else instances of alternating attention. Julius Cæsar did not really dictate four letters while writing a fifth, but his attention vibrated from one to another; and the phenomenal chess-players shift their attention from one to another of the games which they are said to play 'simultaneously.' †

Attention to part of one's total object of consciousness of course implies inattention to the rest. The 'absent-minded' person, who is blind and deaf to the sights and sounds of his environment, is inattentive to them precisely because he is attentive to something else, for example, to some imagined scene or more ideal project. The narrower the object of my attention, the more 'absent-minded' I become. Sometimes, indeed, this negative aspect of attention, the glaring inatten-

* For other experiments, cf. L. Witmer, "Analytic Psychology," p. 54, Exp. XVI.; Titchener, § 38, p. 113 (4); Seashore, p. 165 ff.

† For experiment, cf. Seashore, p. 164.

tiveness of the person meanwhile absorbed in emotion or calculation or landscape, is more significant than his attentiveness.

(*d*) The discovery that one attends to a part only of the total object of consciousness at once suggests the question: To what part? The answers to this question may, perhaps, reduce themselves to three. It is a matter of common observation that I attend (1) to the pleasant or unpleasant — for example, to the compliment which some one pays me or to my toothache; and (2) to the novel, or unusual, for example, to the figure of a turbaned Hindu in an Oxford audience which fills the Sheldonian theatre. My attention to a sensationally intense object, for example, to a thunder-clap, and my attention to a moving object, for example, to a flying bird or to a moving signal, are cases of attention to the surprising or unusual. Finally (3) I attend to that part of my total field of consciousness which is connected with other objects of my attention. If I am studying the problem of immigration from Southern Europe I notice the most casual newspaper references to Slavs and to Italians, and I remember the southern type of this or that face in a crowd. If I have hurried the carpenters out of the house which they are building for me, by helping to fill with putty the holes left by the nails in the woodwork, then for weeks I mark the variations of color between wood and putty in the wainscotings and furnishings of the houses which I visit. No one of these three characters invariably distinguishes the object of attention — one may attend to the dull color or the soft sound; an object closely connected with our ordinary interests may be unattended to; and finally — though psychologists are not in agreement on this point — one may attend to an object which is neither pleasant nor unpleasant.

But though the object of attention is not inevitably distinguished by each of these characters, it is probably always describable in at least one of these ways: it is pleasant or unpleasant, or else novel, or it is closely connected with experience.

III. The Classes, Conditions, and Results of Attention

A common classification of attention is as (1) natural or instinctive, and (2) acquired. It will be observed that this distinction does not imply any difference in the nature of the two sorts of attention. Natural and acquired attention do not differ at all, regarded merely as attention. The difference lies simply in the fact that attention of the first sort is instinctive, untaught, whereas attention of the second sort is acquired through individual experience or through imitation.* All natural attention is evidently, therefore, involuntary. Acquired attention is either involuntary or voluntary, that is, willed. To illustrate: five minutes ago I was instinctively attentive to the whistle of the incoming steamer; whereas I willed my present acquired attention to this chapter on attention. If I were attending neither to the whistle nor to the scientific discussion, but to a thrilling page of some novel, my attention would be acquired, indeed, — for a printed page is not naturally interesting, — but involuntary. Natural attention is in fact directed to objects which are unusual, pleasant, or unpleasant. The objects of acquired attention are, directly or indirectly, connected or associated with these. We have, thus, the following classification of attention as —

* Cf. Chapter V., p. 89.

I. Natural, or Instinctive (always Involuntary) to
   a. The pleasant or unpleasant.
   b. The novel.
II. Acquired
   Involuntary } to the object associatively connected
   Voluntary } with an object naturally attended to.

The relation between will and attention, which is sometimes denied, will be further discussed in a later chapter.* It is, however, immediately clear that acquired attention is of great practical significance. If our attention were purely instinctive, we should go on through life enlarging our primary childhood interests — absorbed in the objects, brilliant, novel, or pleasant, of our immediate perception. We acquire new interests through our ability to compel ourselves to attend to what is normally uninteresting and unattended to. Thus, voluntary attention attests the power of intellectual development. As Professor Barrett Wendell says: "The practical aim of a general education is such training as shall enable a man to devote his faculties intently to matters which of themselves do not interest him. The power which enables a man to do so is obviously the power of voluntary, as distinguished from spontaneous, attention."

Of the bodily conditions of attention there is little to be said. There are evidently no end-organ excitations of attention. And though we are justified by physiological analogy in postulating some special neural condition of attention, the physiologists speak in vague and more or less divergent terms of the nature of such a neural process. Some sort of special 'preparedness of brain-centres' must be assumed to exist. The characteristic muscular contractions which ac-

* Cf. Chapter XIII., p. 227.

company attention are more readily described. They are of two sorts: in the first place, contractions, usually instinctive, of the muscular apparatus of the sense-organs, tending to adapt these organs to the conditions of distinct consciousness. For example, we instinctively change the convergence or the accommodation of our eyes in order to obtain a distincter outline of the object which interests us; we turn our heads toward the source of the music to which we are attending; and we follow a moving object with our eyes. Muscular contractions of this sort are, of course, peculiar to sense-attention. A second class of muscular contractions is characteristic of all sorts of attention — such contractions, namely, as prevent disturbing movements of any sort. The rigidity and stillness of the body is, indeed, an obvious accompaniment of attention.

In the successive sections of this chapter attention has been described as elemental 'attributive' consciousness; the object of attention has been distinguished as a relatively stable part of the total field of consciousness and as sensationally novel, or affectively toned, or associatively connected; attention has been distinguished as instinctive or acquired, involuntary or voluntary, and, finally, the bodily correlates of attention have been indicated. It remains to speak briefly of what may be named the results of attention. First and most important is the normal recurrence of the attentive consciousness. In concrete terms, we are likely to remember what we attend to, and, conversely, we forget what we inattentively experience.*

In the second place, attention determines the direction of my

* For experiments, cf. E. L. Thorndike, "The Elements of Psychology," p. 107, Exps. 10 and 11.

imagining; it forms, in a word, the starting-point of association. The next chapter will lay more stress on the relation of attention to association.* Here we need merely name and illustrate this connection. Not the whole experience of a given moment, but the emphasized, that is, the attentive, part of it is likely to form the starting-point of my imagination. For example, my outlook on the view from my window is probably followed not by the imagining of a closely similar landscape, but by the imagination — let us say — of a lighted Christmas tree due to my attentive consciousness of the evergreen tree near my window. Attention is thus a condition alike of association and of retention. The chapters which follow will make this more evident.

A word should be said, in conclusion, of the relation between interest and attention. The term 'interest' is best used as synonym for involuntary attention. I am interested in the objects to which, without effort of will, I attend.

* Cf. p. 114.

CHAPTER VII

PRODUCTIVE IMAGINATION, MEMORY, SUCCESSIVE ASSOCIATION

I. Productive and Reproductive Imagination

This chapter is devoted to the study of imagination from a new point of view.* Imagination has, up to this point, been described as sensational, unified, and 'private' consciousness of particularized objects, and has been classified according to sense-types. We are now to take account of the distinction, practically and æsthetically significant, between reproductive (or recurring) and productive (or inventive) imagination. Relatively accurate and complete reproductive imagination is called memory.

It must at once be noted that the 'structural elements' of imagination always are reproduced (that is, repeated) and not in any sense 'novel.' They are part of our original endowment, instinctive forms of consciousness, as we may call them. I can imagine no brand-new color, and no new taste. The novelty involved in so-called creative imagination is therefore a novelty of combination, for one complex experience may differ from every previous one, though, taken singly, no ele-

* Before reading farther, the student should answer, in writing, the following questions: (1) What seems to you to be the difference between imagining and remembering? (2) What method would you use in order to memorize (*a*) the objects in a jeweller's window? (*b*) a Shakespearian sonnet?

ment or part of the 'novel' experience is new. Every instance of creative imagination illustrates this statement. In imagining a centaur, one combines the image of a man's head with that of a horse's body; in inventing the telegraph, Morse prolonged in imagination the image of charged wire, and united it with that of vibrating lever and writing point. These are instances of the combination of images in themselves far from simple. The parts combined may, however, be much less complex — mere elements or very simple images.

The forms of imagination thus provisionally illustrated must be more closely considered. Of creative imagination two main forms are ordinarily distinguished: the mechanical and the organic. The mechanical image is a complex, not of qualities, but of relative totals, of experiences complete in themselves, as if a painter were to paint a picture of Tuscan olive trees on a New England hillside. The organic image is a complex of single elements or of fragmentary aspects of different objects, which fuse into a new whole of organically related parts. Within the class of organic imagination one may distinguish, also, the fanciful from the universal imagination, on the ground that the first lays stress on more or less bizarre and accidentally interesting characters, the second on essential, universally appealing qualities. Thus, Kipling's description of the "Workers" includes a bold fancy: —

"They shall splash at a ten-league canvas with brushes of comet's hair."

Miss Jewett employs a similar figure, but the wide appeal of it marks the more universal imagination: —

"*Madonna mia!* if in truth
Our Raphael from heaven's palaces

Might lean across the centuries
* * * * * *
Even he might find a study, fair

As his last fresco in the skies,
Might pause, untouched of mortal taint,
One infinite half-hour to paint
The motherhood in your dear eyes."

The study of reproductive imagination will involve us in more detail. It has already been classified as complete or incomplete, accurate or inaccurate. These are relative terms, and it is probable, of course, that no case of literally complete and accurate reproductive imagination ever occurs. Practically complete and accurate imagination is called memory and is, as everybody knows, a significant factor in conduct and an indispensable basis for thought. The questions, "How do I remember?" and "How may I foster and, if possible, increase my chance of remembering?" assume, therefore, a practical importance of high order. The admitted answer to the first of these questions is as follows: "I remember through association." The meaning of this term we have next to discuss.

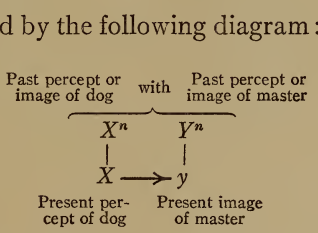
II. The Nature of Association

Successive association is the sequence of an imagination on a perception (or another imagination), a sequence which is attributed (in after-reflection) to the previous occurrence, simultaneously or in swift succession, of the two experiences.[1]*

* The term 'association' is often used in the sense of 'successive' association. For the distinction between 'successive' and 'simultaneous' association, cf. Chapter IV., p. 65, with Note, and Appendix, Section VII. (§ 1). The Arabic numerals, throughout the chapter, refer to numbered divisions of the Appendix, Section VII.

For example, my present memory of a Parisian dinner-table — the brightly lighted *salle-à-manger*, the long table, the white-haired hostess — is associated with my present percept of a knock on my door, that is, it follows upon the knock and is explained by the fact that, night after night, just such a muffled tap from the servant who summoned me preceded my consciousness of the dinner-table.

The most important and obvious classes of association may best be described by the terms 'total' and 'partial.' * 'Total association' is that between complex experiences which are complete in themselves. It is an external and prosaic sort of connection explained as due to the simultaneous or the successive occurrence of 'the same' experiences in the past. The association, one after another, of the imaged notes of a melody, words of a poem, or implements of a trade, are examples of this common form of association which may be readily symbolized by the following diagram: —



In this diagram, the small letter (y) stands for 'image' and the capitals stand for 'either percept or image'; the arrow designates the fact and the direction of the association, and the line connecting X^n and Y^n indicates that the two experiences

* These terms were suggested by James. The expression 'total' must not, of course, be interpreted as if it required that the entire experience of a given moment should be associated with the imagination which follows on it. On the other hand, the term 'total' covers cases in which the first term of the association is very limited in extent, in which, for example, the first term is the consciousness of a single word.

occurred either simultaneously or successively; the index suggests that X^n and Y^n are past experiences.

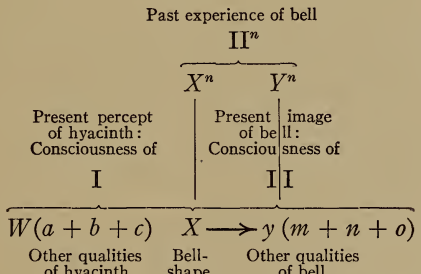
Partial association is the association of elements of consciousness or of groups of elements. Its most extreme case, which James aptly calls 'focalized association,' is the observed connection between one single element and another elemental or complex experience. This type of association is more varied in form and less obviously attributed to continuity in past experience, and must therefore be considered in more detail.

First of all, let us assure ourselves that the partial association does indeed involve the assumed identity of its terms with past experiences, which were either simultaneous or successive. We may select, as an extreme instance, the association implied in these verses of Shelley: —

> "And the hyacinth, purple and white and blue,
> Which flung from its bells a sweet peal anew
> Of music, so delicate, soft and intense,
> It was felt like an odor within the sense."

Now, it is in the highest degree improbable that Shelley had so often or so vividly experienced together the fragrance of hyacinths and the sound of bells that the one should suggest the other. At first sight, therefore, this seems to be a case of association which does not involve an assumed identity of the connected terms with past experiences occurring together. But on closer scrutiny we discover that the actual connection, for Shelley, between imagination of sound and perception of fragrance was the consciousness of the bell-shape of the flower. None of the other elements of the perception of the hyacinths, the consciousness, for example, of their color, their height, their texture, has any connection with the imagi-

nation of the peal of music. But this connecting link, the consciousness of the form of the flowers, is not associated with the imagination of sounding bells as a whole, for it is itself one element of this imagination; in fact the only association involved is that between (1) the elemental consciousness of 'bell-shape,' common to both the perception of the fragrant hyacinth and the imagination of the pealing bell, and (2) the remaining elements of the imagination of the bell, the auditory imagination of pitch, intensity and volume of tone, and the visual imagination of the color and form of the bell. This will be made clearer through the following diagram:—



Here the Roman numerals, I. and II., represent the total, concrete facts of consciousness, the hyacinth-percept and the bell-image; X is the element common to both (the consciousness of shape); y represents the group of elemental imaginings, of pitch, intensity, and the like (m, n, and o), associated by X and forming with it the image of the pealing bell; whereas W groups together those elements, the consciousness of color, height, and so on (a, b, and c) of the hyacinth-percept, which have no part in the association. Comparing this, therefore, with the concrete associations, we find that it has the following distinguishing characteristics: first and foremost the

starting-point of the association is very narrow, either a single element or — as we shall see — a group of elements, but never a concrete total. This first term (*X*) of the association is, in the second place, a part both of the first and of the second of the successive, concrete experiences (the hyacinth-percept, I., and the image of the bell, II.) and the association is, thus, entirely within the second of these experiences, the image of the bell. It follows, also, that only this second one (II.) of the concrete totals of consciousness need be regarded as identical with any former experience; in the present case, for example, Shelley need never before have seen a hyacinth, but he must already have seen and heard a pealing bell, in order to have the association. Finally, it is evident that, in cases of successive association, the first of the associated elements or groups of elements (*X*) necessarily persists in consciousness, whereas the elements combined with it in the earlier complex (I.) fade gradually away; and that the persisting element is then surrounded by the added elements (*m*, *n*, *o*) of the second concrete (II.). This persistence of the earlier experience, though occurring in concrete association, is especially characteristic of the 'partial' type.

The connecting term of a partial association (the *X*) may include more than a single element. We have then an instance of what may be named 'multiple association.' When Wordsworth, for example, says of Milton: —

> "Thy soul was like a star and dwelt apart,"

the star reminds him of Milton's soul, not merely by its aloofness but by its light. Or, to take a more prosaic illustration, if the sight of an Italian salt ship calls up an

image of a Roman trireme, the association is not between consciousness of salt ship and of Roman trireme as total experiences, for I surely have not been conscious of them at one time or in immediate succession on each other. But neither does this association start from any single feature of the perceived ship. Rather, a highly complex combination of elements (falling short, however, of a concrete total) — the consciousness of dark hull, of masts, and of rigging — is common both to the perception and to the imagination; and these factors common to both experiences are associated with the images, cerebrally excited, of banks of oars and Roman figures, which complete the consciousness of the trireme.

It has thus been shown that the partial, like the total, association is accounted for by the assumed identity of associated experiences with earlier experiences; but that these recurring experiences, instead of being concrete wholes, are either elements or groups of elements, which have been combined in former perceptions or imaginings — of pealing bells and of Roman trireme, for example. An association should always, therefore, be analytically studied. The important point is the determination of its first term, and the common error is the supposition that a complex experience is invariably to be taken as a whole in tracing the associative connection. On the other hand, as we have seen, all subtler associations are instances of association between more or less elemental parts of total experiences. Undoubtedly the greater number of associations are of the total sort — associations between consciousness of object and of use, between the percept of a face and the image of a name, and between the terms of verbal and motor series. But the

associations which distinguish the imaginative from the prosaic type of mind, which are the essence of all metaphor and the very heart of humor, belong, all of them, to the 'partial' type. No opposition is too fixed, no separation of time or place too wide, to be bridged by this sort of association.

We have, therefore, the following types of association:[2] * —

ASSOCIATION

I. *Total* or *Concrete* Association, of complete experiences (with or without persistence of the first term).

II. *Partial* Association, of persisting elements of consciousness: —
   a. Multiple Association (starting from a large group of elements).
   b. Focalized Association (starting from a single element or from a small group of elements).

Before taking up the more practical question of the definite direction of association, two theoretical comments must be made. It must be pointed out in the first place that one's experiences never recur, in the sense that the percepts or images of one moment are actually identical with those of a preceding moment. On the contrary, my present image of Faneuil Hall, of my uncle, or of the date of the fall of Khartoum is quite a different event from my earlier perception or image of the same building, person, or date. Unquestionably, however, I assume a certain 'recurrence' of the past experience, and this assumed identity or recurrence is rightly recognized by the psychologist as a character of association. A further discussion of the possibility and nature of recurrence would be metaphysical.

A second theoretical remark is the following: evidently

* The student should not fail to practise himself in the analysis of cases of association. For suggestions, cf. Appendix, Section VII. (§ 2).

the study of association involves the distinction, already discussed, between (1) my subject-self, the unique and persisting subject of complex experiences; and (2) these same experiences regarded as impersonal, though not externalized, objects belonging to a special point of time. Such a treatment proves to be necessary to adequate psychological description. It is dangerous only if one forget that the distinction of subject-self from its experiences is an abstraction — that the experiences never occur except as experienced by a self and that a self is not absolutely divorced from, or opposed to, but rather inclusive of, these experiences.

III. The Direction of Association

The discussion of association has thus made evident the close interweaving of partial contents of our complex total experience. It is evident that when one of these partial experiences 'recurs,' as perception or imagination, some other, previously continuous with it, recurs also, as imagination. A very vital question concerns the actual direction of association. Given a recurring perception or imagination, it has perhaps already occurred a score of times in as many different connections. Which, then, of the images that might conceivably follow on it will actually be associated? If, for example, the sight of a topaz necklace is the starting-point of the association, will it be followed by a vague imagining of Delhi, from which it came, by an imagination of the crown jewels in the Tower of London, or finally by some mainly verbal image — the image, for example, of the words 'topaz necklace' or of the verses —

> "And I would lie so light, so light
> I scarce should be unclasp'd at night."

Obviously, it is of practical importance to learn, if we can, the principles according to which one image rather than another is associated; for thus we may increase the chance of recalling what is useful or pleasant rather than the indifferent or harmful parts of our earlier experience. Now experiment confirms the every-day observation that experiences are likely to be associated in proportion as they are (1) naturally interesting or (2) frequent or (3) recent.* By naturally interesting experiences are meant those which involve instinctive attention, and it has appeared already that the objects of instinctive attention — so far as they can be characterized — are sensationally intense, or novel, or affectively toned. Two sorts of frequency, also, should be distinguished. An experience may occur frequently in the same connection — for example, a bell may ring thirty times a day, always by pressure of the same button; or the experience may recur frequently but in different connections — for example, pressing a button, turning a handle, and working a treadle, each a dozen times a day, may ring the same bell. Recent experiences need not be further classified.

We may readily find examples of associated imaginings of these different sorts.[3] If the sight of the necklace suggests the words 'topaz necklace,' it is because of the frequent connection of visual impression and words; if, on the other hand, it reminds me of the verses, this is because I was last night rereading "The Miller's Daughter"; if it suggests an imagination of Delhi or of the crown jewels, it is because these are images inherently interesting through sensational intensity or

* Similarly, it is true that, of the percepts or images of a given moment, the suggestive one — that which forms the starting-point of association — will be interesting, recent, or repeated.

through emotional thrill. Or, to take another illustration: if the sight of a surrey, with yellow awning, reminds me of the carriage in which I drove from landing-dock to hotel, in Gibraltar, this is because the Gibraltar experience was very vivid — sensationally novel and intense as well as markedly pleasant; if the surrey, however, reminds me of the rugged Maine farmer who drives it, this is because he yesterday drove me to Bar Harbor in it; if, finally, it reminds me of a prosaic train-hack, this is because my most frequent drives are to and from railway stations.*

The practical applications of these principles of association will be referred to again in the concluding part of this chapter. The discussion of this section may be concluded by a brief statement about the probable physiological explanation of association. In a general way it may be said that the physiological condition of association is the excitation of intra-cortical fibres connecting different cerebral areas. The larger these connected brain-areas, the more nearly 'total' is the association; and the more continuous the cerebral excitation, the more persistent is the consciousness. It is also natural that connecting fibres which have been frequently or recently or strongly excited should offer little resistance to the excitation; and in this probability we have the suggestion of a physiological basis for the secondary laws of associative frequency, recency, and interest.

IV. The Uses and Methods of Memorizing

The functions of imagination are by this time evident. By reproductive imagination, or memory, I hold to my past; and

* For experiment, cf. M. W. Calkins, "Association" (*Psychological Review Monograph Supplement*, No. 2); Titchener, § 52.

in creative imagination I reach out also beyond the limits of past and present. As a merely perceiving self I am bound to this desk, this loom, this plot of ground; but as a remembering self I live through, once more, the exhilarating adventures and the beautiful scenes of my past experience, and as a creatively imagining self I am hampered neither by 'now' nor by 'then.' I go beyond my own actual experience, I see visions, I dream dreams, I create new forms. In Stevenson's words: —

> "When at home alone I sit
> And am very tired of it,
> I have just to shut my eyes
> To go sailing through the skies."

Evidently, therefore, we shall wisely seek to foster both memory and creative imagining. But it is plain at once that one cannot directly will novelty or spontaneity or independence in imagining; and that one may as well try to harness Pegasus as to frame rules for the fancy. In other words, the cultivation of imagination is limited to the cultivation of memory — the effort to reproduce accurately and vividly. Indirectly, indeed, this cultivation of the memory lays the foundation, as it were, for creative imagination and fancy. In other words, memory is not a mere end in itself, and we memorize not only in order to re-live our past experiences, but in order to become capable of new ones. For all creative imagining, as has appeared, consists in the novel combination of the reproduced images of color, sounds, and movements, or of words. The creative suggestion, the flight of fancy, follows only on the vivid and faithful reproduction of the actual experience; and imagination, lacking this accuracy and fidelity, is insignificant and ineffective. Thus, the truly imaginative poet is endowed

with what Lewes called 'vision,' and his work is distinguished by "great accuracy in depicting things . . . so that we may be certain the things presented themselves in the field of the poet's vision and were painted because seen." *

Not only creative imagination but all forms of thought are based on memory. Thus, I could not generalize without memory — for example, I could not be conscious of chairs as a class, if I could not remember different sorts of chairs which I have seen; and I could not reason — for example, I could not reason out the solution of an algebraic problem — if I could not remember the values, once learned, of the different terms. Now analytic reasoning and creative imagination are the two psychological forms of learning, that is, acquisition of new experience; † and it is therefore true that memory (though in itself a preservation of old experiences) is essential to learning. Even physiological learning, the acquirement of new bodily dexterities, is dependent on memory; for the old instinctive reactions would be repeated again and again — the fish would always snap the hook and the child would invariably touch the flame — but for memories of the painful results of such activities.

Obviously, therefore, it is well worth our while to concern ourselves with methods of memorizing; for, despite great individual differences in the ability to memorize, experimental investigation has failed to disclose any one utterly incapable of improving his memory. On the contrary, unexpected capacity for improvement has been brought to light. In a long series of experiments carried on in the Wellesley College

* "Principles of Success in Literature," Chapter III. The student is advised to read this entire chapter.

† Cf. Chapter V., p. 89.

laboratory,* one subject was trained to reproduce correctly series of eighty-one colors or odors or nonsense syllables; another learned to reproduce series of sixty-one terms; and no subject failed to show some improvement through practice.

Methods of memorizing have been formulated on the basis of the principles of attention and of association.[4] These methods vary somewhat according as one seeks to memorize one fact or many, and according as one wishes to memorize facts as ordered or facts irrespective of order. Certain conclusions, however — one may perhaps call them rules for memorizing — emerge clearly from the experimental study of methods.† The first of these has already been stated: *One should attend to that which one wishes to remember.* To promote memory one must, therefore, observe with attention; to secure the recurrence of an experience, one must concentrate oneself upon it. A classic illustration of the dependence of memory on attentive apprehension occurs in Wordsworth's "Daffodils":—

> "I gazed — and gazed — but little thought
> What wealth the show to me had brought,
>
> For oft, when on my couch I lie
> In vacant or in pensive mood,
> They flash upon that inward eye
> Which is the bliss of solitude."

* Cf. "A Study in Memorizing Various Materials by the Reconstruction Method," by Eleanor A. McC. Gamble, *Psychological Review Monograph Supplements, Psychological Series*, No. 42, 1909. The remaining portion of this chapter is based, in great part, upon the experimental investigation and the conclusions of this book.

† For experiments (of various types), cf. Seashore, Chapter XI.; Myers, *op. cit.*, Exps. 95, 96.

The second rule for memorizing is designed to meet a difficulty in attentive apprehension due to the multiplicity of objects which it is desired to attend to, and thus to remember. *Attention*, it is evident, *should be directed to those parts of a complex or of a series which are normally most often forgotten.* So far as series are concerned, ordinary observation and experiment alike disclose the fact that the middle part of a series is most likely to be forgotten — a fact readily understood when one remembers that the first of a series has a certain interest, and that the last of a series possesses the advantage of recency in experience. It is evidently, then, expedient to direct one's attention toward the middle of the series — experimental indications point to the part just beyond the middle. Thus, if one is trying to visualize a series of the colors green, gray, brown, pink, blue, white, red, black, mauve, the attention should be directed not to green and gray, nor to black and mauve, but to blue and white.

Another method for attending to a group of facts is recognized by the third rule for memorizing: *single facts to be remembered should be grouped or unified.* Words, for example, are most readily remembered as linked in sentences or in stanzas; and the streets in a city or rooms in a building are best recalled as related parts of a map or plan. Even meaningless material, if one is trying to remember it, should be grouped — nonsense syllables, for example, in rhythmical measures, or colored papers in blocks of three or four. Indeed, every-day observation shows that facts of any sort are best remembered when grouped. Thus, I learn the date, 1690, of the publication of Locke's "Essay" by connecting it with the date, 1688, of the coming of William and Mary and with the fact that Locke returned from his exile in Holland on

the ship which bore the Princess of Orange; and I connect the invention of printing and the discovery of America with the late fifteenth century by regarding both as manifestations of the renaissant spirit of adventure.

The fourth rule for memorizing follows from a principle of association: that an experience occurring frequently in different connections is the more likely to recur. If the professor of economics and the professor of German and the professor of ethics alike quote Nietzsche in their lectures, I am likely to be reminded of Nietzsche more often than if he were favored by one only of my teachers. It follows that *one should emphasize existing connections and form new connections of the fact-to-be-remembered with other facts likely to recur and to suggest it.* This rule, though important, needs to be guarded. For, first, the greater the variety of facts indirectly or directly connected, the greater the likelihood that, in a given situation, an undesired image — or no image — will recur. If the nonsense syllable *mej* appears in the fifth place of a series which I am trying to learn, the fact that it has held second place in yesterday's series and eighth place in a last week's series makes it likely that, on trying to repeat to-day's list, I assign *mej* to second or eighth, not to fifth, place, or that I am altogether doubtful of its position. The formation, in the second place, of artificial connections is commonly of very questionable value, for such connections lack the very conditions of associative recurrence. It is futile, for example, to transfer one's ring to the middle finger for the sake of reminding oneself to wind the clock. Clock-winding and ring-on-third-finger are not normally connected in my experience, but occur together seldom, and there is therefore little likelihood that the sight of the ring, a few hours hence, will recall

precisely the image of clock-winding. Indeed, the artificial auxiliary image, expressly formed to suggest some other image, has a pertinacious way of absorbing attention and thus of preventing the association desired. If I try to remember Mr. Saltmarsh's name by 'connecting' it with the term 'Freshmeadow,' I am more than likely to strain our relations by calling Mr. Saltmarsh 'Freshmeadow' when next I meet him.

A final rule for memory has already been implied: *one should repeat the fact, or the series, or the group of facts to be remembered.* This rule is based on the principle underlying association that the frequently occurring experience is likely to be suggested, or remembered; and that it is also, by virtue of mere repetition, likely to be suggestive. However commonplace or naturally uninteresting the scene or the paragraph, let it often enough be repeated in one's experience and one is bound to remember it — perhaps to the exclusion of the vivider landscape or stanza. This is a truth of very great pedagogical importance. We know that naturally interesting and recent and frequent experiences are likely to recur. But the interest — that is, roughly speaking, the pleasantness or unpleasantness, or unusualness — of an experience is, for the most part, beyond our direct control. We cannot at will make our experiences vivid in order to remember them, nor dull their poignancy in order to forget them. And though we are often able to secure the recency of our experience — to refresh our memories and to 'cram' overnight for examinations — yet this sort of memory is notoriously evanescent. In repetition, on the other hand, we have a memory-method which is, in great degree, directly subject to our control and variation and which is also significant and relatively permanent in effect. With a sufficient number of repetitions one may remember, for a while

at least, almost anything; one may supplement associations which have been formed through impressive or through recent experiences; and one may even supplant harmful associations already formed. A child who often enough repeats, from the safe vantage-ground of his father's arms, the experience of stroking Jack, the dog, will in the end exorcise from his mind the memory of Jack's overrough welcome; and anybody may correct the most ingrained misspellings who will often enough copy the misspelled word in its proper form. Ordinary observation, supported by a certain amount of experimental study, suggests that this voluntary repetition of facts to be remembered is more trustworthy when slow than when fast. It is true that swift learning, when successful at all, is more effective than slow learning, in proportion to the time spent on it; but many series and groups of facts are too large to be learned at all after this fashion, and facts quickly learned — for example, Shakespearian lines and chronological tables 'crammed' for examination — seem to be forgotten far more quickly than facts more slowly acquired. Doubtless the great advantage of slow learning is that it facilitates what Miss Gamble calls 'good technique' in memorizing; and by this is meant, wisely distributed attention, artificial grouping, and emphasis upon the connection between terms in a series.

Experimental investigation has concerned itself especially with repetition as a factor in memorizing series and has supplied two corollaries to the theorem that repetition strengthens memory. These are: first, that *repetition has a diminishing effect:* that I learn more in the first few repetitions than in many later ones; second, that *repetitions are more effective if distributed than if massed* — that it is better, for example,

to repeat a stanza three times every hour for four consecutive hours than to repeat it twelve times on a stretch.

We conclude then that, for each one of us, there is good hope of cultivating the memory. By discriminating attention, by careful grouping of the diverse, one may wisely apprehend one's material; and by patient repetition one may increase the likelihood of its reappearance. Even the man with the wretched verbal memory should not give over hope of improving it; for an exact verbal memory is a priceless possession. A word may summarize, as no other can, a mass of details or may express a meaning which no other can carry. And a beautiful word-sequence on the lips or on the pen of a master of style has an irreplaceable music and charm.

CHAPTER VIII

RECOGNITION

I. Recognition as Personal Attitude

The word 'memory' is commonly used with two distinct meanings. "I remember" Schiller's "Erlkönig" when I can correctly repeat it; but "I remember" the teacher who set me to learning the poem when I recognize her, twenty years later, an unexpected figure in the Potsdamer Bahnhof. These two experiences, though very often combined, are utterly different and are therefore wisely distinguished by different names. In this book, accordingly, the word 'recognition' is used to indicate the consciousness of an object as identical with an object of my earlier experience, whereas 'memory' is used of accurate reproductive imagination, the repetition of former consciousness. Memory, in this sense, is very often supplemented by recognition, yet is possible without it. For example, I am remembering if I "see with my mind's eye" a vision of the Dent du Midi, even though I do not at the moment realize that this imagined mountain is called "Dent du Midi," or that I have ever before seen it. But I am recognizing when I say to myself, "I saw this mountain on a July day from the Montreux terrace," or even if I reflect, "I have seen this mountain before, though I don't know where or when." Recognition may accompany perception, and indeed every sort of experience as well as memory. The example just given is of recognition with memory; but

when in the summer of 1901 I actually saw the Dent du Midi, for the second time, I recognized it as the same mountain which I had first seen ten years before — and this was recognition with perception. Recognition is distinguished, also, as more or less complete. When I recognize a figure in a Paris crowd as one I have seen before, but try in vain to recall name or home or other association, this is very incomplete recognition. The recognition is relatively complete if, on the other hand, I recognize the figure as that, for example, of Professor Harold Höffding; if I recall that I first met him in the World's Fair Building at St. Louis in 1904; that he has written a book on psychology, a history of philosophy, and a philosophy of religion; that he has a son who is much concerned in problems of Danish education, and so on.

It is evident that there are indefinitely many grades of completeness of recognition, and it must now be shown that this completeness consists in the supplementation of recognition by associated imagination. Totally incomplete recognition, which occurs seldom (according to some psychologists, never), is that in which one perceives or imagines an object without any associated imagination of former place or circumstance. The recognition is nearly incomplete if there occur only a single supplementary imagination — for example, if the recognition of a face suggests one image only, that of a steamer-deck; it grows fuller if there follow more images — for instance, if the steamer-deck image is succeeded by the verbal image, "Devonian, 1902"; it is more nearly complete when there follow — probably after a pause and in a rush — still other images, verbal or concrete, for instance, the images of "Colonel Blake, Civil War veteran, travelling with a pretty young wife."

Supplementing imagination plays so important a part in

useful recognizing that some psychologists have described recognition as any experience supplemented by imagination. This account of recognition is, however, discredited by certain experimental studies. These show at least three types of recognition which would be impossible if the recognition consisted in supplementing imagination pure and simple. There are, first, cases in which imagination follows on the consciousness of an unrecognized object, as when I call an unfamiliar object by a totally incorrect name. Obviously, recognition cannot consist in the image of a word which does not have any connection with the object recognized. Cases occur, in the second place, in which the recognition precedes the supplementary imagination by a marked interval — in which, for example, an odor is recalled as familiar long before the imagination of name or of circumstance. Here, the recognition precedes the supplementary imagination and cannot, therefore, be identical with it. There are finally a few cases on record — too few, however, to be, in themselves, decisive — in which an object has been recognized without the occurrence of any supplemental imagining.[1] *

Up to this point, recognition has been described and illustrated in a more or less untechnical way. We must now discover and formulate its essential characters; and first of these is the emphasized persistence of the self in recognition. When I recognize, I regard my present self as experiencing in the present what I, this same self, experienced in the past. John Stuart Mill dwells on this character of recognition in a well-known passage about memory (by which, as will appear, he means what we are calling recognition).

* These Arabic numerals, throughout this chapter, refer to numbered paragraphs of Appendix, Section VIII.

"What is memory?" he asks.* "It is not merely having the idea of [a] fact recalled. It is having the idea recalled along with the belief that the fact, which it is idea of, really happened . . . and . . . to myself. Memory implies an Ego who formerly experienced the facts remembered, and who was the same Ego then as now." The consciousness of myself as 'same' through changing experience is thus an integral part of recognition.

We may next ask: Of what besides my persisting self am I conscious in recognition? in other words, what is the object of my recognition? Apparently it may be of any type. I may recognize a person; an external thing or scene; an impersonal rule or law; or, finally, my own experience as such. More carefully scrutinized, the object of recognition is person, thing, or impersonal fact regarded as identical with the same object experienced in my past. The object of recognition, in a word, is an object related to myself.

The structural analysis of recognition will form the final stage of this description. From perception and imagination, which (it will be remembered) are analyzed into elements mainly sensational, recognition is distinguished by the prominence of elements of a totally different sort, relational elements, as they have been called. The nature of these relational elements has next to be considered.

II. Recognition as Relational Consciousness

Relational Elements[2]

Some psychologists claim that structural analysis resolves our consciousness into elements wholly sensational; others

* Note 33 to Vol. II., Chapter XIV., Section 7, of James Mill's "Analysis of the Phenomena of the Human Mind."

hold that there are but two classes of elements: sensational elements, the color-qualities, taste-qualities, and the like, and affective elements, the feelings of pleasantness and of unpleasantness.* The element of attention, or clearness, is sometimes named in addition to these.† But many contemporary psychologists, including the writer of this book, are convinced that all these analyses are inadequate; that we have certain experiences which are not completely analyzed, even structurally, when the sensational and the affective elements and the attention, which form part of them, have been enumerated; that there are, in other words, elements of consciousness other than the sensational and affective elements and attention. These neglected elements of consciousness have been named relational, and it is not difficult to discover experiences into which they enter as significant part. When, for example, I try to match one green with another, my consciousness of greenness, of colorless light, of brightness, and of extensity are not the only elements of my consciousness. On the contrary, the consciousness of the likeness or difference of the given green as compared with the standard is the very essence of the experience. Again, when I think of a vibrating string as cause of a sound, the consciousness of causal relation is as distinct a feature of my experience as the sensational consciousness of pitch or of loudness.

But, easy as it is to point out experiences characterized by relational elements, the attempt to enumerate them discloses extraordinary obstacles. They have no special physical stimuli, and they are physiologically conditioned not by any end-organ excitation but by brain-change only — either by

* Cf. Chapter XI., p. 172, and Appendix, Section XI., § 1.
† Cf. Chapter VI., p. 94, and Appendix, Section VI., § 1.

the excitation of the so-called association centres, or by the excitation of transverse fibres, or in both ways.* On account of this lack of distinctive physical stimuli, the relational elements cannot easily be isolated and varied by experimental devices, since experiment must be applied to physical stimuli and not directly to consciousness itself.† In our study of these relational elements we are in great part, therefore, thrown back upon individual introspection — notoriously untrustworthy and at this point especially difficult. We are thus liable to mistake a relatively simple yet analyzable experience for one which is really elemental. For all these reasons it is unwise to attempt a full classification of relational elements. The following enumeration is incomplete, and indeed merely tentative. Of the experiences which it names, some, doubtless, are not wholly unanalyzable; but all are irreducible to merely sensational and affective elements: The experiences of 'one' and of 'many' are peculiarly constant elements of this class, that is, they seem to lie at the base of most relational experiences; and what James calls the 'feelings' [3] of 'and,' and of 'but' — that is, the consciousness of connection and of opposition — and the experiences of 'like' and of 'different,' of 'more' and of 'less,' are certainly relational experiences and are probably also elemental.

Few wide-awake adult experiences are destitute of these relational elements. Perception and imagination, for example, though predominantly sensational, are characterized, as we have seen, by a consciousness of unification (or together-ness) and of separateness.‡ And whenever, as in the experience

* Cf. Appendix, Section III. (§ 7).

† Cf. Chapter I., p. 8.

‡ Cf. Chapter IV., p. 66.

now under discussion, that is, in recognition, I am conscious of time, there the relational consciousness is significant. Psychologists who deny the occurrence of any elemental relational consciousness believe that recognition may be adequately described without recourse to it. When, for example, I recognize a certain picture in the Hague gallery, my consciousness includes, they hold, merely (1) the visual elements involved in my consciousness of the rich brown tints, the high lights, and the contour of the face; (2) the verbal imagination of the names of picture and of painter — "Homer," by Rembrandt; (3) the organic sensations due to my relaxed attitude as I come upon a well-remembered picture among many unfamiliar ones; and (4) a feeling of pleasure. But though all these are truly elements in my consciousness of the picture, by themselves they would not constitute recognition. To this belongs a simple, though not an elemental, experience, which may be named the consciousness of familiarity. It is hard to analyze, yet clearly characterized by non-sensational elements other than the affection of pleasantness, and attention. Like some sensational complexes, the consciousness of humidity, for example, it is so intimate a fusion of elements as to have an individuality of its own. But like that, too, it is after all capable of analysis into simpler parts, the relational consciousness of 'same' and of 'past.' In other words, the consciousness of an object as familiar, that is, the recognition of an object, seems to include, when reflected on, the consciousness of sameness with a past thing, and the recognition of an event means the awareness of 'this event identical-with-something-past.' Closely observed, therefore, every experience of familiarity is analyzable into these factors. This does not mean that we necessarily think of the words 'same'

or 'past,' but that we have special sorts of consciousness expressed by these words. The experience of sameness is relatively simple. The analysis of the consciousness of the past is far more difficult. It involves, like all consciousness of temporal relation, a realization of the 'moment,' that is, of the fact which is linked with other facts in two directions. But the 'past' is the irrevocable, unrevivable moment. The experience of the past may, therefore, be roughly described as the consciousness of an irrevocable fact, linked in two directions with other facts.

The study of volition will involve a consideration of another sort of relational consciousness of time, that is, the consciousness of the future.* But the chapter immediately following on this will discuss, instead, those impersonal forms of relational consciousness which are called thought. The results of the present chapter may be recapitulated in the statement that the recognizing self is (1) relationally conscious of (2) itself as persistent and of objects as related to its past. Comparing recognition with perception and imagination we find, therefore, that it differs mainly in two respects from both. It is, first, an explicit and emphasized consciousness of myself, and, in particular, of myself as persistent. Every experience, it is true, includes this consciousness of persisting self, but in perception and in imagination the awareness of self is unemphasized and unattended-to, whereas, in recognition, it is the centre and core of the consciousness. Recognition is, in the second place, an experience in which not sensational but relational elements are predominant.

A word should be said of paramnesia, so-called 'false

* Cf. Chapter XII., p. 219.

memory,' which is better named false recognition. It has two forms, perceptual and imaginative recognizing. An example of the first is the 'been-here-before' feeling which sometimes overwhelms us when we enter strange places and new scenes. Rossetti has vividly described this experience: —

> "I have been here before,
> But when or how I cannot tell:
> I know the grass beyond the door,
> The sweet, keen smell."

In the second type of paramnesia one "recognizes," as belonging to one's past, imaginations which correspond with no past occurrence. Many of our dream imaginations and many experiences of the mentally deranged are of this type; but even commoner illustrations of it are the inaccurate testimony and the fictitious 'recollections' of perfectly honest people. Nicolay and Hay, the biographers of Lincoln, are quoted as saying, from their experience in editing recollections, that "mere memory, unassisted by documentary evidence, is utterly unreliable after a lapse of fifteen years."

CHAPTER IX

THOUGHT: CONCEPTION

THE words 'thought' and 'thinking' are often on our lips and are used with many shades of meaning. To begin with: 'thought' is often identified with 'consciousness,' and is thus contrasted with 'matter' or 'extension.' This is the meaning which Descartes gives to the word in his famous proposition: "Cogito ergo sum." Again, 'thinking' is often used to describe all non-perceiving consciousness: "What are you doing in the dark?" some one asks me; "Just thinking," I may answer — and 'thinking' here means imagining, indulging in revery. The psychologist, however, is wont to use the terms in stricter and narrower fashion and to mean by 'thinking' not consciousness in general, but a form of consciousness to be distinguished as well from imagination as from perception — namely, the consciousness of objects as related to each other. The thinking self is the self (1) relationally conscious (2) of related objects which (3) it knows, reflectively if not immediately, as objects, also, of other selves. We shall consider these characters of thought in a slightly different order; and shall begin by seeking illustrations of the difference between perception and imagination, on the one hand, and thought, on the other. I see or imagine a strawberry and a tomato; a scaly lobster; an electric drum which revolves after I touch a button. But I think about the likeness of strawberry to tomato; of the class of crustacea; and of the causal

connection between electric contact and moving drum. In my thinking I am, in other words, attentively conscious not of color, sound, or fragrance, nor of happiness or unhappiness, but of likeness, of causal relation, or of logical grouping.

The related objects of thought may be of any sort, personal or impersonal, external or non-external, public or private. I may, for example, compare (and thus think about) selves, about things, about formulæ, even about my own experiences. I think about these objects, however, as related, and as related not to me but to each other. Otherwise stated, the relation is impersonal, even when the related objects are personal. Herein thought-objects are sharply distinguished from recognized (or familiar) objects, from the objects of my love, my hate, and my other emotions, and from the objects of my will. Of all these objects I am directly aware as related to myself; whereas, in thinking, I am only vaguely conscious of myself but attentively conscious of the objects, as related.

We have next to notice that thinking is not, like imagination, a 'private' experience. As in the case of perception I am conscious, either immediately (during my thinking) or reflectively (as I look back on my thinking), that I am sharing the experience of other thinking selves.[1]* Otherwise stated: thought-relations are public, universal, not peculiarly my own. There is something private and particular about my reveries and my day-dreams, but my thoughts are never regarded as personal property. My castles in Spain are private dwellings, but the great halls of thought swing wide to

* These Arabic numerals, throughout this chapter, refer to numbered paragraphs of Appendix, Section IX.

every comer. This is most readily illustrated from the more abstract sorts of thinking, and the most striking of all examples are from logic and mathematical science. No man appropriates the multiplication table or the axiom that things equal to the same thing are equal to each other, or the theorem that the sum of the angles of a triangle equals two right angles, as an experience peculiar to himself.

The character of thought which has still to be emphasized is revealed by a structural analysis. My consciousness of objects as related is distinguished by elemental experiences of a special sort — relational experiences, or feelings, as the preceding chapter has designated them. These feelings of likeness and of difference, of totality, of opposition, are experiences as distinct as the sensations of blue, of noise, of saltness, and the affective feeling of pleasantness. There are no physical stimuli, and no well-established or finely differentiated neural phenomena with which we may coördinate them; but they are all, none the less, distinct experiences, and not to be resolved into sensational and affective elements. There are as many kinds of thinking as there are impersonal relational experiences, and these forms of thinking are most readily grouped according as their objects are temporally or non-temporally related. Causal thinking, involving a reference to temporal order, belongs to the first class; comparison, the consciousness of objects as like or different or equal, is a form of non-temporal thinking, for 2×2 is 4, and white is other than black, not now or to-morrow, but without any reference to time. To discuss in detail all the forms of thought would carry us beyond our limits. We shall, therefore, consider only three: conception, judgment, and reasoning.

I. Conception

a. The Nature of Conception.[2]

Conception is the relational consciousness (reflectively attributed to other selves also) of a group or of an object as member of a group. Conception is, indeed, distinguished from all other kinds of consciousness by its generalized object. I perceive or imagine, for example, my own striped pussy or the pumpkin on the kitchen table, but I conceive the class 'cats,' or 'any pumpkin.' Conceptions of both sorts are the terms, as will appear, of general judgments expressed in such propositions as "cats eat mice," or "pumpkin is for making pies."

The relational experiences especially distinctive of conception are the experiences of generality. These are two (corresponding with the two sorts of object of conception): the consciousness of class, and the consciousness of 'anyness,' that is, of membership in a class. Thus, my consciousness of the pumpkin includes not only (1) the sensational consciousness, probably indistinct and shifting, of the yellowness, smoothness, and roundness of the pumpkin and (2) the vague relational consciousness of oneness and of distinctness — for if this were all, conception would not be structurally different from perception and imagination — but also (3) one of the two relational experiences of generality, the consciousness of class or the consciousness of 'any.' Neither of these is a strictly elemental consciousness. The first is the consciousness of the oneness of many similars, and therefore involves at least three elemental experiences. The second is the consciousness of similarity to the many forming a group, and is consequently even more complex. But somewhat as the sensational consciousness of quality, the consciousness of intensity, and that

of extensity fuse in a sensation, so the relational elements fuse in a consciousness of generality.

Conception may be described either in terms of its object or in terms of the elemental kinds of consciousness into which it is structurally analyzable, for the two sorts of description are, roughly speaking, parallel. From the first point of view, conception is classified by reference to the common features of the class which constitutes its object; according to structural content, conception differs in that the consciousness of generality attaches to one or another of the experiences into which the conception is analyzable. It would be foolish to attempt an exhaustive enumeration; but three important types of conception must be named. These are (1) *verbal*, the consciousness of a class (or member of a class) whose common character is a name; (2) *relational*, the consciousness of a class (or of a member of a class) whose common character is a relation — say of order, opposition, or degree; (3) *motor*, the consciousness of a class (or member of a class) whose common character consists in this, that each one of the class calls forth a similar bodily reaction. These descriptions are in terms of the object of conception. Described from the standpoint of structural analysis, *verbal* conception is the perception or imagination of a word, supplemented by a feeling of generality; *relational* conception is that in which the consciousness either of class or of 'anyness' attaches itself to a predominantly relational experience; *motor* conception is conception in which the consciousness of bodily reaction is the significant and characteristic centre to which the consciousness of 'class' or of 'any' attaches.

Verbal conception is said to occur in all abstract thinking. The conceptions of 'justice,' of 'power,' of 'benevolence,' may

consist mainly of verbal imagination augmented by a feeling of generality. Yet the rôle of verbal imagination in thinking has probably been overemphasized; and abstract conception is doubtless more often relational than purely verbal. When, for example, in studying logic or theoretical natural science, I conceive order, series, function, force, or causality, my consciousness is best described as a relational experience accompanied by the consciousness (also relational) of generality; and the object of my thought is rather a relation than a word.

Concrete conception is in great part of the motor type. The generalized feature of my 'hat,' for example, is not the material, or color, or form, because no one of these is common to the innumerable, widely different objects known as hats. Between the minister's silk hat and his wife's picture-hat with the ostrich feather there is, in fact, little in common except the characteristic motor reaction called forth by each. The hat is thus the 'to-be-put-on-the-head,' and this imagination of bodily reaction is probably the part of my consciousness of 'hat' which is accompanied by the experience of generality and followed by a series of images, — of mortar-board, cardinal's hat, and peasant's cap, — very different objects, similar in this one respect, that they are things to be put on the head. In the same way, foods differ in every conceivable particular of color, form, and consistency, but agree in calling forth a common system of bodily movements. The generalized feature of the object 'food' is thus the fact that it is the 'to-be-eaten.' In the same way, the pen is the 'to-be-written-with,' the flower is the 'to-be-smelled' or 'to-be-picked,' the chair is the 'to-be-sat-down-in.' [3]

A final teaching about conception is the following: The

conception belonging to a given moment is associative of a series of images of closely resembling objects.[4] In other words, a conception forms the starting-point for a series of partial associations. This mark of conception, it will be observed, is not a constituent feature but a function of it — not a part of it, but a result of it, as it were. There can be no doubt that a conception is, as a matter of fact, followed by a series, longer or shorter, of images of objects said to belong to a class. The conception of 'boat,' for example, suggests a panoramic series of images of canoes, sloops, fishing schooners, and warships; and the conception of 'bag' is followed by a rapidly shifting procession of images of travelling bag, shoe bag, rag bag, knitting bag. This function of suggesting the images of similar objects is often expressed by saying that a conception, or generalization, "represents" or "stands for" a group of similar objects. Herein it is sharply contrasted with ungeneralized perception or imagination. My perception of one particular kind of opal ring is likely to associate an imagination of the odd little shop in "la rue de la Grosse Horloge," where I bought the ring, and this in turn may be followed by the image of the friend who incited me to buy it and by the memory of her disquisition on ancient gems. The images succeeding on perception or imagination may thus be of objects very different from each other and from the initiating experience. In the case of conception it is otherwise. The conception 'ring,' for example, associates a series of images of rings, each resembling all the others in the possession of certain common qualities, and the conception 'theorem' is followed by the consciousness of propositions and of figures from the different books of Euclid, each more or less similar to the rest.

b. The Uses and Dangers of Conception

There is no more insistent mental impulse and no more persistent mental habit than that of framing conceptions. Once I have learned to generalize I am eager to refer every new object, event, or situation to its class, and to regard it as 'any' or as 'one of a group' and not merely as 'this.' I see an oddly shaped piece of metal; it is an irregular, oblong object, silvery, carven, hollow: I am uneasy until I classify it as a vase or as a tea-caddy or as a paper-weight, that is, until I group it with other objects similar to it in few or in many characters. Or I find, as I walk for the first time in the Maine woods, a flower which I never have seen, and I do not rest until I group it with the orchids, regarding it not as a single individual but as one of a class.

This ineradicable tendency has its justification, and — in a way — its explanation, in the significance of conception in the mental life. It is true that by conceiving I in no wise enlarge my experience — that is, I learn nothing in the technical sense of the word 'learn'; but, on the other hand, I wisely sort out and distribute and preserve the results of past experience. In a word, conception is a form of mental thrift, a canny economy of one's mental attainments. It will, however, appear in the next chapter that the general judgment (which is merely the conception supplemented by a feeling of wholeness and analyzed by discriminating attention) is an important constituent of reasoning;* and in this way conception, like memory, though itself a preserving function, lays the foundation for creative experience, for acquisition. It will be shown, also, in our study of will, how conception

* Cf. Chapter X., pp. 148 ff.

simplifies choice by helping us to subordinate particular possibilities of thought or action* to classes which we have earlier chosen or rejected. In brief, generalization groups objects of our consciousness, and the result of this grouping is that a single pulse of attention covers a mass of phenomena that must otherwise be dealt with singly, at great loss of time, or utterly neglected.

It will later be shown that conception has a social as well as a mainly individual value in that it facilitates intercourse between conscious beings by making possible conventional language.† Conception aids intercourse also in an even more fundamental way. We communicate with people the more readily because we and they form conceptions. For in conceiving we lay stress on common experiences and we abstract from that which is peculiar to ourselves. Thus, we may talk or write to people who have met few or none of the particular objects of our acquaintance precisely because we have common conceptions; because, for example, we mutually know 'friends' and 'foods' and 'amusements,' though we have no common friends, and live on different fare, and amuse ourselves in very different ways.

It is time to turn from this enumeration of the advantages to a consideration of the dangers of conception. Conception is, as has appeared, a form of generalization, and may therefore menace the life of imagination, of reasoning, and of emotion. We are best fitted, at our present stage of progress, to understand the first of these perils. The fundamental excellencies of imagination are vividness and accuracy of detail. Conception, on the other hand, implies indistinctness and vagueness

* Cf. Chapter XII., p. 229.

† Cf. Chapter X., p. 162.

of sensational detail. My conception of andirons may be, to be sure, an imagination (supplemented by a feeling of generality) of andirons; but the sensational experiences of color, of shape, and of surface, are far less vivid and detailed than in concrete imagining. Indeed, if I were vividly imagining the andirons, I should be absorbed in this particular experience; it would no longer 'stand for,' or associate, a lot of similar images; it would be a 'this' not an 'any.' Evidently, therefore, one never forms a conception save at the expense of one's imagination; and it follows that one should never generalize when sensational richness is one's chief concern. Obviously, also, conception is peculiarly opposed to creative imagining, the consciousness of the novel, for to conceive is precisely to ignore what is new, to seize on every novel object, scene, or event, and triumphantly to shut it in with its predecessors in a pigeon-hole already labelled. It is, of course, true that conception may effectively work over the products of creative imagination, but too exclusive occupation with the general leaves no scope for originality or initiative. For a similar reason, conception imperils emotion and will. These, as will later appear, are intensely individualizing experiences, whereas conception, ignoring differences, reduces people and objects to groups and to classes. There is, thus, a double reason why the artist should eschew generalizations. For the work of art should be an embodiment of the imagination of its maker and an incitement to the æsthetic emotion of the observer; and both imagination and emotion are particularizing experiences which have no concern with the general as such.

Yet conception, rightly guarded, is of highest importance to us. For though our lives are mere colorless routine if we

generalize where we ought to cherish the vivid and the individual, yet our lives are chaos unless they are ordered by the awareness of rule and group. Without encroaching on the province of imagination we may wisely, therefore, train ourselves to frame useful conceptions. And such training will be gained both by attention to similarities of appearance, behavior, and relation, and by the attempt to follow general reasonings as embodied in scientific and philosophical works.

CHAPTER X

THOUGHT (*continued*): JUDGMENT AND REASONING

II. JUDGMENT

By 'judgment,' as the term is used in this book, is meant the relational consciousness of a whole as including or excluding certain emphasized features, an experience reflectively known as shareable with other selves. The term 'judgment' is used, also, both technically and popularly, to indicate affirmation or belief; but, in the opinion of the writer, no other single word can express the consciousness of a whole, and it is better, therefore, to use 'judgment' in this sense, leaving to the word 'affirmation' the other function. From the definition just formulated, it is evident that judgment, structurally regarded, is a complex of elements of consciousness, characterized by the relational experience of 'wholeness.' The related object of judgment may be of any type: external thing, other self, inner experience; I may, for example, make judgments about my hat, my friend, or my theory — that is, I may regard any one of the three as a complex whole and may emphasize by my attention a character included as a part of this whole or else excluded from it. The judgment whose object is an external thing evidently is a perception, an imagination, or a concrete conception, supplemented by the consciousness of wholeness. The distinction between these different sorts of consciousness of external thing is vague and shifting. For

example, I look off at a gray church spire, half a mile below me, and have a consciousness of grayness, form, roughness, oneness, and limitedness. I do not reflect upon this object nor analyze it; and no one part of it — grayness or tapering height — impresses me more than another. So far, then, my experience is mere perception. But now, for some reason, the grayness of the spire draws my attention; I lay little stress on its form, but I am interested in its color, — in other words, I have an 'abstract notion' of the color. Finally, however, I am conscious of the grayness as a part of the spire, as belonging to it, as forming with its shape and other features one whole; and now for the first time I am judging, conscious of a complex as a whole inclusive of an emphasized part. Perception and perceptual judgment alike are distinguished, first, from abstraction by their complexity, and second, from the total sensational complex by their limitedness. But judgment is distinguished from perception by the added feeling of wholeness, and by the invariable emphasis of some part within its total or of some excluded factor. The three sorts of experience — perception, abstraction, perceptual judgment — may be represented in words, by the expressions: "I am conscious of this gray spire," ". . . of grayness," ". . . that this spire is gray." The propositional form of the last clause emphasizes both the totality of the object of the judgment and the emphasized part of it. These are examples of particular judgments, A similar general judgment would be expressed in the words, "I am conscious that Gothic spires are gray."

Judgments are classified in several ways.[1] * To begin with, they are, as has just appeared, (1) particular or general,

* These Arabic numerals refer to the numbered paragraphs of Appendix, Section X.

according as they start from perception (or from imagination) or else from conception. Judgments are grouped, in the second place, as (2) positive or negative, according as an emphasized factor is included or excluded from the object of the judgment — that is, from the whole of which, in judging, one is conscious. Judgments, finally (3), may be classified from the manner of their formation, as analytic or synthetic, that is, as judgments of reflection or of discovery. An analytic judgment is the result of attention to a whole (external thing, or self, or my own experience). For example, I have seen shadows on the snow a hundred times, but at last I emphasize, by attention, the distinctly blue color of the shadows cast by tree trunks; and then for the first time I make the judgment expressed in the words, "the shadows are blue." I am then definitely conscious of the whole "blue shadows," within which I emphasize the character of blueness. I may make, in similar circumstances, a negative analytic judgment if I am conscious that "the shadows are not gray." In this case the 'judgment' is rather to be described as complex of succeeding imagination upon persisting perception (or upon imagination) than as simple perception or imagination. For example, this experience of being conscious that "the shadows are not gray" is a succession of the imagination of gray shadows upon the perception of blue ones. The feeling of wholeness attaches to the perception of blue shadows; but the emphasis of attention falls also on the excluded character, the grayness.

A synthetic judgment arises through the successive consciousness of different objects. In the positive synthetic judgments the two objects are then regarded as parts of one whole. Thus, on the perception of a toad quietly sunning

himself follows my perception of his mouth opening to engulf a fly. The character of eating flies forms, henceforth, a factor of the whole, 'toad eating flies,' which is the object of my judgment. In this case (of synthetic judgment), though the judgment is reached by a sequence of perception on perception, the judgment itself is complex perception or imagination (with emphasized part), characterized by feeling of wholeness. It should be noted that the object of a judgment may conceivably include more than one emphasized part. Since, however, our attention is very limited, it is probable that the greater number of judgments include, psychologically as well as logically, but a single predicate. The judgment, for example, "paramecia are unicellular and have but one form of reaction," though expressed in a single proposition, is, for most of us, two judgments, in which the feeling of wholeness attaches successively to the consciousness of the complex objects, 'paramecia-unicellular' and 'paramecia-reacting-in-one-way.'

One final distinction must be noted. Negative judgments are always analytic, for they can be framed only on the basis of such experience as makes a judgment analytic. I can attribute a character to an object, though I have never before been conscious of the two together — for example, I can make the synthetic positive judgment, "some water-lilies are pink"; but I cannot exclude from an object anything which I do not first imagine as belonging to it. Thus, the judgment, "these water-lilies are not white," involves an earlier percept or image of water-lilies as white; and the judgment, "this soup is not hot," implies that soup should be hot, that is, it implies a former acquaintance with hot soup. These are, therefore, analytic judgments.

III. Reasoning

a. The Nature and Classes of Reasoning

Judgment is best known in the form of reasoning. We seldom reflect upon the single judgment, the mere consciousness of discriminated wholeness in our immediate perception and imagination, but we notice the continuous judging which we call reasoning. A reasoning, or a demonstration, is a succession of judgments leading to a new judgment. It has two main forms — deductive reasoning, in which the concluding judgment is narrower in scope than some one of the preceding judgments, and inductive reasoning, in which the conclusion is wider than any preceding judgment. These distinctions must be illustrated and elaborated.

The objects of the succeeding judgments of deductive reasoning are related in the following way: each of the partial objects forming the total object of the conclusion, or final judgment, has been combined (as object of a preceding judgment) with another partial object, the 'middle term'; and this middle term does not form an emphasized part of the object of the conclusion. The objects of these succeeding judgments may be symbolized thus: *xy*, *yz*, *xz*, where *y* stands for the suppressed middle term. In more concrete fashion, this description of deductive reasoning is illustrated by any actual instance. Suppose, for example, the successive judgments expressed in the following propositions: —

My table bell does not ring.
It is an electric bell.
An electric bell with renewed battery rings.
My bell, with renewed batteries, will ring.

Here the first judgment is the consciousness of the bell, with emphasis on the excluded character of ringing. The second judgment is an accentuation of still another character of the bell — the fact of its being an electric bell, and consists in the consciousness of the bell as a whole, with special stress on the fact of its electric connections. In the third judgment most characters of the bell are unattended to, but the consciousness of it as electric is still emphasized and is supplemented by a new consciousness, that of connection with renewed batteries. Finally, in the conclusion, the character of the bell as itself electric is relatively unaccented, but the two characters successively connected with this, (1) that of the bell as ringing (or not ringing) and (2) that of the bell as connected with a renewed battery are realized as emphasized parts of the whole, 'table bell which rings because connected with renewed batteries.' Thus, the concluding judgment is the realized connection of the terms of two preceding judgments; each of these terms was previously connected with a third term, now unemphasized; and the whole experience is properly called 'deductive reasoning' or 'mediate judgment.'

Inductive reasoning is less complex. A series of parallel, particular judgments is followed by a judgment, general or particular, more inclusive than any of the preceding judgments. From several observations, for example, of the fact that sal ammoniac added to the batteries makes the bell ring, I formulate the general judgment expressed in the proposition, "all electric bells ring when the batteries are renewed." Such inductive reasoning is thus expressed in a syllogism of the following sort: —

The electric bell in the physiological laboratory rang when sal ammoniac was added to the battery.

The electric bell in the laundry rang when sal ammoniac was added to the battery.

The electric bell in the fire-engine house rang when sal ammoniac was added to the battery.

All electric bells ring when sal ammoniac is added.

It is clear that induction is a normal precursor and preliminary to deductive reasoning. For example, the conclusion of this inductive syllogism about electric bells forms part of the deductive reasoning about the table bell. All scientific reasoning is, in truth, a combination of induction with deduction — a series of particular judgments leading to general conclusions followed by the application of these conclusions to still other particulars. The law of the conservation of energy, for example, was formulated as a result of successive judgments, based on observation. The repeated observations of Carnot, Joule, Mayer, and Helmholtz, that mechanical energy is convertible into an equal amount of heat led to the formulation of the general principle that "to create or annihilate energy is impossible and that all material phenomena consist in transformations of energy." The law, once formulated through induction, was applied to energy of all sorts — of light, of electricity, of magnetism; and again these deductions have been inductively established. Thus, induction and deduction supplement each other in all effective scientific procedure. It must be noted, however, that deductive reasoning is not universally based on induction. Instead, it may be based upon judgment immediately known as universal. An example is expressed in the following syllogism: —

Angles *A* and *B* are alternate internal angles.
Alternate internal angles are equal.
Therefore *A* and *B* are equal.

Here the second judgment is perfectly general, or universal, but its universality is not derived from the enumeration of many instances of equal alternate-internal angles.

Reasoning, whether deductive or inductive, may consist of varying combinations of many sorts of judgment. The judgments which it includes may be positive or negative, particular or general, analytic or synthetic. In the example of page 148, for instance, the first judgment is negative, the others positive; the first, second, and last are particular judgments referring to my own table bell, but the third is a general judgment, the consciousness of an important character, connection with renewed batteries, of the whole class of ringing electric bells. The final distinction, that between analytic and synthetic judgments, since it concerns only the manner of formation, not the character of the finished judgment, is not readily expressible in words. It is, however, probable that the first and third of these judgments are synthetic, and that the fourth is analytic. The second judgment may be either analytic or synthetic. It is the business of formal logic to study separately these different forms of reasoning in order to distinguish them as valid or as invalid. Thus, the logician teaches that reasoning is illicit if it is made up entirely of negative judgments, or if the conclusion is wider in scope than the premises taken together. Psychology, on the other hand, studies actual cases of reasoning irrespective of their validity or invalidity, taking account primarily of the way in which people do reason, not of the way in which they should reason.

But though the psychologist may concern himself with all sorts of reasoning, it will be convenient to select for discussion the especially effective type of deductive reasoning — founded often on induction — which may be known as analytic-synthetic reasoning. It consists of the following order of judgments: there is, first, an analytic judgment in which some one feature of a whole object is singled out and brought to the foreground of attention; second, a synthetic judgment whose object is the emphasized part of the first judgment's object combined with some new character; and, finally, a judgment whose object is the originally unanalyzed whole, supplemented by this new character. Analytic-synthetic reasoning may thus be described in the words which James applies to judgment in general, as the 'substitution of parts and their implications or consequences for wholes.' One concerns oneself, for example, with the question of the restriction of the power of the British House of Lords. One's consciousness of the House of Lords is highly complex and very vague: it includes visual imaginings of hall and of figures, many verbal images, and relational consciousness — in particular the experience of wholeness. If any conclusion is to be reached, it must be by the emphasis of some one feature of that complex object, the House of Lords — the fact, let us say, that it is a hereditary house. At once the simpler consciousness of 'hereditary house' suggests (as the consciousness of the more complex object had failed to suggest) that a hereditary body under constitutional government should not interfere with legislation. This character supplements the initial object of judgment, the British House of Lords, and is realized as forming with it a whole. We have, therefore, as expression of this reasoning, the syllogism: —

The British House of Lords is a hereditary house;
Hereditary bodies should not interfere with legislation;
The British House of Lords should not interfere with legislation.

A final remark must be made. It must expressly be noted that a given result may often be reached without reasoning as well as through reasoning. The consciousness of a given situation may be followed immediately, without intervening judgments, by a judgment similar to that to which one might have reasoned. The perception that my bell does not ring might, for example, be followed immediately, without intervening analysis, by the consciousness of adding sal ammoniac to the battery. This would be a case of associated imagination and would be explained through the fact that I had previously seen a broken bell repaired after this fashion. Cases of supposed reasoning, for example of animal reasoning, are often immediate associative imagining, without the analysis and the mediate judgments involved in reasoning. The next section will compare these two sorts of mental procedure.

b. The Uses and Dangers of Reasoning

The most efficient form of reasoning is the combination of analytic judgments of reflection with synthetic judgments of discovery. Reasoning of this sort is an important kind of self-development, or learning, a means of acquiring new outlooks, new points of view, new bases for action. Analytic-synthetic reasoning attains these ends by means of the analysis involved in the first judgment. For this judgment, since it is analytic, emphasizes a quality or an attribute within a whole object or situation; and because this discriminated part is

less complex than the total in which it belongs it has fewer possible consequences; and because it has these definite consequences, the analytic judgment is likelier than a more complex experience to form the nucleus of a second judgment. When, for example, I judge that a certain mosslike substance is animal, not vegetable, — that is, when I emphasize its animal characters — I readily reach conclusions impossible by mere observation of it as a whole. All this is clearly taught by James.* "Whereas the merely empirical thinker," he says, "stares at a fact in its entirety and remains helpless or gets 'stuck' if it suggests no concomitant or similar, the [analytic] reasoner breaks it up and notices some one of its separate attributes. This attribute has . . . consequences which the fact until then was not known to have."

This enumeration of the uses of analytic-synthetic reasoning will be checked by a very natural question. It has been pointed out that this sort of reasoning is not the only method, though the usual one, of enabling us to reach new results. For it is always possible that immediate judgment may replace even analytic reasoning in any given case. One man may gain by a flash of intuition the same result which another attains only by the closest reasoning; and the bare result is as valuable in the one case as in the other. But granting that the mediate method of analytic reasoning is not the only way of attaining the adequate solution, there still remain several unassailable advantages with the analytic reasoner. His results, in the first place, are readily repeated. Intuitions, that is, immediate judgments or mere associations, occur we know not how; and we cannot reproduce them at will. The result which a man has reached by an unexplained

* *Op. cit.*, Vol. II., p. 330.

association, once forgotten, is beyond his voluntary control. On the other hand, he can repeat at will the reasoning founded on close analysis. A student has forgotten, let us say, the accusative singular of the Greek word, ἐλπίς. He remembers, however, the reasoning process by which he first fixed in his mind the fact that third declension nouns in -ις, when accented on the last syllable, have the lengthened accusative, to avoid the abrupt stop. Thus the accusative ἐλπίδα, forgotten in itself, is remembered as one link in a chain of reasoning. In the same way, one can repeat a geometrical demonstration, though one has forgotten it, by beginning with the close analysis of the figure; one can recover the lost date, by reasoning from some fact associated with it, by arguing, for example, that, a statesman who smoked could not have lived before the reign of Queen Elizabeth. It behooves, therefore, even the person of quick intuition and of ready memory to train his reasoning power. The flash of inspiration may be more brilliant, but is surely far less steady, than the light of reason. The Aladdin rôle in the mental life is no sustained part; the genius which appears at one's first bidding may well forbear to come at a second summons. In plain English, the power to analyze and to reason is relatively stable, whereas unreasoned association is capricious and untrustworthy. It is, therefore, the part of wisdom to secure a reasoned theology or scientific system or practical philosophy, precisely because one thus has the chance to review and to recall it.

This suggests another advantage of reasoning over immediate association: the opportunity which it offers to the candid person to revise and to amend his results. The most dogmatic and unyielding of individuals is the man who has

jumped at his conclusions. He is naturally tenacious of them, because he has no idea how he came by them and no hope of gaining any others if he lets them go. So the most ardent sectarian is the one who doesn't know the *raison d'être* of his own sect, and the most zealous political partisan can give you no reason for his vote beyond the utterance of a talismanic name or symbol. It would be too much, of course, to claim that every reasoning person is open-minded; but it is quite fair to say that only persons who reason are open-minded. For nobody can reverse his decision who cannot retrace the path of deliberate reasoning which has led up to it.

So far, only the mainly individual advantages of reasoning have been considered. Reasoning has, none the less, a distinctly social value. For the reasoner has at least a fighting chance of sharing his results with other people's. The lucky man who guesses correctly may be brilliant and inspiring, but he cannot well be convincing. He may be absolutely certain that prohibition does not prohibit, or that Sophocles is greater than Aeschylus, or that Hegelianism is absurd; he can even temporarily impose his enthusiastic beliefs on other people, but he cannot work permanent change in their intellectual convictions. We are constantly hearing that argument is futile, and yet there seems no other way of effectively sharing one's conclusions.

It would, however, be unwise to conclude that the results of reasoning are inevitably good. On the contrary, there is always danger lest deductive reasoning be trivial, and lest inductive reasoning be misleading. Deductive reasoning, in the first place, is a waste of time if it is concerned with unimportant matters which are as well turned over to the swifter process of associative imagination; and deductive

reasoning is deadening and dulling when it chokes the spontaneity of imagination. There is no more tiresome human being than the man who insists on arguing every unimportant detail. Even greater peril attends the abuse of inductive reasoning — namely, incomplete induction based on scanty and overhasty observation. General conclusions, inadequately established yet obstinately cherished, are terrible barriers in the way of progress. Indeed, strictly speaking, no absolute certainty attaches to a general proposition based on an induction. As Hume says, "experience can be allowed to give direct and certain information of those precise objects only . . . which fell under its own cognizance;" and it is very rarely possible to examine directly all instances referred to in an inductively grounded universal judgment. One cannot, for example, measure the results of all transformations of energy; and one cannot observe that every particle of matter in the universe attracts every other. The highest degree of probability attaches to the great inductions of science; and there is undoubted utility in inductions based on fewer observations, provided such inductions are used purely as working hypotheses to be thrown aside when found to conflict with fresh observations. But there is absolutely no excuse for the hasty induction except as starting-point for further investigation. The progress of science has been constantly obstructed by this over-tenacious clinging to the results of incomplete inductions — to the corpuscular theory of light, for example, or to catastrophism as explanation of the extinction of prehistoric forms of life. And the progress of culture is perpetually retarded by the hopelessly persistent generalizations of shallow thinkers and superficial observers. Hasty inductions about people and

nations are especially unsafe, because human beings, as compared with physical phenomena, are peculiarly irregular in behavior. And yet books about America and France and Turkey are still written as the outcome of three-months' observations and we are still taught that all Frenchmen are insincere, that all Americans are materialistic, and that all Germans are musical. To be sure, many observations contradict all these conclusions, but the motto of the inveterate generalizer has been well stated in the words, "If the facts don't correspond with my theory, so much the worse for the facts." The truth is that there should be no exception to the rule: inadequate inductions are never to be made except as basis for necessary decision or for further scientific testing.

c. Bodily Conditions and Accompaniments of Thought — in Particular of Reasoning

We reminded ourselves at the outset of our study that physiological and psychical phenomena seem to correspond closely, and that the human body is the most constant of the objects of our perception. Accordingly we undertook to classify and, as far as possible, to explain the facts of our consciousness by constant reference to regularly preceding, accompanying, and following bodily processes. We have now to carry out this part of our programme with reference to thought, and in particular with reference to reasoning. So far as brain processes are concerned, little need be added to what has been said about the brain conditions of relational experience.* More obviously significant than these hypothesized brain conditions are the observable bodily reactions which accompany thinking. They vary, of course,

* Cf. Chapter VIII., p. 128.

with the different forms of thought, but we should notice especially first, the habitual reactions called forth by conceptions (as by perceptions);* and second, the delayed and often hesitating reactions which accompany reasoning. The habitual movements corresponding to our conceptions have been discussed in the preceding chapter.† The hesitating reactions of reasoning demand further comment. As contrasted with the relatively immediate reactions which accompany our perceiving, our imagining, and even certain forms of thinking, — swift comparisons, for example, — the outward behavior in reasoning is markedly slow. Let us suppose, for example, that a boy jumps into his dory and pushes off for a row. To place the oars in the rowlocks is a reaction, coördinated through experience, which follows at once at sight of the oars. But suppose that the oars have been left behind, and that he reasons out, somewhat as follows, the way of getting back to shore: —

An oar is simply an oblong board;
Any oblong board will serve as oar;
The seat or the board in the bottom is an oblong board;
The seat will serve as oar.

The bodily reactions which accompany this reasoning do not follow instantaneously on his consciousness that the oars are gone. There is perhaps a moment, while he is thinking of the forgotten oars, when he makes no movement; then his eyes wander from one end to the other of the boat; then he grasps the board in the bottom of the boat and tries in vain to pry it up; finally he loosens the seat and begins awkwardly

* Cf. Chapter V., p. 88.
† Cf. Chapter IX., p. 138.

to paddle with it. Such a series of bodily motions is sharply contrasted on the one hand with the instantaneous and co-ordinated reaction which would have followed on the perception of the oars, and on the other hand with the equally immediate but uncoördinated, chaotic, excited reactions which would have accompanied a mainly emotional (that is, frightened), unreasoning consciousness that the oars were gone.* In this latter case there would have been no pause, no regular movements of eyes and hands, but rather excited, interrupted movements — shrieks, excited waving of the hands, jumping from one end to another of the boat. Conceivably, one of these excited movements might have turned out to be successful in getting the boat to shore, — for instance, he might accidentally have seized the boat-hook, have swept it back and forth in the water, and so have brought himself toward land, — but this success would have been neither a result nor a proof of his having reasoned out the way of reaching the shore. It would have been the accidental outcome of the random movements that accompany emotional consciousness.

The obviously hesitating and delayed character of reasoning reactions has furnished to comparative psychologists an important objective criterion of the occurrence of reasoning in young children and in animals.[2] Untechnical observers incorrectly suppose that the spontaneous, untaught performance of any successful action, which is not an instinctive response, is in itself a proof of reasoning. Accordingly, a dog who opens a new gate or who, unbidden, brings a sponge when his master is bailing out a boat is held to reason. The objection to this conclusion lies in the fact that the animal may have performed the supposedly reasoned act either

* Cf. Chapter XI., p. 206.

through accidental immediate reaction or else through memory, not through reasoning. The dog who brings the sponge has, presumably, often seen the sponge both in the boat and in the shed to which he runs to fetch it; immediate association without reasoning suffices to explain his action. And the dog who opens the gate may have opened it first by an accidental movement, and later by memory of that movement.

To test this last hypothesis, many psychologists have experimented in the following fashion: The dog, cat, bird, monkey, or other animal on whom the experiment has been made, has been confined, when more or less hungry, in a cage, or large box; food has been placed in sight of him, but outside his enclosure; and this has been so arranged that the animal may escape by "manipulating some simple mechanism" through movements which he is perfectly capable of making — for example, by "pulling down a loop of wire, depressing a lever, or turning a button." The animals have invariably responded by instinctive, excited, random movements of all sorts — by leaping, biting, clawing, trying to squeeze through holes. In other words, they have responded with the immediate, random, excess movements characteristic of the affective and excited consciousness, not with the delayed and relatively calm responses of the reasoning mind. In the course of these excited movements they have, it is true, chanced, ordinarily, on the successful reaction which has released them from confinement. But such a reaction is certainly no proof of reasoning. For not only is it made in the course of the animal's chaotic, random movements; it is often, though not always, an action never repeated. To quote Professor Thorndike: "In the case of some difficult associations," the animals "would happen to do the thing six or seven

times, but after long periods of promiscuous scrabbling, and then forever after would fail to do it." This observation has been substantiated by other experimenters, and shows abundantly that in these cases the successful acts are performed accidentally, and not through reasoning. For what one has reasoned out, one remembers: in Thorndike's words: "If they had acted from inference in any case, they ought not to have failed in the seventh or eighth trial. What had been inferred six times should have been inferred the seventh." *

It is fair to conclude, on the basis of this evidence, that there is so far no proof of the occurrence of animal reasoning. None the less, many animals possess an alert and many-sided intelligence; for the immediately associated imagination may, as has been pointed out, lead to the same result, in action, as the reasoned conclusion. In questioning the ability of higher animals to reason, we are not, therefore, questioning their capacity to act effectively, or their possession of rich percepts and of swift-coming images.

IV. Thought and Language

A brief consideration of the nature and the function of language is rightly included in this chapter; for conventional language is, in a way, both effect and condition of the two significant factors in thought: generalization and abstraction. Generalization in its two forms, conception and general judgment, has already been considered. By abstraction [3] is meant attention, with emphasis upon the excluding aspect of attention. For in attending to anything one abstracts from the unattended-to part of the total object of experience; and in

* *Monograph Supplement*, No. 8, of the *Psychological Review*. Cf. *Psychological Review*, Vol. V., p. 550.

this sense the attended-to is the abstract (more literally, the abstracted), and attention is abstraction. Language, in its widest sense, is an aggregate of bodily reactions (or results of bodily reaction) — in particular, an aggregate of articulate sounds or of gestures — by which conscious beings communicate with each other.[4] Of language, thus defined, there are two forms; and the first of these is natural language in which the communicated sounds and gestures are mere immediate and instinctive reactions, imitative and interjectional in their origin.* The different barks by which a dog signals to another, 'food,' 'danger,' 'friend,' are instances of this so-called 'natural language.' Obviously it is highly significant in the development of social relations, emotional and purposive, of conscious beings with each other. Certainly, however, it need not involve thought of any sort. And — what seems at first sight more curious — natural language can be understood by such animals only as are of common species and environment. Mr. Garner, for example, who spent many months in learning the 'language' of monkeys, in one of our Zoos, was disappointed in the hope of gaining thereby an understanding of the cries and calls of monkeys in the African jungles. This is because the natural sounds and movements are so variously modified by differences in bodily structure and in environment.

With conventional language the case is different. The word, just because it is not, in its present form, the instinctive expression of any feeling, or the copy of any natural sound or shape, may be learned by all individuals who are capable of apprehending and producing it. A word is, in fact, an

* Cf. Chapter V., p. 89, and Appendix, Section V. The student is advised to read: C. H. Judd, "Psychology, General Introduction," Chapter X.

artificial sign realized as representative of something besides itself. The ability to know a given sound or gesture as a sign demands first, abstraction, that is, exclusive attention to the representative character as distinguished from all the more naturally interesting sense-qualities of the sound or the gesture; and second, generalization, that is, the grouping together of a lot of sensibly dissimilar sounds and motions by virtue of this likeness of function. Animals seem to lack this ability to abstract and generalize the sign-character, that is, to learn that phenomena so different as words pronounced, barks, and paws crossed are alike in the character of standing-for-something.[5] It follows that animals make and understand sounds and movements which actually serve as signs, but that they do not know sounds and movements as belonging together to the class 'signs.' Thus, I may teach my dog, Doc, that a sharp bark will secure release from confinement, or that crossing his paws will bring him food, and I may even teach him to distinguish certain words, as 'food' and 'water,' and to associate them with the appropriate objects. But he knows these words and barks and postures, each for each, as associated with a particular object, not as possessed of the general character of standing-for-something else.*

It has thus appeared that abstraction and generalization are essential to the formation of conventional language; and it must now be shown that abstraction and generalization (the important factors of thought) are greatly facilitated by conventional language. Conventional language aids abstraction or attention, because the reference of any word may be so limited. I may, it is true, abstract without the use of words — for example, in looking at a marble, I may attend

* Cf. James, "Principles of Psychology," Vol. II., p. 356.

to its shape, abstracting from its color; but I cannot help seeing the color with the shape, and therefore the use of the word 'spherical,' referring as it does to form exclusively, assists abstraction. In other words, verbal imagination lacks the distracting complexity of concrete imagination.

Language must, in the second place, aid generalization, since every word of a conventional language (exclusive of its proper nouns and its interjections) is a general term — that is, the consciousness of a word may suggest any one of a whole group of objects. Of course a concrete image sometimes serves this same purpose of suggesting a group of similar objects, but the very poverty and simplicity of the word specially fits it for this general reference. The image, for example, of my special lynx muff will be followed by the consciousness of places where I have carried it, railroad stations in which I have left it, and the like, whereas the perception or imagination of the word 'muff,' free of vivid, particular associations, more readily recalls the whole class of muffs. Thus, words serve often as a sort of tag, or sign, for the class once formed, an artificial help toward distinguishing and remembering it.

But while it is thus abundantly evident that thought and language are closely related, we must guard ourselves against two psychologically untenable views: first, the supposition that words invariably suggest classes of objects, and second, the belief that every general term implies a corresponding conception. As to the first point: experience shows that though a word is always a general term in the sense that it may suggest a class of objects, yet it actually often suggests a single particular object or relation. The word 'wave,' for example, in the lines, "The breaking waves dashed high, on a stern and rockbound coast," may, of course, suggest the

class 'waves' and may be followed by a series of resembling images — say of waves of the sea and of air-vibrations. More likely, however, the word at once suggests a concrete object or scene; and one has a vision of a headland of the rocky New England coast. Indeed, the aim of poet and of narrator is precisely to hold words to the function of suggesting particular scenes and emotions and to prevent their use as representative of the class or group. Thus the potential general term may remain a mere verbal image. In the second place, a word may be a general *term* and perform its function of suggesting similars while yet it corresponds to no conception or general *notion*. This is the case wherever the word-consciousness is unaccompanied by an awareness of generality. I may read the word 'chest,' for instance, and it may suggest to me a series of boxes of different shapes and sizes, and yet I may not be conscious of any generality. In this case, though the spoken or written word 'chest' may be called a 'general term,' the verbal imagination of 'chest' is not, according to our doctrine, a conception.

It is thus evident that words need not correspond directly with conceptions. It is equally important to realize that conception and, indeed, all forms of thinking, are possible without language.[6] It is true that most of us think in words. We find it difficult or impossible to carry out a long train of reasoning without formulating in words the different stages of it; and even when we reason silently, we are likely to discover ourselves imagining *sub silentio* the words of our argument. In conception, also, the verbal imagination often forms the centre of our experience; so that, for instance, the conception 'truth' almost always includes a verbal image. Etymologists, indeed, argue that the absence from a given language of a

particular sort of words or signs is probably indication of a lack of the corresponding conceptions. Savages unpossessed of a system of numerals count up to five or six only, and perform no intricate arithmetical operations; and from the paucity of color-terms in Homeric Greek it is argued, not unreasonably (though not decisively), that the Hellenes of this period discriminated few colors. But all this simply shows that conventional language facilitates and establishes thought, and that the two develop by a sort of mutual interrelation. To insist, as Max Müller insists, that thought is impossible without language, is to overlook the outcome of much introspection and to misapprehend the nature as well of thought as of language. Conventional language is, as has been said, a system of signs, composed of certain images, usually auditory, motor, or visual. Thinking, on the other hand, necessarily includes a consciousness of impersonal relations. It is absurd to assert that the experience of objects as related is absolutely dependent on one's possession of any specific set of images.

Certain experiences of the deaf and dumb furnish interesting testimony on exactly this point. D'Estrella, an educated deaf-mute, has given a detailed account of his moral and theological reasoning in the very early years of his neglected childhood.* He had never attended school, knew nothing of the conventional gesture-language, and possessed, in fact, only a few rude signs, none of them standing for abstract ideas. Yet, during this time, he not only gained a belief that the moon is a person, — a conclusion carefully reasoned from facts of the moon's motion and regular appearance, — but, by meditating on other nature-facts, he found for himself a god,

* James, *Philosophical Review*, Vol. I., pp. 613 *seq.*

a Strong Man behind the hills, who threw the sun up into the sky as boys throw fireballs, who puffed the clouds from his pipe, and who showed his passion by sending forth the wind. Mr. Ballard, another deaf-mute, describes a parallel experience,* his meditation "some two or three years before . . . initiation into the rudiments of written language," on "the question, How came the world into being?" Testimony of this sort, though of course it may be criticised as involving the memory of long-past experiences, confirms the antecedent probability that thinking may be carried on in any terms — concrete as well as verbal. Whenever one is conscious of a group, or of a member of a group, then one is conceiving. The conception may include a verbal image, but need not. Whenever one is conscious of the wholeness of a complex, with emphasized part, then one is judging. The judgment often includes an imaged proposition, but does not necessarily contain it. Whenever, finally, one is conscious of successive, connected, discriminated wholes, one reasons. Reasoning, to be sure, more often than conceiving or judging, has a verbal constituent, yet reasoning also may be carried on without words.

Conversely, the use of the general term, proposition, or syllogism, is no sure indication of judging or reasoning. For these forms of word-series have become so habitual that one may use them without full realization of their meaning. For example, the proposition, "the apple is yellow," may not mean more to the man who speaks it than the words 'yellow apple,' that is to say, no judgment at all, no experience of differentiated wholeness, need be involved; and the propositional form of the words may be a mere unconscious

* James, "The Principles of Psychology," Vol. I., pp. 266 *seq.*

reflex, due to habit. Evidently, therefore, the psychologist must be on his guard against the false supposition, that wherever proposition or syllogism is, there also is judgment or reasoning. He, of all men, must be alive to the possibility that words do not always reveal, or even conceal, any 'thought within,' but that they may be used without any meaning, for mere pleasure in their liquid syllables, their rotund vowels, their emotional impressiveness.

CHAPTER XI

EMOTION

I. The Nature of Emotion

a. Emotion as Personal Attitude

The I, or conscious self, as so far described, is an exclusively perceiving and imagining, recognizing and thinking self. But nobody merely sees and hears, thinks and imagines: rather, every self also loves and hates and enjoys and is disappointed. We shall turn now to the study of this affectively and emotionally conscious self. Emotion is, first and foremost, an intensely individualizing experience. In loving and fearing I am conscious of myself as this self and no other; and I am, furthermore, conscious of the individual and unique nature of the friend whom I love or of the superior whom I fear. In more technical terms: both the subject and the object [1]* of emotion are realized as unique or irreplaceable. In this doubly individualizing character, emotion is distinguished from perception and from all forms of thought, for in these I lay no special stress on myself, as just this individual, nor do I regard the object of my consciousness as peculiarly individual. Rather, I realize, reflectively if not immediately, that other selves see and hear as I do, and I assume that any other self must think as I do. It is true that,

* These Arabic numerals, throughout this chapter, refer to numbered divisions (§§) of the Appendix, Section XI.

as I reflect on my life of imagination, I seem to have been in my imagining a peculiarly isolated, unique self. Yet this uniqueness and individuality forms no inherent part of the imagining. In my emotion, on the other hand, I immediately realize myself as a unique self; I find it difficult to believe that there is any other lover or hater in the world, that there is any grief save my grief: in a word, I individualize myself in emotion. And with equal emphasis I individualize the object of my love or hate or fear. I love this child; I hate that man; I delight in this sunlit stretch of river. I do not love children, and hate men in general, and enjoy any river scene. To say that I love any such class or group is either mere fiction or else it is a metaphorical way of saying that I love this and this and this child, — in fact, that I cannot think of any child whom I do not love; that I hate every man whom I know; and that I delight in every river scene. Herein, again, emotion is distinguished from most other experiences. The objects of perception and imagination, it is true, and the objects of some forms of thought, are reflectively known as particular, — I say, for example, that I perceive this house and imagine this particular scene, — but such consciousness of the object as particular is a sort of after-experience, not at all an immediate, inherent factor in perceiving the house and in imagining the scene, whereas it is the very core of emotion to be conscious of the individual.

In a second character, its receptiveness, emotion evidently resembles perception. In happiness and in unhappiness of every sort — in hope and in fear, in enjoyment and in dislike, in envy and in sympathy — I am conscious of being affected by my environment, that is, by the selves and by the things of which I am conscious. "My soul," as Coleridge says, lies

"passive, driven as in surges." All emotion includes this awareness of being influenced or affected — in a word, emotion is a receptive, or passive, experience. This character of emotion is often overlooked, partly because emotion is normally preceded or accompanied by very obvious bodily movements and partly because it is so often followed by the assertive, or active, conscious relations, will and faith. In the later study of these two other individualizing, yet assertive, experiences the inherent receptiveness of emotion will become more apparent.*

b. Emotion as Affective Consciousness

The Affective Elements

As so far studied, emotion is, thus, an evidently complex, receptive, doubly individualizing experience with either personal or impersonal object. Emotion as complex or inclusive experience has now to be regarded from another point of view. Perception, it will be remembered, is an experience, (1) immediately realized as receptive consciousness of externalized and impersonal object, and (2) reflectively realized as shared with other selves; it is also (3) a sensational experience. The description of perception as sensational is gained by analyzing perception, without explicit reference to the perceiving self, into irreducible elements, — of color, quality, pitch, loudness, — each belonging to a definite time. Such an analysis, which is called 'structural,' must now be undertaken of emotion. We must know whether love and fear and envy and the rest reduce also to sensational elements, — say, of warmth and of pressure

* Cf. Chapters XII., XIII.

due to heart-beat, — or whether they include other elements of consciousness. When we put the question in this way, there is little doubt about the answer. An emotion is characterized, always, as pleasant or unpleasant (or both): for example, liking is pleasant and terror is unpleasant; and pleasantness and unpleasantness are clearly elemental feelings. One can no more tell what one means by agreeableness or by disagreeableness than one can tell what redness and warmth and acidity are: in other words, these are distinct and irreducible experiences.

From the class of sense-elements affections are, however, plainly differentiated. Unlike sensational elements, they are not always present in consciousness, and cannot conceivably occur by themselves without belonging, as it were, to other experiences. The fact that we are not always conscious of either pleasantness or unpleasantness is ordinarily expressed by saying that much of our every-day experience is 'indifferent' to us. The other characteristic is clearly shown by the reflection that we are conscious, not of agreeableness or disagreeableness by itself, but always of an agreeable or disagreeable somewhat, of a pleasant familiarity, for example, or of an unpleasant taste. These distinctions, of course, are not immediate constituents of either pleasantness or unpleasantness, that is to say, when one is conscious of pleasure one does not necessarily say to oneself, "this experience might have been perfectly indifferent, and the pleasantness of it belongs to its color consciousness." On the contrary, these are only possible after-reflections about the agreeableness or disagreeableness. The fact that the affections are not always present in consciousness, and that they seem, as has been said, to 'belong to' other experience of

any order,* may be indicated by calling them 'attributive' elements of consciousness.†

Some psychologists maintain that besides pleasantness and unpleasantness there are four other affective elements of consciousness (or 'feelings'); namely, excitement and tranquillity, tension, and relief.[2] On this theory, there would be six affective elements of three sorts, opposed to each other two by two. In the opinion of the writer of this book, this is a mistaken view; and for the following reasons. In the first place, though emotions are rightly characterized as exciting or tranquillizing, 'excitement' and 'tranquillization' are complex rather than elemental experiences, fusions of temporal-relational with organic-sensational consciousness. 'Tension,' in turn, seems to be nothing more nor less than attention; and attention, though classified as attributive element, and so coördinate with the class of affections, is not an affection. 'Relief,' finally, seems to mean little more than absence from tension. We shall, therefore, abide by the traditional view that the elemental experiences peculiar to emotion are the two: pleasantness and unpleasantness.

Emotions are characterized also — and that by common admission — by the organic sensations which they include. Most conscious experiences contain, of course, the vague awareness of bodily processes; but in emotion these organic sensations are peculiarly prominent. The experiences of quickened heart-beat, of faintness or of dizziness, of growing warmth or of creeping chill, are factors of most emotional experiences.

* By the words 'of any order' the attributive elements are distinguished from extensity, which, even if not always present, attaches only to sensational elements.

† Cf. Appendix, Section III., § 34.

The mention of these experiences due to internal bodily changes suggests the problem of the physiological explanation of emotion. It will be convenient, however, to postpone this discussion to the fourth section of this chapter and to turn at once to a more detailed psychological analysis of emotions.

II. The Forms of Emotion

In the effort to be true to the distinctions of actual experience, we shall find that emotions are commonly grouped according to the varying relations of different selves to each other and on the basis of the contrast between pleasantness and unpleasantness. Our study of emotional experiences will start from the following outline of the basal emotions:[3] —

PERSONAL EMOTIONS

I. Egoistic, Unsympathetic Emotions
  a. With other self as object: —
    1 Happy (that is, pleasant) emotions: —
      (*a*) Without valuation of other self: —
        Happiness, realized as due to other self, — Liking
      (*b*) With valuation: —
        Happiness, realized as due to other self,
        Who is,
          (1) Stronger than oneself, — Reverence
          (2) Equal to oneself, — Love(?), Friendship(?)
          (3) Weaker than oneself, — Tenderness(?)
    2 Unhappy (that is, unpleasant) emotions: —
      (*a*) Without valuation: —
        Unhappiness, realized as due to other self, — Dislike
      (*b*) With valuation: —
        Unhappiness, realized as due to others,
        Who are
          (1) Stronger than oneself, — Terror
          (2) Equal to oneself, — Hate
          (3) Weaker than oneself, — Scorn

b. With myself as valued object: —

1 As valued by myself,

(*a*) Happiness in myself, regarded as worthy, — Pride

(*b*) Unhappiness in myself, regarded as unworthy, — Humility

2 As valued by others,

(*a*) Happiness in being admired, — Vanity

(*b*) Unhappiness in being scorned, — Shame

II. Altruistic, or Sympathetic, Emotions

a. Homogeneous: —

1 Happiness through shared happiness, — *Mitfreude*

2 Unhappiness through shared unhappiness, — Pity

b. Heterogeneous, or mixed: —

1 Happiness through another's unhappiness, — Malice

2 Unhappiness through another's happiness, — Envy

IMPERSONAL EMOTIONS

I. Egoistic

a Sensational, — Like, Dislike

b Relational, — *Ennui*, Enjoyment of the familiar, etc.

II. Altruistic (absorbing): —

a Sensational, — Æsthetic pleasure

b Relational, — Logical pleasure, Sense of humor, etc.

The fact must be emphasized that this outline makes no pretence of including all forms of emotion. Two omitted distinctions should specially be named: that between certain emotions according as their objects are past or future; and the distinction, already mentioned, between exciting and depressing emotions. From the former point of view, anxiety is distinguished from disappointment as having a future, not a past, object; and from the latter, hatred is different from

extreme terror in that it is exciting and not depressing. All these distinctions might be added to the table of emotions, but at the risk of complicating it too greatly.

a. Personal Emotion

We have first to study the most primitive and most significant of the forms of emotion — personal emotion. It appears in the two well-marked phases which underlie all personal relation, as egoistic or as altruistic, that is, as laying stress on myself or on other self. We must, however, guard against the error of describing egoistic emotion as if it included no awareness of other self or selves. If this were true, there would be no personal emotion at all, for that demands the relation to a particular other self, and exists only in so far as it emphasizes and individuates the other self or other selves. Like and dislike, fear and gratitude, and all the rest, are obviously expressions of one's attitude to other selves, but these 'others' are not realized as themselves caring and hating and fearing, but only as the conscious, yet unfeeling, targets or instruments to one's own emotions.

It follows from this distinction that many kindly, good-natured feelings are rightly classed as unsympathetic. Mere liking, for example, is as unsympathetic and egoistic an experience as dislike. By this particular self one is pleasantly affected; by this other, unpleasantly. But the pleasure is as distinctly individual and unshared as the dissatisfaction. The other selves are means to one's content or discontent, and are thought of as subordinated to one's own interests.

We have, therefore, two distinct types of unsympathetic emotion. On the one hand, there is the moroseness, the

discontent, the hostile fear or hate or contempt, of the man who realizes himself as unfavorably related to other selves. Quite as significant, on the other hand, is the unruffled good nature, the sunshiny content, the unaffected liking, or even gratitude, of the individual who feels that he is happy in his relations with other selves. The common temptation is, of course, to give to these genial feelings an ethical value, and to contrast dislike, as selfishness, with liking, as if that were unselfish. The truth is, however, that the one attitude is as 'egoistic' as the other. To like people is to realize them as significant to one's own happiness, not to identify oneself with their happiness. And, in truth, a great part of what is known as 'love' of family or of country is of this strictly egoistic nature. Dombey loved his son because the boy was 'important as a part of his own greatness'; and many a man loves family, church, or country merely as the embodiment of his own particular interests and purposes.

It is even possible to secure other people's pleasure and to avoid paining them, not in the least to gain their happiness, but because their cries of grief assault our ears as their happy laughter delights us. The most consummately heartless figure of modern literature, Tito Melema, is so tenderhearted that he turns his steps lest he crush an insect on the ground, and devotes a long afternoon to calming a little peasant's grief. "The softness of his nature," we are told, "required that all sorrow should be hidden away from him." But this same Tito Melema betrays wife and foster-father and country, in the interests of his own self-indulgence: other people's emotions are insignificant to him in themselves; he regards them only as the expression of them rouses him to delight or to sorrow; he never for an instant enters into

them, identifies himself with them, or makes them his own.

The avoidance of another's pain does, it must be added, require what is sometimes called sympathy, the involuntary tendency to share the organic sensational consciousness of other people. The pain which one feels at the sight of somebody's wound is an illustration of this experience, known as 'organic sympathy.' We are, however, here concerned with emotion not with sensation.

Besides this fundamental difference between the personal emotions, liking and reverence and love, which involve pleasantness, and the opposite ones, dislike, terror, and hate, which are unpleasant experiences, we must take account also of another difference, which marks off the simpler from the more complex form of these feelings. In all these experiences, our happiness or unhappiness is referred, as we have seen, to other selves, and is realized as connected with them. When the consciousness of this relation becomes explicit, that is, when other people are clearly and definitely realized as affecting us and as sources of our happiness or unhappiness, then those vaguer personal feelings of like and dislike give way to emotions in which the realization of others is more sharp-cut and more exactly defined. Closely regarded, the distinctions among these complex emotions are found to be based on the estimate which is formed of those 'other selves' who are means to one's happiness or unhappiness. When these other selves are realized as greater, stronger, than oneself, the resulting emotions are reverence and terror; when they are conceived as on an equality with oneself, the emotions are love and hate; when they appear, finally, as weaker or inferior, the feelings are scorn and tenderness.

It is not difficult to illustrate these abstractly worded definitions. Reverence, the individualizing, receptive, happy consciousness of a greater self, is the emotional attitude of child to father, of soldier to commander, of worshipper to God. It is the emotion thrilling through the lines of Coleridge to Wordsworth, "friend of the wise and teacher of the good," and culminating in the last verses: —

> ". . . Friend! my comforter and guide!
> Strong in thyself and powerful to give strength!"

For the parallel emotion toward a self conceived neither as greater nor as weaker than oneself, there is no precise name. The terms 'love' and 'friendship' are employed in this chapter; but to this usage it may well be objected that these are no mere emotions, but that, in their complete form, love and friendship include the active attitudes of loyalty and trust. But, named or unnamed, there is surely a happy emotion which obliterates distinctions of greater and weaker. To paraphrase Aristotle: love is the character of friendship, and by love friends, however outwardly unequal, "make themselves equal." The word 'tenderness' even more inadequately expresses the happy emotion centred in some one weaker than oneself. It is the feeling of the mother for her child, of the master for the cherished pupil, of every lover for the beloved one who is weak or afraid. It is the feeling which stirred the heart of Alkestis for Admetos, the emotion which Sokrates felt when he played, in that "way which he had," with the hair of Phaidon, as he said, "To-morrow, I suppose, these fair locks will be severed."

To turn to the unhappy emotions: every revolt from tyr-

anny and oppression is a living illustration of the contrast between terror or fear and hatred. Why did the French peasantry, who endured the burdens of Louis Quatorze, rebel against the materially lessened impositions of Louis Seize? What is the nature of the emotional contrast between the two generations, only a century apart: in the earlier period, hapless suffering from disease, starvation, and exaction of every sort, without the stirring of opposition; a hundred years later, fierce and furious resentment against oppression and misery? There is only one answer to questions such as these. The peasants of the older period were still bound by the traditional belief that court and nobles were naturally above them, loftier and more powerful than they. Their feeling to these superior beings, realized as instruments to their own undoing, was of necessity, therefore, the paralyzing emotion of terror; but the feeling, though intense, remained impotent and futile, and led to no effective reaction so long as the nobles held, in the minds of these peasants, their position of lofty isolation. The French Revolution was, in fact, directly due to the spread of the doctrine of social equality. Rousseau's teaching of the essential likeness of man to man, once it took root in the mind of the French people, grew of necessity into the conviction that peasants and nobles were no longer separated by an impassable barrier. And with this conviction of their equality, the unnerving emotion of terror gave way to hate with its outcome of fury and rebellion. So in England, four centuries earlier, the peasants rebelled under Wat Tyler not through mere discontent with industrial conditions but because the levelling emotion of hate had been excited by the teaching of the Lollard priests and of John Ball. The men of Kent and of Essex, persuaded of the

essential equality of serf with master and of villein with landlord, no longer feared but hated the lords of the manor against whom they rose.

Apparent exceptions are really illustrations of this principle, for the outburst of fury against one's superior always turns out to be due to a momentary denial of his superiority, a temporary tearing of the god from its pedestal. The fear of the superior beings readily, however, reasserts itself, and this explains the temporary nature of many revolts and the easy resumption of authority. A handful of soldiers may check the violence of a mob, because the vision of brass buttons and uniforms inspires an unreasoning conviction of the superiority of military force, and transforms hate and rage into futile fear. The insubordinate fury of usually obedient children is like mob-violence, a temporary assertion of equality with their old-time superiors; and like mob-fury, the anger of children readily gives way to the old acceptance of authority.

The emotion of scorn, finally, involves the conviction of another's inferiority. It is evidently impossible to despise a man, so long as one regards him as one's own superior, or even as one's equal. Contempt is, thus, the dissatisfaction involved in one's relation to an inferior person. The inferiority may be real or imagined, and of any sort; but just as reverence or respect may be regarded as a virtue, so contempt is readily considered from the ethical standpoint, and it is rightly rated as morally unworthy if it takes account of the superficial inferiority of fortune or of station.

These emotions have other selves as emphasized object. In contrast to them are emotions whose chief object is myself. "'Tis evident," Hume says, "that pride and humility have

the same object . . . self, of which we have an intimate memory and consciousness. According as our idea of ourself is more or less advantageous, we . . . are elated by pride or dejected by humility. . . . Every valuable quality of the mind," Hume continues, " . . . wit, good sense, learning, courage, integrity; all these are the causes of pride, and their opposites of humility. Nor are these passions confin'd to the mind. . . . A man may be proud of his agility, good mien, address in dancing, riding, fencing. . . . This is not all. The passion, looking farther, comprehends whatever objects are in the least ally'd or related to us. Our country, family, children, relations, riches, houses, gardens, horses, dogs, cloaths; any of these may become a cause either of pride or of humility." * Spinoza sums up this conception in fewer words: Pride, or self-approval (*acquiescentia*), is, he says, "joy arising from the fact that a man contemplates himself and his power to act," whereas "humility is sadness arising from this, that a man contemplates his own powerlessness." †

Besides this obvious distinction between the happiness of self-content and the unhappiness of self-depreciation, there is a difference between emotions in which the core of my happiness or unhappiness is my relatively independent valuation of myself and those in which my elation and dejection consist primarily in my consciousness of others' estimation of me. From this point of view, we may distinguish pride, as " isolated self-esteem" in which "the mind stops at home, turns in upon itself, and sits before the glass in pleased admiration," from vanity, the "dependent and sympathetic type of self-esteem," which is "uneasy till confirmed by

* "A Treatise of Human Nature," Book II., Part I., § 2. † " Ethics," Pt. III.

other voices; unable to refrain from inviting applause." * And, similarly, we may contrast humility with shame, the shrinking consciousness of the loathing of one's fellows. Spinoza names these emotions 'glory' and 'shame.' They arise, he says simply, "when a man believes himself to be praised or blamed."

It is not necessary to insist on just these meanings for the words pride and vanity, humility and shame. 'Vanity,' for example, is often limited in application to baseless and empty self-conceit; and 'humility' may be used of a tranquil realization, untouched by sadness, of one's low estate. But whatever names be chosen to express the distinctions, it is important to the analyst of human emotions to recognize the experiences to which these terms are here applied. Aristotle's great-souled man who, "being worthy of great things, rates himself highly," is proud, not vain. His supreme content is rooted in self-satisfaction, and he disregards, if he does not scorn, the approval of other people. Malvolio, on the other hand, is vain: he delights in his appearance precisely because he believes himself to be the observed of all observers. The despairing self-contempt of Philip Nolan, "the Man without a Country," is so deep that he has no thought for the estimate of his companions; but Sigismond's shame is his consciousness of the scorn of the Bohemians who have heard the stinging reproach of John Hus: I came here trusting in the word of an emperor. It is probable, indeed, that the social forms of these emotions are original and primitive; and it may even be that pride and humility are never utterly self-sufficient; and that, in one's seemingly isolated approval or contempt of self, one is, after all, judg-

* James Martineau, "Types of Ethical Theory," Vol. II., pp. 237–238.

ing oneself by the standard of the ideal spectator or by that of society.

The experiences which we have so far described have all been characterized by their egoistic narrowing of consciousness, by their heavy emphasis on one's own concerns and interests, by their incurable tendency to regard other selves merely as ministers to one's own individual satisfactions and dissatisfactions. The sympathetic emotions are manifestations of the altruistic phase of self-consciousness, the widening embrace of other people's interests, the sharing of other people's happiness and unhappiness. In one's sympathetic relations with other people, one regards them as possessing a significance of their own, quite aside from their relations of advantage or disadvantage to oneself, and one shares these new interests and ideals in such wise as to enlarge the boundaries of one's own experience.

Emotions of personal sympathy are of two main types: I am happy in another's happiness or unhappy in his grief. There is no English word to express the sharing of joy, and we are forced to borrow from the Germans their exact and perfect word, *Mitfreude*. The poverty of the English language expresses, unhappily, a defect in human nature. I certainly am quicker to sympathize with people's sorrow than to delight in their happiness. It is easier to weep to my friends' mourning than to dance to their piping, easier to share their griefs than to share their amusements, infinitely easier to console them than to make holiday with them.

The greatest distinction in these simple feelings of sympathy is in the narrowness or the wideness of them. There may be but one individual whose experience I actually share,

whose joys and sorrows I feel as mine. In the presence of this one other self my strictly individual happiness is disregarded, and the boundaries of my self-consciousness are enlarged. I live no longer my own life, but this other life — or rather, my own life includes this other life. Yet my relations to all others save this cherished one may remain narrowly egoistic: I may still be concerned only for myself, and interested in these others only as foils to my emotions. Life and literature abound in examples of sympathy within the narrowest limits, of egoistic emotion giving way at one point only. Aaron Latta is a modern illustration of this attitude: he lives his self-centred life undisturbed by the wants, the hopes, the cares, of the village life about him, but he is quick to notice the shade on Elspeth's brow and the merest quiver on her lip. With a true intuition, indeed, the novelists and the dramatists have united to represent the most unsympathetic of mortals as vulnerable at some point. Dickens, the keen student of the emotions, has only one Scrooge, 'quite alone in the world . . . warning all human sympathy to keep its distance,' and represents even the Squeerses as possessed of 'common sympathies' with their own children.

Closely following upon the narrowest form of sympathy, which recognizes the claims and adopts the interests of one individual only, are family-feeling, club-feeling, college-feeling, church-affiliation, and all the other sympathies with widening groups of people. For sympathy is normally of slow growth. The more primitive emotions are naturally self-centred, and they give place only gradually to the identification of oneself, first with the joys and griefs of one's mother or nurse or most intimate playmate, then with the

emotional experiences of the whole family group, later with the hopes and fears and regrets and delights of a larger circle. It is interesting to observe that, with every widening of one's sympathy, the limiting circumference of one's own self is pushed farther outward. The sympathetic man has always a richer, concreter personality than the self-centred man. He has actually shared in experiences that are not immediately his own; he has seen with others' eyes and heard with their ears, and his pulses have beat high to their hopes and joys; his experience has been enlarged by his sympathies.

There is something abnormal, therefore, in the checking at any point of this outgrowth of sympathy. People whose sympathies embrace only the members of their family, their cult, or their class, are only incompletely human, for a lack of emotional comprehension, or sympathy, marks a stunted personality. Even patriotism, so far as it limits sympathy to feeling with the inhabitants of any one corner of the globe, deprives a man of his birthright: communion in the joys and sorrows of life with 'all nations of men,' or rather, with that which Tolstoi calls 'the one nation.'

We have, finally, to consider heterogeneous sympathetic emotions: happiness through realization of another's unhappiness, that is, malice, and unhappiness through consciousness of another's happiness, that is, envy. By common consent, these are morally undesirable emotions, yet there can be no question that they are sympathetic, as well as egoistic, that is, that they require a genuine sharing of another's experience. I cannot envy you, if I am so deeply occupied with my own emotions that I do not realize you as happy. And I cannot really know that you are happy without, in some degree, experiencing or sharing your happiness.

This, to be sure, is often denied: I am said to possess the idea of an emotion without experiencing the emotion itself. But, surely, to be conscious of emotion means nothing if it does not mean to have the emotion. I may, of course, have the purely verbal images, 'happy,' 'unhappy,' 'emotion', without any affective consciousness and without any realization of myself in relation to others; but nobody's emotion can influence my own without my experiencing or sharing it to some degree. The resulting relations to other selves are, therefore, heterogeneous sympathetic, or mixed, emotions. Not only do they combine happiness and unhappiness, but they supplement a sympathetic by an egoistic emotion: the happiness which we faintly share with another, in our envy, is swamped in the egoistic unhappiness which it arouses, and the unhappiness of our fellow, dimly felt in our maliciousness, is swallowed up in a surging happiness that is quite our own.

It would be a mistake, however, to suppose that malice and envy exhaust the nature of this emotional experience. Barrie has shown us a perfect embodiment of mixed emotion in the figure of Sentimental Tommy. Never was anybody more sympathetic than Tommy, boy and man. He entered into the feeling of friend and of foe alike: divined and shared in Elspeth's loneliness, Aaron's bitterness, Grizel's passion and scorn, and Corp's loyalty. He never could have been what he was to all of them, had he not, up to a certain point, shared actually in their feelings; had he not believed in himself as Elspeth and Corp believed in him, hated himself as Aaron hated him, alternately loved and despised himself as Grizel loved and despised him. And yet all this sympathetic communion with others was merely a stimulus to

his own private emotions, a ministry to the luxury of his self-occupation, whether delicious pleasure or equally delicious misery. Such sympathy, as element of one's egoistic and unshared happiness or unhappiness, is that which is here called heterogeneous sympathetic emotion.

b. Impersonal Emotion

This chapter has so far been concerned with personal emotion, the conscious relation of happy or unhappy self with other selves. But one may like or dislike the furnishings of a room as cordially as one likes or dislikes its inmates, and one may be as desperately frightened by a loaded gun as by a tyrannical master. This means that emotion, though primarily a realized relation of oneself to other selves, may be also a relation of oneself to impersonal objects.

Some emotions, to be sure, are necessarily personal. Every form of sympathy presupposes our realization of other selves, and reverence, like contempt, is felt toward selves and not toward things. Hate, also, is a personal emotion — since, although we often feel a certain irritation, more than bare dislike, for inanimate objects when they thwart our purposes, yet in these cases we probably personify the things at which we are angry. Such personification of inanimate objects is ridiculously clear in a child's anger at the stones which refuse to be built into forts, or at the doors which resist his efforts to open them; and even grown-up resentment against smoking fires and catching hooks involves a personification of the offending object.

Impersonal emotion, the conscious relation of happy or unhappy self to event or to thing is, like personal emotion,

an individualizing, or particularizing, experience. Just as I love or hate, pity or envy, this particular person or these people, and do not impartially and indiscriminately care for 'anybody,' so, also, I like or dislike this special thing or these things, am bored by this monotony, and pleased with that familiar experience; and my æsthetic pleasure is always an absorption in this Chopin Mazurka, this tree white with blossoms, this Shakespeare sonnet, not an indiscriminate delight in a class or group.

We have already instanced impersonal like and dislike for things, not people. We have many experiences, also, of satisfaction or dissatisfaction with the relational aspects of things or events. Our outline names only two of these: enjoyment of the familiar, and the parallel distaste for the repeated or monotonous. Both feelings are well known: the cosey comfort of the old chair and the worn coat, even when one can find a thousand flaws in both; and, on the other hand, the flat, stale profitlessness of the well-known scene and the every-day objects. We, poverty-stricken, English-speaking people, have no noun by which to designate this latter experience: we may call it tediousness, or may speak of ourselves as 'bored,' but we are often driven to borrow one of the adequate foreign expressions, *ennui* or *Langweile.*

Like and dislike and the relational emotions are distinctly egoistic, laying special stress on myself and my condition. Among the impersonal emotions, however, are certain highly significant experiences which are embodiments of the other phase, the altruistic, self-effacing phase of consciousness. The first of these, æsthetic emotion,[4] must be considered briefly: a full treatment of it would

require another volume, and would lead us far afield into domains of philosophy and of art. Æsthetic emotion is the conscious happiness in which one is absorbed, and, as it were, immersed in the sense-object. No words describe æsthetic emotion better than Byron's question: —

> "Are not the mountains, waves, and skies a part
> Of me and of my soul, as I of them?"

For the æsthetic consciousness, as truly as sympathetic emotion, is a widening and deepening of self — never a loss of self — by identification of the narrow myself, not with other selves, but with sense-things.

It is important to dwell on the consciousness of self involved in the æsthetic feeling because there is, as we have seen, a sense in which the æsthetic consciousness, because it refers to things, not to people, is rightly called impersonal. But absorption in the beautiful is never a loss of self. Most of that with which one is usually concerned is indeed lost: one's practical needs, one's scientific interests, even one's loves and hates and personal relationships are vanished, but in place of these there is the beauty of this or that sense-thing, which one feels, accepts, and receives, widening thus the confines of one's personality. There is an easy introspective verification of this account of the æsthetic consciousness. Let a man scrutinize closely the feeling with which he emerges from one of those 'pauses of the mind,' in which he 'contemplates' an object 'æsthetically': he is sure to experience a curious feeling of having shrunken away from a certain largeness and inclusiveness of experience, and though he has regained interests which he had temporarily lacked, he has also lost something from his very self.

From this general description of æsthetic emotion as an adoption and acknowledgment of sense-objects, an immersion of oneself in the external and objective, we enter upon a more detailed consideration of its characteristics. The æsthetic emotion is, first and foremost, enjoyment, not dissatisfaction, a mode of happiness, never of unhappiness. This follows from the completeness of absorption in the æsthetic object, for unhappiness and dissatisfaction involve always desire, aversion, or resentment, the effort to escape from one's environment. The æsthetic emotion is, therefore, a consciousness always of the beautiful, never of the ugly. Not the emotional æsthetic experience but the reflective æsthetic judgment has to do with ugliness; for ugliness is not a positive term at all, but a reflective description of an object as unæsthetic, an epithet which can only be applied after one has had experience of the beautiful.

The description of the æsthetic consciousness as absorption of oneself in the sense-object indicates a second character of the æsthetic experience, its attentiveness. This conception of æsthetic emotion, as involving attention, helps us account for the things which people call beautiful. It is an open question whether simple experiences, such as single colors or tones, have any beauty; but if we do attribute beauty to them, it is certainly by virtue of their intensity or distinctness, as when we admire the bright color or the distinct sound. For intense and distinct experiences are, as we know, ready objects of attention, so that it is fair to conclude that sensational experiences are beautiful, if ever, when easily attended to. A careful scrutiny of complex objects of beauty shows that they, too, are easily attended to, though for another reason. The sense-object which is beautiful is

always a unique totality of characters, and both by the unity in which its details are united, and by the individuality of the combination, it is readily attended to. Every beautiful object is an illustration of the principle. Thus, curves are beautiful, and broken lines are ugly, in part because the curve is a whole, readily apprehended, whereas the broken line is a series of unessentially connected sections, with difficulty grasped as a whole; and rhythm is beautiful because it binds into a whole, expectantly apprehended, the successive movements, tones, or words of the dance, the melody, or the poem. The more complex the parts which are bound together, if only the complexity does not overstrain the attention, the more organic the unity and the greater the beauty. By this principle we may explain what we call the development of our æsthetic consciousness. To a child, the couplet or the quatrain may well give more æsthetic pleasure than the sonnet, precisely because he can attend to the one and not to the other, as harmonious whole. He will prefer the short lines of the "Cavalier Tune" —

> "Kentish Sir Byng stood for his king,
> Letting the crop-headed Parliament swing,"

to the more complicated metre of "Hervé Riel" —

> "On the sea and at the Hogue, sixteen hundred ninety-two,
> Did the English fight the French, — woe to France!"

Consciousness of the beautiful is, in the third place, direct and immediate, not reflective and associative; that is, the beautiful is always an object of direct and immediate perception. An object may gain interest, significance, and value, but never beauty, by its suggestiveness. This is an important point, for sentimental moralists and even sober psychologists are constantly contrasting what is called

the beauty of expression, or significance, with immediately apprehended beauty. We are told, for instance, that the bent figure of a laborer is 'beautiful' because the man has worked bravely and faithfully, or that an ill-proportioned, wooden building is beautiful because it is a happy home. These are misleading metaphors: nothing can be beautiful which is not a direct and immediate object of sense-perception; the figure is ugly, though the man's life is an inspiration; the building is hideous, though it enshrines happiness. Nothing is gained, indeed, by confusing every value with the distinct and well-defined value of the beautiful. What we mean by æsthetic consciousness is a direct experience; and, as Münsterberg teaches, only the unconnected, the 'isolated fact in its singleness,' can be beautiful — can bring about, in other words, the complete absorption of self in sense-object.

A final feature of the æsthetic consciousness has already been suggested; it is a characteristic emphasized by Kant, by Schiller, by Schopenhauer, and, indeed, by all the great teachers — the entire disinterestedness of æsthetic pleasure. This means that the contrast between one self and other selves is all but vanished in the æsthetic experience, and that one becomes, as Schopenhauer says, 'a world-eye,' a perceiving and enjoying, not a grasping or a holding self. To enjoy a bronze or a painting because it is mine, or to delight in a view because it stretches out before my window, is thus an utterly unæsthetic experience, for the sense of beauty admits no joy in possession, and beauty does not belong to any individual. This disinterestedness of the æsthetic consciousness explains the mistaken opposition, sometimes made, of the 'beautiful,' to the 'useful.' It is quite incorrect to hold that a useful object may not also be beautiful; and, indeed, men like

Morris and Ruskin have fairly converted even this Philistine age to the possibility of welding together use and beauty, in the practical objects of every-day life, in buildings, furnishings, and utensils. But it is true that one's consciousness of the utility is not identical with one's sense of the beauty, and that one seldom, at one and the same moment, appreciates the convenience of a coffee-pot handle and the beauty of its curve, or realizes the brilliancy of a color and the likelihood that it will not fade. While, therefore, objectively regarded, the union of beauty and utility is the end of all the arts and crafts, subjectively considered, the consciousness of utility must not be identified with the sense of beauty, precisely because the æsthetic sense demands the subordination of narrow, personal ends.

The common distinction of æsthetic from unæsthetic sense-experiences may be accounted for in a similar fashion. The organic sensations, such as satisfied hunger and thirst, bodily warmth, active exercise, — all these are pleasant but they are not 'æsthetic' pleasures, because they are, of necessity, sharply individualized and referred to my particular self. Tastes, also, and smells are experiences which serve narrow and definite personal ends of bodily sustenance. They are seldom, therefore, artistically treated as objects of æsthetic pleasure. For the beautiful object is cut off as utterly from my narrow needs and interests as from the associative connection with other facts; in the words of Schopenhauer, it is 'neither pressed nor forced to our needs nor battled against and conquered by other external things.' Thus the world of beauty narrows to include one object of beauty.

Two other forms of altruistic or adoptive impersonal emotion must be mentioned. The first of these is the

enjoyment of logical unity, often discussed under the name 'intellectual sentiment.' Every student knows the feeling, and counts among the most real of his emotional experiences the satisfied contemplation of an achieved unity in scientific classification or in philosophical system. The feeling should be sharply distinguished from another characteristic pleasure of the student, the excitement of the intellectual chase, the enjoyment of activity in even unrewarded search. The pleasure in logical unity follows upon this tormenting pleasure of the chase, as achievement follows upon endeavor. It clearly resembles æsthetic emotion not only in its absorption and disinterestedness, but also in the characteristic harmony, or unity, of the object of delight. For this reason, the enjoyment of logical unity is sometimes reckoned as itself an æsthetic experience. The writer of this book, however, approves the usage which restricts the application of the term 'beautiful' to sense-objects. This limitation, of course, forbids the treatment of enjoyment of logical unity as a form of æsthetic pleasure.

Brief reference must be made, finally, to a third form of impersonal and altruistic emotion — the 'sense of humor.'[4] For our present purpose, it is most important to dwell upon the self-absorbing, externalizing nature of the experience. Just as we are said to forget ourselves in our apprehension of the beautiful, so also we forget ourselves, that is, our narrow individuality, our special interests and purposes, in our appreciation of the humor of a situation. What Professor Santayana has well said of the æsthetic consciousness we may equally apply to the saving sense of humor: there is hardly a "situation so terrible that it may not be relieved by the momentary pause of the mind to contemplate it æsthetically"

or humorously. It is because we have such need of pauses, in the arduous business of living, that we value the sense of humor so highly, and for this same reason we find the most estimable people, if devoid of humor, so inexpressibly tiresome.

There are as many theories of the comic as of the beautiful, but virtually all of them agree in defining the sense of humor as enjoyment of an unessential incongruity. Narrowly scrutinized, every 'funny' scene, every witty remark, every humorous situation, reveals itself as an incongruity. The incongruity of humor must, however, be an unessential discordance, else the mood of the observer changes from happiness to unhappiness, and the comic becomes the pathetic.

III. The Bodily Conditions and Correlates of Emotion

a. The Physiological Conditions

This section, which concerns itself with less purely psychological considerations, will first discuss the physical and physiological conditions of emotion, — more precisely of those elements of consciousness to which a structural analysis reduces emotion. These elements include, as has appeared, at least the following: (1) affective elements of pleasantness and unpleasantness, and (2) organic sensational elements.

(1) The affections are distinguished from sensational elements in that they have no definite physical stimulus, no distinct form of physical energy which corresponds with them, in the way in which vibrations of the ether normally condition sensations of color, and atmospheric waves condition sensations of sound. This independence of physical stimulation is admitted by everybody, so far as the mode of physical

stimulus is concerned. Ether or atmosphere vibrations, and mechanical or electrical, liquid or gaseous, stimulus may bring about now a pleasant, now an unpleasant, now a perfectly indifferent, experience. It is true that certain sensational qualities — pain and probably also certain smells and tastes — are always unpleasant, and there may be certain sensational qualities which are always pleasant; but, none the less, every class of sensational qualities (except that of pain) includes both agreeable and disagreeable experiences; and many sensational qualities are sometimes pleasant, at other times unpleasant, and again indifferent.* It follows, as has been said, that the affective tone cannot vary with the mode of physical stimulus.

Some psychologists have, however, supposed that a definite relation may be found between the degree — and possibly also the duration — of physical stimulation and the affective experience.[5] This relation is usually formulated as follows: any stimulus of great intensity, and many stimuli of prolonged duration, occasion unpleasantness, whereas stimuli of medium intensity bring about pleasantness, and very faint stimuli excite indifferent experiences. But this is not an accurate statement of the facts. Both moderate stimuli, and even stimuli which at one time are strong enough to be unpleasant, may become indifferent — for example, workers in a factory may grow indifferent to the buzz of the wheels which is intolerable to visitors; and low degrees of stimulation, for instance, the faint pressure of fingers on the skin, are sometimes pleasant. The pleasantness and unpleasantness of all save sensational experiences of great intensity seem to depend, so far as they can be explained at all, not on the physical inten-

* For experiment, cf. Seashore, Chapter XV., pp. 191 ff.; Titchener, § 34.

sity of their stimuli, but on two other factors — the unexpectedness and the intermittence of the stimuli. The constantly repeated stimulus, unless very strong, is indifferent, whereas the unexpected stimulus occasions pleasure.

We have thus been unsuccessful in the effort to discover definite physical stimuli of the affections. We have, however, reached certain positive, though as yet uncoördinated, results. Very intense, and intermittent stimuli occasion unpleasantness; unexpected stimuli of moderate intensity excite pleasure; and habitual stimuli are indifferent. A further consideration of these results of our inquiry leads us to a study of the physiological conditions of affective elements of consciousness. These, to be sure, can be only hypothetically assigned, because they have eluded discovery by direct experimental or by pathological methods. We must proceed cautiously in the absence of direct experiment, but we are safe in asserting, first of all, that there are no peripheral or surface end-organs of pleasantness or unpleasantness, since such end-organs could only be excited by special physical stimuli, of which, as we have seen, there are none. It is also probable that pleasantness and unpleasantness are not brought about by the excitation of the sensory cells in the brain, that is, of the cells directly connected by afferent nerves with the surface end-organs. For variation in the locality of these functioning cells, in the degree of their excitation, and in the number excited, have been seen to correspond, in all probability, with sensational qualities, intensities, and extensities.

Bearing in mind that any theory of physiological conditions is uncertain, until it has been verified by experimental observation, we may still profitably guess at the physiological basis for the affections.[6] In the writer's opinion, one plaus-

ible account of this physiological condition is the following: pleasantness and unpleasantness are occasioned by the excitation of fresh or of fatigued cells in the frontal lobes of the brain, and the frontal lobe is excited by way of neurones from the Rolandic area of the brain. When the neurones (or cells) of the frontal lobes, because of their well-nourished and unfatigued condition, react more than adequately to the excitation which is conveyed to them from the Rolandic area, an experience of pleasantness occurs; when, on the other hand, the cells of the frontal lobe, because they are ill nourished and exhausted, react inadequately to the excitation from the Rolandic area, then the affection is of unpleasantness; when, finally, the activity of frontal-lobe cells corresponds exactly to that of the excitation, the given experience is neither pleasant nor unpleasant, but indifferent.* This theory is assumed, as working hypothesis, in this chapter.

From this suggested explanation of the affective factors in emotion we must turn to an attempted account of (2) the sensational constituents.[7] These are of two main classes: first, those which are brought about by internal bodily changes, especially by changes of heart-beat and of arterial pressure; second, those which are due to the movements of head, limbs, and trunk, including respiratory movements.† Many psychologists have tried to discover, experimentally, exact differences between bodily conditions of pleasantness and unpleasantness respectively.‡ The results of these inves-

* The general reader is advised to omit pp. 200[2]–204,[2] certainly at the first reading of the chapter.

† On this subject, the student is advised to read James, "Psychology, Briefer Course," Chapter XXIV., pp. 373–386; or "The Principles of Psychology," II., Chapter XXV., pp. 449–471.

‡ For experiments, cf. Seashore, Chapter XV., pp. 201 ff.; and Titchener, §§ 35–37.

tigations are not unambiguous, for the difficulties of experimenting on emotional conditions are very great. It is, in the first place, hard to bring about any genuine emotion under laboratory conditions — to rouse keen joy or pronounced grief while one is encased in apparatus destined to measure the bodily processes; and, in the second place, emotional states are so complex that it is hard to isolate pleasantness and unpleasantness for experimental testing. The following distinctions may, however, be accepted as more or less probable:[8] —

(1) Pleasantness is characterized by a slow and strong pulse, by dilating arteries, and by bodily warmth. Unpleasantness is characterized by a fast, weak pulse and by bodily chill. This is the result best established by experiment and by introspection.

(2) Pleasantness is perhaps characterized by relatively quick and weak breathing; unpleasantness by slow and deep breathing. This conclusion is not so well substantiated.

It should be added that all these bodily conditions may conceivably occur without our being conscious of them; but that the consciousness due to the internal changes (the consciousness of heart-beat, of warmth, of cold, and the like) are probably always a part, even if an unemphasized part, of emotion; whereas the consciousness of some, at least, of the external changes, of altered breathing or of actual movements of the body, is only a frequent and not an invariable, constituent of emotion. My amusement, for example, often includes my consciousness of my smile, yet I may be amused without smiling.

It is thus evident that certain bodily changes, internal and external — changes in dilation of blood-vessels and in pulse,

in respiration, and in the movements of face and limbs — condition and accompany the emotions. But we have not completed our study of the bodily conditions of emotion until we try to discover the brain or nerve changes which condition these changes in pulse, respiration, and the rest. A probable account of these brain changes is the following. First, (*a*) sensory brain-centres are excited through perception or imagination of a given object; next (*b*) the excitation of these sensory neurones spreads to the brain-centre of bodily sensations and movements, that is, to the region forward and back of the fissure of Rolando, and there excites motor cells.* This excitation of the motor neurones of the Rolandic region is then carried (1) downward to lower brain-centres in the *medulla oblongata*, which control the unstriped muscular coatings of inner organs of the body, such as blood-vessels, heart, and intestines. In this way the internal circulatory changes are brought about: the heart-beat and pulses are checked or increased, and the arteries (not the big ones near the heart, but the smaller, thin-walled vessels in outlying parts of the body) are dilated or constricted, thus occasioning either a flush and rising temperature or pallor and chilliness. The downward excitation is carried (2) to the striped or skeletal muscles attached to the bones of the body, and thus the 'external' changes in breathing and muscular contraction are occasioned. Both sorts of bodily change, the 'internal' and the 'external,' excite end-organs of pressure, and the internal changes excite also end-organs of warmth and cold; and these excitations of the end-organs of pressure and of warmth or cold are carried upward by ingoing nerves to the sensory cells of the bodily-sensation-and-movement-centre

* Cf. Appendix, Section III., § 7.

(the Rolandic area). The excitation of these sensory cells is the immediate condition of all the organic sensations (whether due to internal changes or to external movements) which are present in emotional experience. And from the Rolandic area, excitations carried to the frontal lobe bring about that adequate (or inadequate) excitation of neurones which conditions the pleasantness (or unpleasantness) of emotion.

We may illustrate this complicated description by the hypothetical account of the bodily conditions of some special emotion — for example, of the delight with which I hail the unexpected arrival of a friend. The conditions of this joy are, presumably: —

First, (*a*) the spread of excitations from the sense-centres, excited by the sight of my friend, to motor neurones in the Rolandic area; and (*b*) the excitation of downward motor neurones.

Second, stronger heart-beat and pulse, and dilation of the smaller arteries which results in bodily warmth and in reddening of the skin.

Third, probably, slower and deeper breathing, as well as other changes (due to the contraction of skeletal muscles) such as smiles and hand-clapping.

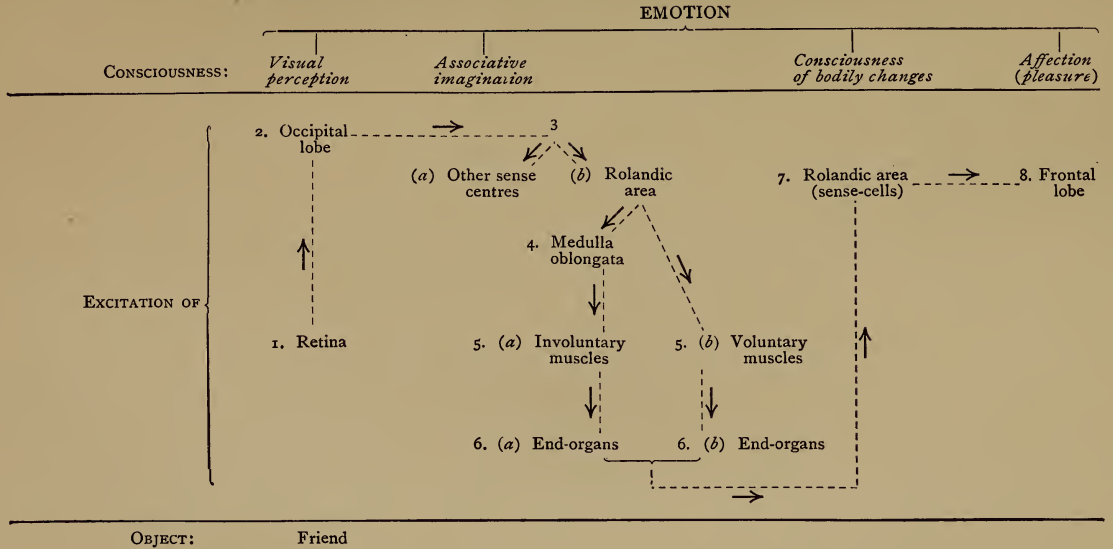
Fourth, (*a*) excitation of end-organs of pressure, occasioned by the internal bodily movements which always occur, and by the external muscular contractions when they occur; and (*b*) the upward spread of these excitations to sense-cells of the Rolandic area. The excitation of one group of these sense-cells occasions the sensations of internal warmth and pressure, which are always a part of the emotion of joy; and the excitation of another group of these cells, when it occurs,

conditions the sensational consciousness of external movement which often forms a part of 'joy.'

Fifth, the spread of excitations from these Rolandic sense-neurones, to the frontal lobes, followed by the adequate excitation of frontal-lobe cells. This vigorous excitation may be explained, at least in part, in the following manner: the stronger heart-beat, characteristic of joy, pumps blood from the heart, and all parts of the body, including the brain, are therefore relatively well nourished. The result of this adequate excitation of well-nourished frontal-lobe neurones is the affective element of the emotion — its pleasantness or unpleasantness. A diagram may make all this clearer (see page 205): —

b. The Instinctive Bodily Reactions to Environment in Emotion

Important to a study of emotion is a consideration of those bodily reactions which accompany and, in part, condition emotional states. They are noticeable, in the first place, as interruptions of preceding bodily reactions of every sort. On the one hand, they are interruptions of those regular and habitual reactions which normally accompany perception; and, on the other hand, they interrupt the deliberate and purposive bodily movements of thought and of will. A second character of emotional reactions allies them with sensational and with perceptual reactions: they are swift and immediate, following directly on stimulation. Emotional reactions, in the third place, like all merely sensational and like some perceptual reactions, are instinctive, untaught. The deliberative reaction to a new situation — the movements necessary, for example, in setting up a new piece of apparatus — and even


EMOTION
Consciousness:
Visual perception
Associative imagination
Consciousness of bodily changes
Affection (pleasure)
Excitation of
2. Occipital lobe
3
(a) Other sense centres
(b) Rolandic area
7. Rolandic area (sense-cells)
8. Frontal lobe
4. Medulla oblongata
1. Retina
5. (a) Involuntary muscles
5. (b) Voluntary muscles
6. (a) End-organs
6. (b) End-organs
Object:
Friend

the less complex perceptual reactions — the movements, for example, with which I react to the ringing of my telephone bell — have all been acquired, that is, learned through imitation of somebody else or through my individual experience of success and failure; but my caress, my shudder, my laughter, — all these are instinctive bodily responses.

Emotional reactions are classified in two ways. They are distinguished, in the first place, as either chaotic excess-reactions or as coördinated hereditary reactions. The distinction may best be brought out by illustration. Suppose that I am seated at my desk and dictating a letter to my stenographer, in part reading from manuscript and in part composing. My consciousness is quite unemotional. My bodily reactions are compounded of (1) the habitual bodily reflexes which accompany and follow my perception of the letter which I read, and of (2) the more deliberate and hesitating reflexes which accompany my adoption of the phrases which I add. At this moment I am frightened, let us say, by the sight of a beast escaped from a travelling menagerie. What now is the character of the bodily response to this environment? It is of course, an instinctive reaction, and it involves an instantaneous 'checking' of the behavior of the previous moment: I at once drop the letter I have been holding and I stop speaking. And it is either a chaotic and unordered reaction — a helpless shriek, and an impotent running to and fro — or it is a coördinated action of the hereditary type; for example, I run away from the beast or I attack him with some bludgeon. Professor Angell has admirably explained emotional reactions of these two types. The stimulus of the emotion — whether external object or image — checks the reaction,

habitual or volitional, of the preceding movement, so that (in Angell's words) * "the motor channels of acquired coördinated . . . movements are somewhat obstructed." These motor impulses "overflow . . . into channels leading partly to the involuntary muscles," and thus resulting in aimless, futile movements, "and partly, through hereditary influences, to the voluntary system," resulting in useful and coördinated, though unplanned, reactions.

Within this group of coördinated and hereditary reactions a second distinction may, finally, be made. The reactions which accompany the happy emotions are movements of advance — such movements as the baby's outstretching of his arms to his mother; the reactions which accompany the unhappy emotions are movements of withdrawal, such as the shrinking of the child from the unfamiliar figure. All these instinctive hereditary reactions may be studied from the standpoint of their biological significance. Darwin and others have shown that the bodily changes in emotion are modified survivals of instinctive reactions of animals and of primitive men to their environment.[9] The trembling of fear, for example, is an instinctive movement which takes the place of actual flight from the enemy; the snarl of hate is a modified survival of the way in which an animal uncovers his teeth, in order to tear and devour his prey, and the quickened breath of anger is a survival of the labored breath of an animal or of a savage, in a life-and-death contest with an enemy.†

* "Psychology," Chapter XVIII., pp. 321–322. The student is advised to read Chapters XVIII. and XIX. in full.

† The student should consult Darwin, "Expression of the Emotions," examining the illustrations. For condensed statement of Darwin's teaching, cf. James, the end of each of the chapters cited on p. 200.

IV. The Significance of Emotion

The two fundamental characters of emotion press to the foreground of our attention as we turn again to the practical question: What is the bearing of our psychology on our behavior? Precisely because of these basal characters, emotion is an important factor in behavior. Emotion is, in the first place, an individualizing experience: it fosters explicit self-realization and direct personal relations and it makes other people real to me. And it is, in the second place, a receptive experience, and makes me sensitive to my environment and responsive to every aspect of it. A secondary character of emotion is also significant from the point of view of conduct. By its very vividness and coerciveness emotion tends to interrupt the habitual course of perception and of thought — somewhat as the emotional bodily reaction breaks in on the habitual response or on the deliberate chain of reactions. And this emotional interruption has, of course, its uses and its corresponding defects. If my habitual activities are never interrupted by emotion, I shall react in undeviating fashion to my environment for all the world like a well-wound wax figure; and if my reasonings are never broken in upon by feeling, I am little more than a calculating machine. On the other hand, if my thinking is never secure from the inroad of my emotions, I am like a heap of fireworks, ready to be set off by any chance spark.

The practical conclusions from this estimate of the significance of emotion are very obvious and yet are worth a restatement. All of them presuppose, of course, the possibility of stimulating, checking, modifying — in a word, the possibility of controlling the emotions. On this point one preliminary observation must be made. The emotions are

only indirectly controllable. Nobody can wave a wand and say to himself, "Now I'll be happy," or "Now is the time to feel mournful." This is a fact which people are always overlooking. "I've brought you here to be happy, and you shall be happy," says the mother to the little girl on a country-week excursion; but a shriek compounded of discontent and indignation is the well-directed answer of the child. Yet, though one may not by a feat of will exorcise the evil passion or the gnawing melancholy there are devices for removing the conditions of emotion. I may mechanically turn my attention to an absorbing and distracting book or occupation; I may open my mind to some tranquillizing influence; or I may arbitrarily assume the bodily postures which accompany pleasure. I shall be most successful in these indirect efforts to expel emotion if, by their means, I can rouse a strong emotion opposed to the one which I am trying to banish. Love that is perfect casts out fear because I cannot be at the same time vividly and happily conscious of another self in equal companionship with me and yet unhappily conscious of the same self as my superior and as cause of my unhappiness. And in like fashion love may exorcise demons of unhallowed desire and of sullen melancholy. Shakespeare, great analyst of the human passions, vividly emphasizes this truth: —

> "When in disgrace with fortune and men's eyes,
> I all alone beweep my outcast state
> And trouble deep heaven with my bootless cries
> And look upon myself and curse my fate
> * * * * * *
> Haply I think on thee and then my state
> Like to the lark at break of day arising
> From sullen earth sings hymns at heaven's gate."

From this preliminary study of the ways of controlling emotion we must turn back to the more specific problem: What are the helpful and what the harmful emotions? At the outset, we must recognize that emotion is an important, and indeed an inevitable, constituent of the psychic life. We are not to try, therefore, to suppress all emotion — and not to suppose that we can be successful if we try. To be universally bored or blasé is for most people a pose and an affectation; and in so far as the effort is sincere it is a mere sign of incompleteness, an admission that one is only half a human being.

But though it is alike futile and mistaken to attempt to banish emotion from experience, it is none the less certain that emotions may be harmful. Emotions are positively harmful if they interfere with essential habits; they are harmful also if they do not stimulate to active consciousness — that is, to volitions or to beliefs. The first of these assertions is so obvious that it hardly needs to be enlarged upon. I simply cannot go on living unless I can protect my useful habits from the incursions of my emotions; and I cannot carry on any train of reasoning while I am strongly swayed by my passions or by my feelings. It is even more necessary to emphasize, in the second place, the truth that emotion is not an end in itself; that emotion, though in itself receptive or passive, is significant in so far as it is incentive to activity; and that emotion turned upon itself, and issuing in no action not only fails of its particular result but inhibits the future tendency to activity. Indulgence in emotions never leading to action may become, in truth, the starting-point of actual disease, nervous and mental; and one of the soundest methods of scientific psychotherapy is the discovery of a patient's

'suppressed emotions,' and the effort to guide them into safe outlets of action.* To hug one's emotions to oneself, to seek or cherish them after Rousseau's or Werther's fashion, for the mere delight or excitement of having them is, therefore, to run the risk of crippling one's power to will, to choose, and to play an active rôle in life. Constant theatre-going and novel-reading are injurious precisely because they stimulate the emotions without providing any natural outlet of activity. The reality of this danger and the practical method of guarding against it have been well set forth by Professor James. "Every time," he says, "a fine glow of feeling evaporates without bearing practical fruit is worse than a chance lost; it works so as positively to hinder future resolutions. . . . One becomes filled with emotions which habitually pass without prompting to any deed, and so the inertly sentimental condition is kept up. The remedy would be, never to suffer oneself to have an emotion, . . . without expressing it afterward in *some* active way." †

This conclusion about the relation of emotion to activity furnishes, as will at once appear, the most important criterion of the value of particular emotions. Emotions are of very manifold sorts and kinds, and are consequently of diverse and unequal value. In fostering and in checking emotion we must, therefore, recognize the different values of the different emotions. For the complete estimation of emotions, as adapted to varying situations, there is here no opportunity, but the main principles of such an estimate may be stated. In brief: I should seek, in the control and development of my emotions, as complete an emotional

* Cf. Appendix, Section XVI.

† "The Principles of Psychology," I., Chapter IV., pp. 125–126.

experience as is consistent with the function of emotion to stimulate helpful activity. On this basis, three practically significant conclusions may be formulated. First, in and for themselves, the pleasurable emotions are helpful and the unpleasant emotions are harmful. This statement stands in direct opposition to the teaching of asceticism that pleasure is in itself an evil, but follows immediately from the principle that emotion is useful in so far as it stimulates activity. For pleasure more often and more intensely than its opposite, pain,* leads to activity. The desire to avoid pain is, to be sure, a stimulus alike to conscious and to bodily activity. But greater decisions are made, truer loyalty is shown, more seemingly impossible results are achieved through hope than through fear, through love than through hate, through confidence than through anxiety. Evidently, therefore, other things being equal, one should seek to rouse and to perpetuate pleasant emotions; and, conversely, it is absurd to urge any one to choose a profession or an occupation or a course of study because it is unpleasant and therefore salutary. It will appear immediately that many pleasant emotions are harmful; but this is always by virtue of some character other than their pleasantness.

Second, altruistic emotions, because most of them are less instinctive, are more in need of cultivation than egoistic emotions. In general, only people whose instincts have been warped by unnatural training need to be exhorted to seek happiness for themselves. Most of us, surely, would be larger and more effective selves if the scope of our sympa-

* The word 'pain' is here used, in its popular sense, to designate the opposite of pleasure; not in its technically correct meaning, to designate a sensational consciousness.

thies were widened, and if the happiness and unhappiness which we share with other selves were intensified. In order to widen my own personality and in order to transform merely passive emotion into active loyalty, I should therefore cultivate my altruistic emotions.

Third, neither the personal nor the impersonal emotions should be cherished to the exclusion of the others. This 'rule' is primarily in the interest of completeness of experience. There are people who are never stirred by the beauty of harmony, of form, or of color, who never draw breaths of satisfaction at the completeness of a demonstration or at the nicety of a logical distinction. Such people may be vividly emotional — they may be moved to their depths by personal contact, they may love and hate and envy, and may quiver with sympathy. And yet they miss part of what life might give them; and for lack of the occasional detachment from the personal, their emotional life is one-sided and thwarted.

The opposite defect is, however, more serious. By missing the impersonal joys of life one defrauds mainly oneself; but by lacking the personal emotions one impoverishes other selves as well. The characteristic temptation of certain temperaments is to regard the personal as if impersonal, to look at all human happenings from the standpoint of æsthetic and intellectual emotion. Thus regarded, a squalid tenement house is merely picturesque, and a defalcation is an interesting social situation. The dangers of this attitude are apparent. The impersonal emotions lead to contemplation and are perilously out of place in situations which demand action.

It will be observed that the cultivation of my altruistic and my personal emotions leads often to my abandoning the

happy for the unhappy experience. But this abandonment should never be from choice of the unhappy-as-such. In spite of, not because of, the unhappiness which it brings me, I should exchange my delighted contemplation of the thatched cottage for a sympathetic consciousness of the discomfort of its damp and smoky interior. The estimation of the comparative value of pleasure is one of the concerns of ethics. Every student of ethics and every keen observer of life admits that the desire for pleasure must be strictly controlled, not because pleasure is evil in itself but because it is so instinctively sought that it tends to displace more important objects of choice.

A brief reference must be made, in conclusion, to the unhealthy fashion of stimulating unpleasant emotion in the alleged interest of completeness of experience. The popularity of sensational novels and of problem-plays is the contemporary indication of this tendency. But nobody needs to seek unpleasantness merely in order to enrich his experience, for life is bound to furnish enough that is unpleasant. The only safe rule is never to create or to seek the unpleasant save as it leads to action individually necessary or socially helpful. Such a principle lies at the basis of a sound estimate in the New York *Nation* of certain widely read novels. "Their revelations of the hideous conditions of life," the *Nation* says, "are not calculated to make any person of good-will seek out that suffering and relieve it. . . . In a time when sensationalism and overemphasis of all kinds bid fair to be regarded as the chief literary virtues, these sordid infernos go a step farther and deal consciously in the revolting. . . . To view a brutal action may be salutary if it prompts one to knock the brute down; to penetrate the

lowest human depths, bearing aid, is well; to classify a new gangrene is well if it evokes a remedy; but to pry about a pathological laboratory that one may experience the last qualm of disgust, and then to exploit such disgust for literary purposes, is to create a public nuisance."

CHAPTER XII

WILL

I. The Nature of Will

a. Will as Personal Attitude

Sharply contrasted with the receptive, passive relations of my conscious self to its object, or environment, are two supremely assertive, active, experiences: will, or volition, and faith. In perceiving, I cannot help seeing and hearing and smelling; and though I can, to a degree, control my imaginings, yet I am a victim, often, of my imagination, for, in normal as well as in abnormal states, insignificant word-series may repeat themselves with wearisome iterations, grewsome scenes may thrust themselves upon me, and bitter experiences may unroll themselves before my unwilling eyes. In emotion, finally, I am influenced by people and things, 'prostrate beneath them,' as Goethe somewhere says.* Opposed to all these receptive attitudes are will and faith: the dominant assertive relations of the self to objects of any sort. Will is a consciousness of my active connection with other selves or with things, an egoistic, imperious relation, a domineering mood, a sort of bullying attitude. In will I am actively, assertively, related to my environment, I am conscious of my superiority and my independence of it,

* Cf. pp. 11 ff., 121 ff., and 171 ff. Thought is not in itself an assertive experience, but is often a result of volition.

I conceive of it as existing mainly for my own use or gratification.

Every leader or captain among men is thus an embodiment of will: his domain may be great or small, spiritual or physical, civil or literary; he may be king or cabinetmaker, archbishop or machinist, inventor or novelist; whatever his position, if he consciously imposes himself on others, if he moulds to his ideals, on the one hand, their civic functions, their forms of worship or their literary standards, or, on the other hand, their furniture and their means of transportation, he stands to them in the relation of imperious, domineering, willing self.

The rebel and the stoic are even more striking embodiments of will than the mere leaders of men. For stoicism and rebellion are instances of imperiousness, in the face of great or even overwhelming natural odds, — assertions of one's independence in the very moment of opposition or defeat. The stoic, in spite of his conviction that apparent success is with his opponent, is unflinching in the assertion of his own domination. "In the fell clutch of circumstance," he declares the more firmly —

> "I am the master of my fate,
> I am the captain of my soul."

Prometheus defying Zeus who tortures him is the classic type of the rebel: —

> "Fiend, I defy thee! with a calm fixed mind,
> All that thou canst inflict I bid thee do.
> Foul tyrant both of Gods and humankind,
> One only being shalt thou not subdue.
> * * * * * *
> Ay, do thy worst. Thou art omnipotent
> O'er all things but thyself . . .
> And my own will. . . ."

It is this attitude of mind, not any specific direction of consciousness toward a definite result, which constitutes what we call will, in the most intimate meaning of that word: a realization of one's independence of people and of things, a sense, more or less explicit, of the subordination of one's environment to one's own use, bodily or spiritual, — such a possession of oneself as is, in its completest development, a subjugation of every outlying circumstance, of every opposing self, and even of every insubordinate desire and thought. For only then is my self-assertion complete when I can say —

> "Yet am I king over myself and rule
> The torturing and conflicting throngs within."

Will is thus an egoistically assertive experience. It is also (like emotion) a profoundly and a doubly individualizing experience. Never am I more poignantly conscious of myself as single individual, as I-and-no-other, than when I assert myself in domination over my environment or in opposition to it. And with equal emphasis I individualize the object of my will: I assert my superiority over this individual, I command this soldier, I dominate this obstacle.

There are two fundamentally important forms of will — will directed toward a future object and will without temporal reference. Will of the first type has as object a specific future event. Will without temporal object is the consciousness of my domination of opposing person or of outlying circumstance, and need not include any contemplation of future change. It is a more fundamental experience than will directed toward future object, for this latter form of will is the expression, ordinarily, of the underlying non-temporal volitional attitude. One often, indeed, issues commands solely as expression of an overbearing disposition, after the fashion of the mother who

sends a messenger to the garden "to see what Willie is doing and to make him stop it."

From the objects of thought of which one is aware as related primarily to each other,* objects of will, like objects of emotion, are sharply distinguished in that they are immediately realized as related to the self. In truth, the assertiveness of will implies the subordinate relation of objects, personal and impersonal, to me, the willing self. These future objects of will are called ends and must be further discussed.

The end of will is, in the first place, real; that is to say, what I will, I always will to be real. Whether it be the will to make my moorings, or to fit together the pieces of a picture puzzle, or to resist a temptation to drive a sharp bargain, the end of my will is always regarded as a real occurrence, in the sense that I will it to be real. This is, indeed, the distinction between the object of my will and the object of my wish. The wish no less than the volition is directed toward a future object, but whereas I may wish for a fairy godmother or for a canal-boat in Mars, the ends of my will never seem to me to be unattainable. Another obvious character of the end is precisely its temporal relation, its futurity. A moment is that which-is-linked-in-two-directions, with its past and with its future. From both past and present the future moment is, however, distinguished by a lack of the irrevocableness which attaches to past and to present. Past and present are beyond change, whereas the future appears to be undetermined.

The object of will is realized, finally, as in a way dependent on the willing. It is, to be sure, an open question whether there is justification for this conviction that the end is in any

* Cf. Chapter IX., p. 134.

sense dependent on the volition; but unquestionably the object of will is so regarded and is thus, as will appear, distinguished from the object of belief.*

b. Will as Anticipatory Consciousness
'The Feeling of Realness'

Roughly parallel with the study of the objects of will is the structural analysis — an analysis of will conceived without necessary or explicit reference to the subject-self. We are entering now upon a famous battle-ground of psychology. Some psychologists have held that there is a specific elemental consciousness characteristic of will; others teach that will is analyzable into a complex of elements mainly sensational.[1] † In the opinion of the writer of this book, neither view is justified. To begin with the doctrine of the sensationalists: they teach that will consists simply and entirely in a mass of sensation, including always the sensational consciousness of bodily movement. Suppose, for example, that in rowing I will to feather my oar. According to the sensationalists, my will consists in (1) the sensational consciousness of the slight and mainly unnoticed movements which, instinctively, I actually make during volition, and (2) the sensational consciousness which constitutes the image preceding the deliberate voluntary movements of my rowing. This antecedent image may be either of the movement to be executed in feathering the oar, or of the way in which the oar will look when feathered. Even in inner volition, the sensationalists teach, — in the effort, for example, to solve the problem or to remember the

* Cf. Chapter XIII., p. 236.

† These Arabic numerals, throughout this chapter, refer to the numbered divisions (§§) of the Appendix, Section XII.

forgotten date, — one is apt to wrinkle one's forehead, to clench one's fingers, and to hold one's breath; and volition is simply the sensational consciousness of these movements. Now it doubtless is true that the willing consciousness includes these sensations of movement; but there is a conclusive objection to the view that volition consists wholly in the consciousness of such movements: experience furnishes each of us with countless examples of movement preceded by imagination of movement, which we never think of calling voluntary. I imagine an operatic air, for instance, and am surprised to find myself humming it, or I listen to an orchestra, and my waving fan moves unconsciously to the rhythm of the symphony. These are instances of movement preceded by the consciousness-of-movement, yet nobody calls the antecedent images — of operatic air or of musical rhythm — volitions; and one names the movements impulsive, not voluntary.* But this admitted difference between impulse and volition would be impossible if volition were an image constituted by purely sensational consciousness.

The discovery that volition contains unsensational elements has led to the assumption of a special volitional, or 'conative' element. But the analysis which follows, of volition, will show no trace of any such irreducible constituent. Roughly stated, volition differs (structurally analyzed) from the mere antecedent imagination in that it includes a certain realized 'anticipatoriness.' This does not mean that volition is a consciousness later realized as having been anticipatory: rather the anticipatoriness is part of the volition. The term 'anticipatoriness' is used to indicate a complex experience including at least three factors: (1) the consciousness of realness;

* Cf. Chapter V., p. 90.

(2) the consciousness of the future; and (3) an experience of linkage or connectedness — the consciousness of the dependence of the end upon the volition. Obviously these three sorts of unsensational experience correspond exactly with the relations, just discussed, of the willed object. Thus, the volition to feather my oar includes not only sensational consciousness, perceptual and imagined, of movement, but distinctive unsensational experiences, describable only as the consciousness of realness, of futurity, and of the dependence of future end on present volition. These experiences, as must constantly be reiterated, are actual psychical ingredients, as it were, of volition — as unmistakable as the sensations of movement, of color, or of sound. Since they are elemental, or nearly elemental, they cannot be described any more than sensational elements can be described; and, unlike sensational elements, they cannot be explained and classified by reference to definite physical stimuli and to differentiated end-organ excitation. But, like sensational elements, they can be pointed out, or indicated, as indeed we have indicated them, by reference to their objects. For example, just as one may indicate to a foreigner the meaning of the word 'red' by saying that red is the visual consciousness which one has in looking at strawberries and at tomatoes, so one may indicate the meaning of the 'feeling of realness' if one say that it distinguishes the volition from the wish to ride a bicycle; one may designate the consciousness of futurity as part of the essential distinction between my consciousness of this August day and my consciousness of a similar day next summer; and, finally, one may refer to the consciousness of the dependence of end on volition as that which marks off my will that my chauffeur shall observe speed regulations from the belief that he will observe them.

Of these three structural factors of the 'feeling of anticipatoriness,' two — the consciousness of the dependence of end on volition, and the consciousness of the future — are relational experiences.* The third — the feeling of realness — is rather to be grouped with elemental attention and with the affections, the feelings of pleasantness and of unpleasantness, as an attributive element. Like these (and unlike the sensational elements) it is not always present in our consciousness — in other words, we may be conscious of objects without regarding them as either real or unreal; and, like the attributive but unlike the relational elements, the feeling of realness is always fused with another element or with other elements of any order. †

II. The Forms of Will

In the more detailed study of the different forms of will we shall be guided by the following scheme: —

I. Will to Act (Outer Volition).
   a. Simple
      (1) With resident end.
      (2) With remote end.
   b. Choice
      (1) Without effort.‡
      (2) With effort.‡

II. Will to Think (Inner Volition).
   a. Simple.
   b. Choice
      (1) Without effort.
      (2) With effort.

* Cf. Chapter VIII., pp. 127 ff.; and Appendix, Section III., § 34; and Section VIII., § 2.

† Cf. Chapter VI., p. 94; Chapter XI., p. 172; Appendix, Section III., § 34.

‡ With resident or with remote end.

This outline, it will be observed, concerns itself only with volition directed to the future, making no attempt to classify the delicately varying non-temporal relations of self to other selves — to distinguish, for example, imperiousness from aggression, or mere opposition from inventiveness.* The outline is based on the distinction of the will to act, or outer volition, from the will to think, or inner volition, — on the distinction, for example, of the volition to sign a check, or to fire a gun or to make an electric contact, from the volition to attend to the elusive analogy, to remember the forgotten name, or to think out the unsolved problem.

a. Outer and Inner Volition (Will)

Outer volition, or the will to act, may have as object either a bodily movement or a result of movement. In the expression of James, it may have either a 'resident' or a 'remote' end. It is thus a consciousness of straining muscle or of moving hand, or else a consciousness of the effect of these movements, of the note to be sounded, the button to be fastened, or the outline to be drawn. This consciousness of the remote end may be visual, auditory, or, in fact, of any sense-type whatever. Such a consciousness of the remote end is followed by movements; but the movements are involuntary, though the consciousness is volitional, because the image which precedes them is an imagination of result, not of movement. A man wills, for example, to reach the railway station, and involuntarily he breaks into a run toward it; he has a visual consciousness of the platform, which means that a centre in his occipital lobe is excited; this excitation spreads along neurones which lead to the Ro-

* Cf. Chapter XIV., pp. 252 ff.

landic centres of leg-muscle activity, and by the excitation of these centres his movements of running are excited. He is conscious of the running, but only after it has begun, and he is even unconscious of some of the leg-contractions involved in the running. In other words, he actively relates himself to the railroad station, not to his leg-muscles, and the movements follow as reflexes, without being specifically willed.*

Two corollaries about outer volition are of such importance that they must receive special emphasis. The volition, in the first place, though called outer volition, is named from the anticipated end, not from any perceivable result; that is, it occurs quite independently of any external result. The fact that I am prevented, by bodily incapacity or by external circumstance, from carrying out my purpose, does not alter the volitional nature of the consciousness itself. The volition is, in other words, not an external event, but rather the anticipation of an outer event (of an act or of its result), including the feeling of anticipation, the consciousness of the necessary connection of this definite experience with a future real event. The physiological phenomenon which follows on volition certainly is the excitation of outgoing motor neurones. But this nervous impulse may exhaust itself before the contraction of any muscles occurs; or the contraction may indeed take place, but insufficiently; or, finally, my successful action may miss the needed support of other actions. I may address the ball with infinite pains, but top it ingloriously; or I may throw the tiller hard over, but fail to bring my boat into the wind. In every case, whatever the reason of external failure, outer

* The student is advised to read James, "Psychology, Briefer Course," Chapter XXVI., pp. 415–422.

will, or volition, remains what it is by virtue of its inherent nature.

The second of these corollaries of the doctrine of outer volition is the following: movements conditioned, or regularly preceded, by consciousness are not of necessity voluntary movements. Every conscious experience, sensational, affective, or relational, as well as volitional, stimulates motor reaction; but such stimulation is volition only when it includes anticipation in the sense already explained. As mere involuntary stimulus to action, every percept, emotion, or relational experience may be termed an impulse.*[2] (A practically useful application may be made, by way of digression, from the observation that actions follow normally from impulses as well as from volitions — in other words, that actions and bodily conditions and mental states are likely to follow on the vivid consciousness of them. For, if this is true, it is evident that one's volitions should be positive rather than negative. To say to oneself, "I will not run my bicycle into that tree" is to cherish an image that is only too likely to prove an impulse to action long before the tardier volition can inhibit it. So, to resolve that "I will not lie awake to-night," or "I will not fill my mind with these corrupting thoughts," is to occupy oneself with the very experience which should be avoided. The most effective volition is always therefore affirmative: one wills to keep to the road, not to avoid the tree; to breathe deeply and sleepily, not to stop lying awake; to "think on . . things . . . honest, . . . just . . . and pure," not to avoid evil thoughts).

These illustrations have suggested the contrast between inner and outer volition. Inner volition may, however, be

* Cf. Chapter V., p. 90.

passed without detailed discussion. Like outer volition, it is anticipation of an end which is real. The end is, however, in this case, another consciousness, not a physical action or situation, but a psychic experience. The volition to remember the forgotten name or date, to guess the riddle, and to understand the working of the intricate mechanism, are examples of what is meant by inner volitions. Compared with outer volitions, it is evident that they do not so closely resemble their ends (or objects). The volitional image of an act may be, in detail, like the act as performed; but the object of inner volition is itself consciousness, and to have the anticipatory consciousness of a consciousness, precisely similar yet not identical, is impossible. Inner volition may, therefore, be defined as anticipatory consciousness, including the idea of linkage with an end, and normally followed by partially similar experience, not by action.

b. Simple Volition and Choice

Within each of the classes, outer and inner will, there is another fundamental distinction: the distinction between simple will and choice, that is, will after deliberation. Deliberation is a conflict of will with will, an alternation in the tendencies or directions of self-assertiveness. It is a sort of clashing and warring between my varying attitudes toward different selves and things; a successive subordination to myself now of one, now of another, person; the will to possess now this object, now that, to suppress now this inclination and again this other. I choose, let us say, to sail to Southwest Harbor instead of walking to Turtle Lake, but my choice is preceded by what is called deliberation, a sort of mental see-saw of forest and ocean consciousness: now I hear

in imagination the sound of the wind in the tree-tops, but its music is drowned by that of the water on the keel of the boat; again, I imagine the vivid brown of the brook bed and the patches of sunlight sifting through the interlaced boughs of the birch trees, but the vision is blotted out by that of the mountains rising sheer out of Somes's Sound.

Imaginings of the accompaniments and of the results of rival objects of choice may play leading rôles in my deliberation. If I am deciding between a course of violin lessons and a stateroom on the *Mauretania*, not merely the images of fiddle and of steamer alternate, but the imagination of myself as playing "Schubert's Serenade" will be confronted by the imagination, let us say, of Winchester Cathedral Close. If I am wavering between a set of golf clubs and the new Clarendon Press translations of Aristotle, the imagination of a round on the Myopia links may be crowded out by a vision of myself as reading, before my study fire, a good translation of the "Metaphysics." This whole experience of alternating imaginations is attended by feelings of perplexity and unrest, the characteristic discomfort of 'making up one's mind.'

In considering the different sorts of choice, we shall do well to follow the lead of James, distinguishing 'choices without effort' from 'choices with effort.'* The difference is simply this: in the choice without effort, I fully abandon one alternative, whereas, in the choice with effort, I choose one alternative in full view of the other. The choice without effort, however prolonged and restless the deliberation

* The student is advised to read James, "Psychology, Briefer Course," Chapter XXVI., pp. 428–442; or "The Principles of Psychology," II., pp. 528–538.

which has preceded, is an easy choice, because at the exact time of making it no other act or result is contemplated.

The choice without effort usually conforms with our habits of thought, inclination, and action. I am deliberating, let us suppose, whether to have the Bokhara or the Persian carpet. The Persian is more subdued in color, but the Bokhara is silkier in texture. The Persian is larger, but the Bokhara follows more nearly the shape of my room. So far I am undecided, but now I see that the blue of the Persian rug does not tone with the blue of my hangings, and at once, quite without effort, I decide upon the Bokhara. Or I am trying to decide whether or not to buy this volume of Swinburne. The paper is poor and the print is fine, but the price is low and the poems are complete. "I really must have it," I say to myself. "But the print is impossible," I reflect. My indecision, however prolonged, is ended by the discovery that the book is an unauthorized American reprint. Now I long since decided to buy only authorized editions of English books, and my actual decision, to reject the book, is made without effort, that is, without even a thought of the advantage of the book.

When confronted, therefore, with what seems a new decision, one wisely tends to consider its relation to former choices, to fundamental inclinations, and to habitual actions. The result of such a 'classification,' as James calls it, is usually a decision without effort. An action, clearly realized as essential to the fulfilment of a choice already made, will promptly be chosen. The advantage of what the older psychologists called 'governing choices' is precisely this, that they make 'subordinate choices' easy.

The choice with effort is not, of necessity, preceded

by longer or more painful deliberation (that is, vacillating consciousness) than the effortless choice. The essential difference is simply this, that the choice is made with full consciousness of the neglected alternative. "Both alternatives," James says, "are steadily held in view, and in the very act of murdering the vanished possibility, the chooser realizes how much he is making himself lose." George Eliot has suggested this experience in the story of Romola's meeting with Savonarola, as she sought to escape from Tito and from Florence. "*She foresaw that she should obey Savonarola and go back.* His arresting voice had brought a new condition to her life, which made it seem impossible to her that she could go on her way as if she had not heard it; *yet she shrank as one who sees the path she must take, but sees, too, that the hot lava lies there.*" *

The most strenuous deliberations of all these types are those of the moral life: the fluctuations between good and evil, right and wrong, desire and obedience. Lifelike descriptions of deliberation are, for this reason, almost always accounts of moral choices. Of this fact the dramatists and the novelists give abundant illustration; and even on the pages of the moralists one may find vivid suggestions of the warring of personal tendencies in deliberation. "I see another law in my members," St. Paul exclaims, "warring against the law of my mind." "Clearly there is," says Aristotle, "besides Reason, some other natural principle which fights with and strains against it."

* Italics mine.

III. The Bodily Conditions and Correlates of Will

A statement concerning the neural conditions and the motor consequents and accompaniments of volition will conclude this chapter. So far as the neural conditions are concerned, there is little to say: the brain changes, whatever they are, which condition the feeling of realness and the relational consciousness of time, along with the ever present excitations of sense-centres, must be the physiological conditions of will. More significant is the distinction, already made, of voluntary movements, as delayed and hesitating, from the impulsive movements following on perception and emotion. The delay is especially marked in deliberate acts; yet every voluntary act (that is, every act preceded by an anticipatory image of itself or even of its end) must be performed less promptly than an action excited mechanically and instantaneously without the intervening brain excitation corresponding to the anticipatory imagination.

The relation between these volitional reactions and reflex, instinctive reactions should be noted carefully. Instinctive actions are untaught, and all reflex acts (whether instincts or lapsed habits) are immediate, whereas our volitional and our thought reactions are always learned through imitation or through individual experience, and are always delayed. Regarded, however, merely as muscular contractions, without reference to their immediacy, to their orgin, or to the consciousness preceding and accompanying them, voluntary movements may be similar, as well as dissimilar, to purely instinctive reactions in a given situation. Indeed, the simple movements of which a complicated voluntary movement is composed — the bending, grasping, pulling, for example —

cannot differ from these same movements performed as mere reflexes. And one may also definitely will to perform an originally instinctive act, in a word, one may supplement instinct by will. It follows that voluntary, like instinctive, emotional reactions of the egoistic type may be classified as reactions of withdrawal or of advance (here, of aggression).

It has been pointed out already, and the fact will later be reëmphasized, that voluntary reactions of all sorts tend to be replaced by immediate and habitual reflexes. In truth, the development of the life of consciousness always tends to suppress the direct motor volitions. Almost all bodily movements are better executed when our aim is directed toward the result to which they lead, that is to say, when the end of volition is an 'outer object,' not an imaged bodily movement.

CHAPTER XIII

FAITH AND BELIEF

I. The Nature and Forms of Faith and Belief

Faith, as distinct from will, is an adopting or acknowledging, not an imperious, demanding phase of consciousness; it lays emphasis not on myself but on the 'other self.' In the attitude of will, I subordinate others to myself; in that of faith or loyalty, I submit myself to others. In the mood of will, I am 'captain of my soul'; in my faith, I acknowledge another leader. Yet faith, like will, is an assertive, not a receptive, attitude of one self to other selves. It is no emotional sinking beneath the force of opponent or environment, but a spontaneous, self-initiated experience, the identification of oneself with another's cause, the throwing oneself into another's life, or the espousal of another's interests. In the words of Edmund Gosse: "No one who is acquainted with the human heart will mistake this attitude for weakness of purpose;" it is not "poverty of will" it is "abnegation." More accurately, such a relation is a supreme instance of faith; and men of faith have always, like the heroes of Hebrew history, "subdued kingdoms, wrought righteousness, obtained promises, stopped the mouths of lions," and this, through the active identification of themselves with great selves, great ideals, and great theories. Primarily, this attitude of acknowledgment and adoption is a relation to other selves: in other words, the object of faith is a self or selves. By belief,

on the other hand, is meant the assertive attitude of a self to an impersonal object. A man has faith in his father, his physician, his fellow student, his God; he believes the necessity of tariff reform, the doctrine that acquired characters are inherited, the dogma of the inspiration of the Bible.

Evidently faith and belief, like will, are assertive and doubly individualizing experiences, with personal or impersonal, external or non-external, 'real' objects. Structurally analyzed, faith and belief — still like will — include the elemental consciousness of reality.* So much for the likeness: faith and belief differ from will mainly in that each is, as has appeared, an altruistic, not an egoistic, an adoptive, not an imperious, attitude toward other selves or ideals or facts. A second difference is the following: the object of belief is always an object congruent with its environment. Nothing seems real to me which does not also seem harmonious. It follows that the objects of belief are of the most varied sort, but that they all agree in being regarded as congruent. When objects of our perception are called 'real,' by contrast with objects of our imagination, they are known as harmonious with each other: the meeting-house which I see accords perfectly with its surroundings, the mosque which I imagine is incongruent with every architectural feature of this New England town; the electric bells which I hear are congruent with the sounds of the city streets, the strains of the "Pastoral Symphony" which I imagine are unrelated with my entire surroundings.

From this it follows that a given object of consciousness may seem from one point of view real and from another un-

* Cf. Chapter XII., p. 222.

real, according as it is compared with one set of facts or with another. James has brilliantly illustrated this truth under the heading, "The Many Worlds of Reality," and has suggested seven such worlds,* including the worlds of sense, of science, of abstract truths, of fiction, and of individual opinion. The motion of the sun, which is real in the sense-world, is thus unreal in the world of science; Goethe's Lotte, though unreal in the sense-world, is so real in the world of poetry that we sharply contrast with her Thackeray's parodied Charlotte, whom we unhesitatingly pronounce unreal. And these distinctions mean merely that the motion of the sun is a phenomenon, congruent with the facts of our every-day observation, — sunrises, moons, and twilights, — but contradicted by the Copernican conception of our earth and the other planets of our system, in revolution about the sun; and that the romantic Lotte is a figure congruent with the life and environment of Goethe's Werther, whereas Thackeray's prosaic Charlotte is utterly unrelated to the Werther world of Goethe's creation. Faith and belief are thus distinguished both by the feeling of realness and by the feeling of congruence; and the objects of faith and belief are harmonious with their environment.

Besides this fundamental difference between faith and belief, on the one hand, and all forms of will, two distinctions must be named between the ends, or objects, of will as directed toward the future, and the objects of belief. These objects of belief, in the first place, are not necessarily future. One may believe a past or a present as well as a future event, as when, for example, one believes that Kleisthenes reformed

* The student is advised to read James, "The Principles of Psychology," II., Chapter XXI., pp. 291 ff.

the constitution of Athens, or that some one is at the front door. In the second place, the object of belief is not regarded as in any sense dependent on the belief. My belief that my new fur-lined cloak will be sent home to me next Thursday differs from my volition that it shall be sent home, because the belief lacks, what the volition has, a sense that this antecedent consciousness has a certain bearing on the result which will follow. In terms, therefore, of structural analysis, belief differs from will not only because the consciousness of the future is unessential to belief, but because belief includes a relational consciousness of harmony or congruence, and lacks the relational consciousness of the dependence of future on present.

Brief mention only need be made of the physiological conditions and of the bodily reactions characteristic of faith and belief. Of the brain conditions little need be added to what was said of the neural conditions of will.* The bodily movements which accompany faith or belief resemble those which follow on will in being hesitating, or deliberative, but differ from them in a marked way. For, whereas will-reactions are movements of opposition, of aggression, and of withdrawal, the reactions characteristic of trust and of belief are movements exclusively of approach: they are imitative and coöperating reactions.

Certain corollaries of the doctrine of faith or belief, as characterized by the feeling of realness, are so important that they demand consideration. It should be noted, in the first place, that side by side with the experience of realness grows

* Cf. Chapter XII., p. 231.

up what may be called a feeling of not-realness. This is evidently a composite of the consciousness of opposition with the consciousness of reality. Neither the consciousness of realness nor that of unrealness can be a first consciousness in any life, because both are learned through experience of such contrasts as that between perception and imagination, fulfilment and hope, execution, and volition. In illustration of the fact that the feeling of unrealness is not a primitive experience, James supposes* 'a new-born mind' for whom experience has begun, 'in the form of a visual impression of a hallucinatory candle.' "What possible sense," he asks, "for that mind would a suspicion have that the candle was not real? . . . When we, the onlooking psychologists, say that it is unreal, we mean something quite definite, viz. that there is a world known to us which is real, and to which we perceive that the candle does not belong. . . . By hypothesis, however, the mind which sees the candle can spin no such considerations about it, for of other facts, actual or possible, it has no inkling whatever." From this correct doctrine that the naïve mind has no inkling of an unreality, James and Baldwin and other psychologists draw, however, the erroneous conclusion that the undisputed, uncontradicted objects of the primitive consciousness are felt as real. The "new-born mind," James says, "cannot help believing the candle real," because "the primitive impulse is to affirm the reality of all that is conceived." But the proof that no object is primitively regarded as unreal falls far short of a proof that it is thought of as real; and, on the contrary, our observation of ordinary experience shows us many instances in which we are conscious neither of realness nor of unrealness. When I

* *Op. cit.*, Vol. II., p. 287.

am really absorbed in the adventures, for example, of Monte Cristo or in a Giovanni Bellini "Holy Family," I am not saying to myself, "this event is not historical," or "this is a portrait figure." In a word, I am conscious neither of realness nor of unrealness, but exclusively of stirring event and of glowing color.

The second of the corollaries from the doctrine of this section is the following: Though faith and belief certainly include the consciousness of reality, such consciousness may be so vague and unemphasized as to be truly an unimportant constituent of the total belief or faith. This fact is of high practical importance, for the doctrine of faith is most often obscured by confusing it with the bare consciousness of reality. A certain consciousness of reality is, it is true, essential to the active attitude toward selves and toward things, that is, essential both to faith and to will. But the mere awareness of reality is a very subordinate part of the experience of faith or belief. Faith is always an active, personal attitude toward another self; belief is always an active, personal attitude toward things, events, or truths; and both faith and belief involve, but are not exhausted by, a consciousness of the realness of selves or of things.

The relation between faith and the mere awareness of reality is most often discussed on an ethical basis. We receive, from great teachers of righteousness, fervid exhortations to have faith and to believe. But still other teachers warn us, as solemnly, that it is alike irrational and immoral to proclaim an obligation to hold opinions. These moralists insist that it is meaningless to assert the ethical superiority of one opinion to another, and they teach that the alleged duty, to hold this or that view of reality, is in opposition to the only

intellectual obligation, unswerving honesty in investigation. This revolt against the "duty to believe" would be justified, if it did not presuppose a wrong interpretation of the exhortations to faith. The truth is, that the great moral teachers always regard faith as personal acknowledgment of great selves and of great personal ideals. Such acknowledgment may involve, it is true, a certain consciousness of reality, and is never possible toward self or toward cause which is held as definitely unreal. On the other hand, such a personal acknowledgment does not presuppose any reasoned conclusion or any philosophic conviction about reality, and may even exist along with an unemphasized or a fluctuating consciousness of the reality of the self whom one follows or of the cause which one espouses. The duty to have faith is always, therefore, the obligation to identify oneself with the persons or the causes which seem the highest; and the exhortation to faith is always, on the lips of the great teachers, an incentive to loyalty. Thus, the New Testament commands to believe emphasize, always, the need or the duty of an affirming, consenting, personal attitude toward a divine self, and do not require that one hold an opinion about him; and the great creeds, also, are expressions of a personal relation. For, from this point of view, a conception of the duty of faith may clearly be held, since personal relations, not convictions of reality, are the objects of obligation, and since faith is the assertive, adoptive attitude of one self toward another.

Faith and belief are thus described as assertive, doubly individualizing adoptive attitudes to objects of any sort, and as distinguished by the elemental consciousness of realness and by that of congruence. An attempt to classify will show that,

like volition, faith and belief may be inner or outer, that is, may consist in the acknowledgment of ideal or of deed, and may be deliberative or simple. Deliberative struggles of faith with faith, of belief with belief, are universal experiences. Antigone's faithful love for her brother in opposition to her obedience to the state, the loyalty of the Soeur Simplice to Jean Valjean battling with her devotion to the ideal of truth, Robert Lee's allegiance to his state in conflict with his love for the Union, — are classic examples of an experience to which nobody is a stranger. Midway between this form of deliberation and the purely voluntary conflict of will with will — the alternating impulses to subordinate to oneself now one, now another, person or external thing — are the crucial struggles between will and faith. The crisis in the life of Neoptolemos was such a conflict between will, the impulse to crush Philoctetes despoiled of his weapons, and faith, the loyal acknowledgment of the rights of Philoctetes and the active adoption of his cause. Romola's deliberation, also, is essentially the vibration between these two fundamental tendencies toward self-assertion and self-effacement, toward the satisfaction of her own craving for a new life and the acknowledgment of a higher authority than her own desire. Both these are instances of an alternation, not between one willing tendency and another, but a fluctuation between will and faith, the egoistic and altruistic tendencies, the imperious and the acknowledging modes, the decision to lose one's life for another's sake or to save it.

II. The Significance of Faith and of Will

Faith and will stand in such close relation that the practical outcome of the study of the two experiences is

wisely formulated in a single section. It is certain that only in will and in faith — in my self-assertion and in my devotion — do I come fully to myself; and that only in will and in loyalty, only as assertive, active self — as leader or as follower — do I influence my environment. Obviously, therefore, these are practically significant experiences; and indeed all other forms of consciousness — memory, reasoning, and, notably, emotion — are estimated always not for themselves merely, but as material or incentive for self-assertion and for loyalty. No quickness of discernment, no power of thought, no depth of emotion, can ever take the place of what may be named energy of spirit. He who lacks it may well echo the cry, "Ce n'est pas de conseils, c'est de force et de fécondite spirituelle que j'ai besoin."

The evident outcome of this conviction of the supreme value of activity is to stimulate me to cherish and to foster my will and my loyalty. This statement must at once be modified by two important observations. To begin with: assertiveness, in either of its forms, is out of place in some situations. There are times when I have no responsibility for action, when I would better contemplate or observe or enjoy with utter receptivity, abandoning myself to stimulations from my environment. In the second place, even in my active relations, I should aim to reduce the number of my specific volitions and acknowledgments. Will and faith are, essentially, the active attitude, imperious or adoptive, of the self as a whole to other self or selves, and to inclusive interests or to complete situations. Therefore will and faith are not most effectively directed to single acts or thoughts; but these result, with greater precision and with distinct economy of consciousness, not from the specific volition, but rather from the

underlying will and from the wide-reaching loyalty or belief. It is true that I am not always capable of these inclusive and fundamental volitions and loyalties. While I am training myself to unaccustomed habits of mind or of body, and whenever will and faith are made difficult by opposing inclinations or desires, then I must make frequent special volitions and must espouse near and not far-away ideals. I must learn to dance, for example, by practising steps, that is, I must will the special movement of the foot and bend of the body. And the most effective way to make myself study an uninteresting subject may well be to will the mechanical operations of rising, getting and opening my book, following with eyes and with voice the lines and paragraphs. But these detailed and repeated volitions are characteristic of the will-in-training, not of the disciplined and educated will. When I have learned to dance, it is sufficient for me to direct my will to the accomplishment of a certain figure, and when I have habituated myself to study, the thought of the subject to be mastered will be followed mechanically by the movements involved in reading. In a word, reactions once willed tend to become involuntary, and, indeed, bodily reactions tend to become unconscious; and not only involuntary and unconscious bodily reactions, but immediate and unwilled mental reactions are likely to be more precise and exact than those which result from specific volition. Only when we no longer have to will the particular turn of the wrist or position of the hand are these movements mechanically accurate; only when we no longer need to bend to our will the words of poem or of formula can we put it to adequate use. In technical terms, the objects of our will and of our faith should be, as far as possible, inclusive and 'remote,' and our specific acts and

experiences should be, as far as may be, the unwilled means to these remoter ends and the unwilled aids to loyalty.

It thus appears that self-development involves a gradual reduction in the number of our volitions and beliefs. In like fashion, deliberation should give place to simple volitions and beliefs. In the beginning, almost every situation which involves either will or faith calls for deliberation. There is a possible alternative to every action, and every decision may be debated. But unquestionably the ideal is to attain volitions so comprehensive and beliefs so fundamental, so far-reaching, that the particular acts and conclusions of life follow from them without anticipation or as results of simple volition and faith. The Rubicon once crossed, Julius Cæsar has no place for further deliberation; the road to Rome once taken, Victor Emmanuel need not pause till the breach is made in the wall by the Porta Pia; his allegiance to the party once fully given, William Gladstone has no need to debate this issue as every new bill is introduced into Parliament. In other words, when once the governing purpose is formulated, when the large allegiance is given, lesser decisions become effortless, former deliberations become needless; even simple volitions, for the most part, give place to unpurposed conclusions and acts. This is the reason why the lives of great men are always, relatively speaking, simple lives. So fundamental and abiding are the great choices which they make, so encompassing and deeply rooted is their loyalty, that they perform naturally, even mechanically, the trivial acts and conclusions on which lesser men deliberate.

We have so far spoken of will and of faith as coördinate forms of assertiveness or self-activity, setting aside the important difference between them. But it must already have

appeared that both — the egoistic, dominating assertiveness of will and the altruistic, adoptive assertion of faith or belief — are essential aspects of the complete self. Most of us are prone to overestimate the significance of will. Like the little boys in their play-regiments, we all want to be officers, and we extol leadership at the expense of loyalty. But self-assertion, though it deepens, cannot widen, my self-realization; imperiousness and domination may be relatively external attitudes toward my environment. Only if I adopt and espouse and take into myself the aims and ideals of other selves do I make of myself what I may be. Even more obviously, I inflict irreparable wrong on my fellow if I imperil his individuality by subduing his will to mine, by imposing my personality upon him; and I fail of the contribution to the social good of which I am capable, if I do not follow where others lead and espouse causes which I have not initiated. It is a commonplace of every-day ethics that only those who have learned to obey know how to lead, and the study of the lives of the really great leaders makes this clear. Only the second-rate commanders are sticklers for recognition. "I will hold his horse for him if he will win me a battle," Lincoln exclaims of one of his generals.

It is equally one-sided, though perhaps not equally common, to follow where one ought to lead, to imitate where one ought to initiate, to obey where one should take command. The truth is that both will and faith, both self-assertion and loyal acknowledgment, are essential factors of the complete life. Each is a manifestation of the deepest individuality, for the great leader cherishes instead of repressing the individuality of his followers; and the whole-souled disciple expresses himself in his devotion.

CHAPTER XIV

THE SOCIAL CONSCIOUSNESS

I. The Forms of the Social Consciousness

Most of the forms of consciousness of which individual psychology treats are, or may be, social: in other words, they include, or may include, a consciousness of relation to other selves. Personal emotion, loyalty, the attitude of command — even reflective perception and thought — involve my experienced relation to other selves. In a narrower sense, the term 'social consciousness' is applied to the awareness of my relation not to an individual but to a group of selves. There are two main types of social group: the mob, or crowd, and the society. The first is a group of selves, of whom each imitates the external acts and the unreflective consciousness of the others. The mob, however, in so far as it concerns the social psychologist, is consciously imitative. It is probably true, to be sure, that mob-actions may be unconsciously performed. The most serious-minded may be carried out of bounds at an exciting football game, and may wake up to find that, quite unconsciously, he has himself joined lustily in ear-splitting yells during several mad minutes. But this unconsciously active mob is the concern of the sociologist, and only incidentally of the psychologist. The social psychologist's interest is chiefly with the group of people who realize their imitativeness, who are conscious, however vaguely, of

shared experiences and actions, who know that they are joining the shout of a thousand voices, or that they are rushing on in a great, moving mass of people. Such vague social consciousness the people of the mob almost always possess.

We have next to remark the strict limitations of the mob-consciousness. The individuals who compose it share each other's perceptual and emotional experience, but their actions are too precipitate to admit time for thought, and they are too deeply swayed by emotion to be capable of loyalty or of deliberate will. The mob-consciousness is not only fundamentally imitative, but utterly lacking in deliberation and reflection, and it is therefore capricious and fantastic. For this reason, the acts of a mob are absolutely unpredictable, since they spring from the emotions, notably the most temporary of our subjective attitudes. The fickleness of the crowd is, therefore, its traditional attribute; the mob which has cried aloud for the republic rends the air with its *Vive le Roi*, and the Dantons and Robespierres, who have been leaders of the crowd, become its victims.

What is sometimes called the insanity of a mob is, in reality, therefore, a psychological, not a pathological, phenomenon. Every emotion and passion gains strength as it is shared, and is characterized by reactions of increasing vigor. The accelerated force of primitive emotions, shared by scores and hundreds of people, is for a time irresistible, the more so because both emotions and the acts which go with them are unchecked by reasoning or by deliberation. No one supposes that the crew of the *Bourgogne* deliberately trampled women down in an effort to reach the boats. No one imagines that the Akron mob would have set fire to the public buildings, when they knew that the man

whom they sought had escaped, had they reasoned the matter out. Seamen and citizens alike were a prey to elemental passions uncontrolled by deliberation.

The activities of a mob may, none the less, be constructive as well as destructive, ideal as well as material. Gustave le Bon, a brilliant French writer, lays great stress on the capacity of a mob to perform capriciously generous deeds as well as cruel ones; and he instances the crusades as example of a great altruistic mob-movement. "A crowd," Le Bon says, "may be guilty of every kind of crime, but it is also capable of loftier acts than those of which the isolated individual is capable." It is, however, perfectly unequal to any logical conclusions, any reasoned acts, any purposed, planned, or deliberately chosen performance. Whether it drive the tumbril or rescue the Holy Sepulchre, its action is purely emotional and capricious, and it takes its cue unreflectively from the leader of the moment, for "a man . . . isolated . . . may be a cultivated individual; in a crowd he is a barbarian."

Many modern writers, Le Bon among them, believe that the crowd or mob is the only social group. They thus completely identify the crowd with 'society,' teaching that the mob-consciousness is the only type of social consciousness. From this doctrine we have good reason to dissent most emphatically, for we clearly find in human experience what has been named the reflective social consciousness. We may compare, for illustration, the reflective national consciousness with mob-patriotism. Everybody is familiar with the mob-activities of so-called patriotism: the shouts, the fire-crackers, the flag-wavings. They are all a part of the contagious feeling and action of a lot of consciously, but

unreflectively, imitative selves. A reflective national consciousness is an utterly different sort of experience. The possessor of it has certain deep-seated social conceptions, ideals, and purposes; these have their significance to him as shared with a group of selves who are consciously related with himself and with each other. These principles and ideals would be meaningless to the reflectively social individual, if they were merely his own. Yet he individually adopts and promulgates them, and he acts them out at the primaries, at the polls, and in public office. Such a reflective national consciousness may well be emotional, but it is not purely emotional, and its emotional attitudes are constant, not temporary and capricious.

Different forms of college spirit illustrate the same distinction. To cheer oneself hoarse at the athletic meet, and to join the men who carry the hero of the games in triumph from the field, may be a mere manifestation of mob-consciousness, an unreasoned, unpurposed wave of feeling, which carries one off one's feet in the contagion of a great enthusiasm. But there is also a deliberate college spirit. The student is profoundly conscious that his pursuit of a well-shaped academic course, of a life of close social affiliations, and of an honorable college degree, is the aim of hundreds of other students. He realizes that he is imitating and, in some ways, leading them, and that they are both imitators and leaders of each other and of him. He more or less clearly recognizes that his advance is an alternate imitation of his teachers and his fellows, and a reaction against them. His degree has a purely social value dependent on other people's estimate of it. In a word, his college life is consciously and reflectively social.

These illustrations have paved the way for a definition of the reflectively social consciousness, as (1) the reflective adoption of, or domination over, the external activities and the conscious experience of other selves, who (2) are regarded as forming a social group. Such a group of reflectively social persons may be called 'society' in contrast with a crowd or mob.

There is need to emphasize the truth that the reflective social consciousness is not merely imitative. The reflectively social person is aware of his power to lead, as well as of his capacity to follow. This tendency of the developed social consciousness has been greatly underemphasized. Monsieur Tarde, for example, believes that the essential nature of society is imitativeness. "Socialité," he says,* "c'est l'imitativité." It is perfectly evident that this definition leaves out of account the characteristic attitude of the leader of society. Even those who have confused society with the mob have been the first to acknowledge the leader as related to the mob, yet not a member of it. "A crowd," Le Bon declares,† "is a servile flock — incapable of ever doing without a master." In truth, however wide the place we make for imitation as a social function, it can never displace spontaneity and leadership. The charge is lost when the officer falls, and the mob disperses when its leader wavers. Customs and conventions and fashions are imitations which are dominated by invention, and every institution is, as Emerson said, 'the lengthened shadow of a man.' Nobody can deny that these masters of men, these captains of industry, these world-conquerors, are men possessed

* Cf. "Les Lois de l'Imitation," p. 75.

† "The Psychology of the Crowd," p. 113.

of social consciousness. We certainly cannot attribute social feeling to the Old Guard and deny it to Napoleon. We cannot assert that the doers of the law have a realization of a public self, society, and that the makers of the law are without it. The sense of moulding the common purpose, of inflaming the public feeling, and of inciting a group of selves to imitative action, is as truly a social consciousness as the realization that one is imitating the thoughts and feelings and acts of a group of similarly imitative selves, at the inspiration of the same leader.

This dominating phase of the reflectively social consciousness does not belong to the great leaders and masters only. On the contrary, every reflectively social individual may assume the dominating, imperious attitude, as well as the imitative, acknowledging attitude. Anybody may, moreover, take this attitude not only toward individuals but toward society — the reflectively social group whose members are realized as either imitative of each other or as dominating each other. The consciousness of this relation of influence lies at the basis of what is known as the realization of one's social duty. One may go to religious services, for example, and observe church festivals, not as a personal duty, but because one believes the observances socially valuable, and is conscious of one's actions as likely to affect other people's. More than this, as our study of will has suggested,* a dominating, not an imitative, attitude toward society is entirely possible when one is not master of a situation, and when, rather, one is leading a forlorn hope or, single-handed, defying a mob. Thus, the experience of Sokrates was profoundly social when, in the Heliastic Court, he stood alone

* Cf. Chapter XII., p. 216.

for a legal trial of the generals of Ægospotami, while the Athenians, beside themselves with horror over the unburied crews, were crying out for quick vengeance on the leaders of that luckless sea-fight. Certainly Sokrates was conscious of himself as opposing, not a single man nor any fortuitous aggregate, but all Athens, a composite group-self whose members were being swept on in a universal passion to a common crime.

The most important form of the reflectively social consciousness is the moral experience. Ethical systems differ, indeed, at many points and, in particular, some include and others exclude the consciousness of obligation as an essential factor of the moral consciousness. But all systems, with the one exception of that form of hedonism which teaches that individual pleasure is the chief good of life, unite in the admission that the moral life involves an altruistic recognition, by one individual, of the claims and of the needs of others. The great moral teachers — Jesus, Aristotle, Spinoza, Kant, and Hegel — always conceive morality as realized relation of myself to others, and found all formulations of specific duty on the conception of myself as social being (*πολίτικον ζῶον*),* as 'member of the universal kingdom of ends'† or as neighbor and brother. By some moralists, indeed, the moral consciousness in its social phase is not distinguished at all from the reflective social consciousness, and any reflective realization of oneself, as member of a group of related selves, is regarded as a definitely moral experience. In the opinion of the writer, there is, however, a difference between the merely social and the ethically social attitude: any group,

* Aristotle, "Politics," Book I., Chapter 2.

† Kant, "Metaphysics of Ethics."

however small, of related selves, can be the object of a genuinely social consciousness, but the moral consciousness keeps in view the relationship, not of any single group, but of all human selves, with each other. The purpose of ethical conduct, therefore, is the realization of complete union between one self and all other selves. In other words, when I am acting morally, I am not aiming at my own pleasure or profit, I am not working to secure the ends of my friend, my family, my society, or even of my state: I am inspired by a wider purpose, an ideal of the harmonized claims and needs of all individuals.

II. Imitation and Opposition

As so far studied, the social consciousness has been distinguished according to the social group — mob or society — which is its object. We may profitably discuss, a little further, two contrasted aspects, imitation and opposition, of the social consciousness and incidentally of social activities. Opposition in its two forms, invention and imperiousness, is the attitude of the social leader; imitation and the allied relation of obedience are the attitudes of the follower, the member of the group, to the leader. We are here especially concerned with imitation and invention. Each, it is evident, is a phase of learning, a widening of individual experience; but whereas imitation involves no social advance, but merely our individual progress, opposition in the form of invention implies an addition to the sum of human acquisition.

If we try to discover how many of our daily acts are repetitions of those of other people, we shall perhaps be surprised at our conclusion. We rise, breakfast, travel by car or by train, enter workroom or office or shop, work behind

machine or counter or desk, lunch, work again, return to our houses, dine, amuse ourselves, and sleep; and innumerable other people, near and far, are also breakfasting, travelling, working, dining, and sleeping. Yet we are in error if we reckon all these repeated activities as imitations. An absolutely isolated individual, without opportunity to imitate any one, would nevertheless eat and sleep and move about. An imitation is an act or a conscious experience conditioned by another, or by others, similar to it. Repeated activities are not, then, of necessity, imitations, but may be independent expressions of an individual, though common, instinct.

When, however, we weed out from the tangle of our repeated acts and experiences those which are mere instinctive or else accidental repetitions, a goodly growth of imitations still remains. For example, though we sleep, not because others do, but because of the conditions of our individual bodies, yet we sleep on the ground or on beds, and from eight o'clock till five, or from dawn till noon, simply because the people who educated us and the people who surround us do the same. So we eat, not because others eat, but to satisfy individual needs; yet we eat tallow or rice or terrapin, we eat with our fingers or with chop-sticks or with forks, and we eat from the ground, from mats or from tables, partly because people have taught us these ways, and partly because these are the manners of those about us. Again, our wanderings from place to place are unimitative, instinctive activities, but the manner of our travelling, on horseback, by automobile, or by aeroplane is, oftener than we think, a caprice of fashion.

The list of our imitative acts is scarcely begun. The root-words of a language, except such as are instinctive vocal outcries, are imitations of nature sounds, and language is always

acquired by imitation. People speak English or Dutch or Portuguese not accidentally, — as the child suggested, who feared that his baby brother might speak German, in place of English, — but through imitation of the people about us. Our handwriting is an imitation of our teacher's, and the earliest handwriting was abbreviated from the pictured imitation of natural objects. We bow to each other instead of rubbing noses; we lace on calf boots instead of binding on sandals; we read and write short stories instead of three-volumed romances; we revel in sociological heroines in place of romantic ones; and we study psychical research and no longer burn witches. But all these acts, ideals, and tendencies are directly due to custom or fashion, that is, to imitation. We do and think all these things, and scores of others, because others act and think in these ways.

Two forms of imitation are socially significant: fashion, or imitation of the present, of contemporary selves and facts, and tradition, or imitation of the past, of one's ancestors, their thoughts and their acts. In Paris, for instance, dress is regulated by fashion, which changes with every season, and every woman therefore dresses as her neighbor does. In Brittany, dress is a tradition, and every woman dresses as her great-grandmother did; the *paysanne*, who moves from one province to another, tranquilly, and as a matter of course, wears a coiffe which is as tall as that of the neighborhood is broad, as pointed as that is square, as unadorned as that is richly embroidered. This adherence to tradition as opposed to custom is the real distinction between conservative and radical. The latter need not himself be original and inventive, but he is friendly to innovation and receptive of the customs of his contemporaries; he breaks with the past and

allies himself with the present; whereas the conservative clings to the past and imitates the traditional observance.

Another distinction is that between physical and psychic imitation, imitation of movement and imitation of emotion or idea. Uniformities of movement — for example, those of drilling soldiers or of training oarsmen — are illustrations of the first class, and fashions in creed or in theory, such as the evolution hypothesis or the modern movement in favor of simplified spelling, are instances of the second sort. The truth is, however, that conscious imitation is only secondarily of thought or of act. Primarily and fundamentally, the object of imitation is another self or other selves, an individual or a social group; and the imitation consists in a conscious attempt to make oneself into this fascinating personality or to become one of this attractive circle. So the child imitates his father's stride, because it is his father's, not from any intrinsic interest in the movement in itself, and is a fierce Jingo because his father sides with the imperialists, not because he himself inclines toward these principles rather than toward others. The life of the child shows most clearly, indeed, the intensely personal nature of imitation. The development of his own personality is, as Royce has taught* by the successive assumption of other people's personality. Now, he imitates, or throws himself into, the life of the explorer; he harnesses his cocker spaniel to an Arctic sledge made of an overturned chair, and he reaches the North Pole ahead of either Cook or Peary. A little later, his ideals are incarnated in the persons of military heroes: you will find him gallantly defending the pass at Thermopylæ behind a breastwork of pillows, or sailing out to meet the

* *Century*, 1894.

Spanish Armada on a precarious ship of tables; he adopts a military step, organizes his companions into a regiment, attempts military music on his toy trumpet, cultivates in himself, and demands from others, the military virtues of obedience and courage. And in all this he is primarily imitating people, and is imitating specific acts and ideals, only as they are characteristic of these people.

One need not turn, indeed, to the life of childhood for illustration of the fundamentally personal nature of imitation. For there surely are few adults whose aims are not embodied in human beings. Whether one's ideal is that of the student, the physician, or the diplomat, it stands out before one most clearly in the figure of some daring and patient scholar, some learned and sympathetic physician, some diplomat with insight and training. One's effort is often explicitly, and almost always implicitly, to be like this ideal self, to realize in oneself his outlook and his achievements; and one is consciously satisfied with oneself when one has completed an investigation, made a diagnosis, or negotiated a treaty as this ideal self might have done it. The moral life, perhaps, offers the most frequent illustration of the personal character of imitation. Our ethical ideals live in the person of some great teacher, and our moral life is a conscious effort to be like him; our aims, also, are set before us as a supreme personal ideal, and we are bidden to "be perfect as our Father in Heaven is perfect."

Leaving imitation, we have briefly to consider the main forms of the contrasted tendency. These have already been named: on the one hand, mere opposition to other selves and to their thoughts and their acts; and, on the other hand,

the leader's attitude, whether domination or invention, toward these other selves. In its simplest form, opposition consists in the will to be different from others. Unquestionably, this tendency has been underrated, in consequence of the almost exclusive interest of the sociologists in the function of imitation. In all save the most servile forms of the social consciousness there occurs alongside of the impulse to follow one's neighbors the instinct to show oneself unlike them, or — as the impulse is sometimes formulated — to show one's own individuality. We are most likely, of course, to find opposition 'writ large' in the actions of children. But the mischief of a child which prompts him quite wilfully to say 'dog' or 'cow' when he knows well that he has spelled c-a-t, to run when he is expected to walk sedately, and to talk when silence is demanded, is merely a more obvious expression of the opposition instinct, which lies at the basis of all eccentricity in dress, repartee in conversation, and inventiveness in science or in art. Throughout these varying manifestations we may descry the tendency to be different, to attain what Royce calls the 'contrast effect,' quite for its own sake and without effort to influence other people. In this way, 'opposition' is distinct from the kindred form of domination, or command, the spirit of the leader of crowds and the organizer of societies.

It must be pointed out, in conclusion, that imitation and invention are never separate in the sense that some people and some achievements are imitative and others inventive. The truth is that every normal person unites in himself, in varying proportions, these two fundamental tendencies of consciousness. Nobody could be absolutely original, if that means unimitative; and conversely, one could hardly be a self with-

out some trace of opposition to one's environment. Thus, the most daring inventor makes use of the old principle, and the most original writer is imitative, at least to the extent of using language. On the other hand, few copies are so servile that they are utterly undistinguishable from the model.

The intimate union of the two tendencies is shown, also, by the fact that the usual road to inventiveness is through imitation. In truth, any honest effort to imitate intelligently must result in transformation rather than in mechanical copying. The healthy mind simply cannot follow copy without the spontaneous and unexpected occurrence of suggestions for change — of hot air instead of steam, an iambic metre in place of a trochaic, burnt umber rather than sienna, or zinc solution in place of chloride. It matters not whether we work at machinery, at poetry, at painting, or at chemistry: we all become inventive by trying to imitate. A curious, yet common, result of this relation is the inventor's inability to realize the extent of the changes which he brings about. Fichte, for example, supposed that he was merely expounding Kant, until Kant disclaimed the exposition and stamped Fichte's doctrine as an injurious and heretical system of thought.

Not only is it true that invention is always by way of imitation. It is also certain that the practically successful, that is, the permanent innovation, is the one which can be readily imitated. The inventor of machinery, so complicated that the common man cannot use it, will not succeed in introducing his machines, and the promulgator of doctrine, so profound that few men can apprehend it, will not greatly influence contemporary thought. This is the reason why the most original thinkers are so seldom leaders of their own

age; why, for example, the teachings of Sokrates, of Jesus, of Galileo, and of Spinoza exerted so little influence on contemporary thought. On the other hand, the brilliantly successful man almost always has that highest grade of commonplace mind which strikes out nothing essentially new, but which is yet keenly susceptible to most suggestions, selecting from these, with unerring good judgment, the readily imitable features. "Too original a thought is," as Baldwin says, "a social sport." Neither Rousseau nor the French Revolution, he points out,* could make a democracy of France; for centuries under absolute rule had unfitted the French to imitate and to adopt ideals of *liberté, égalité, fraternité.* For a like reason, Constantine could not christianize his legions by baptizing them; and indeed nobody ever yet foisted on a group of people any ideal which they were unprepared to imitate.

* "Social and Ethical Interpretations," p. 469.

CHAPTER XV

THE RELIGIOUS CONSCIOUSNESS

I. Typical Personal Relations

From the conception of psychology as science of myself in relation to my environment, personal and impersonal, it follows that every concrete personal relation may be the basis of a psychological study. My relation to this friend and to that, to brother or father or wife or child, to my employer or to my servant — every one, indeed, of the relations, in which my life consists, may be reflected on, analyzed, and explained after this manner of the psychologist.[1] The truth is, however, that a very healthy instinct prevents us, ordinarily, from this sort of analysis of our personal relations. We are too deeply absorbed, in living these relations, to reflect about them from the dispassionate scientist's point of view. We hesitate, and rightly, to pluck out the heart of our own mysteries; we prefer to love and to have faith, to sympathize and to enjoy, to command and to yield, without rendering up to ourselves a balanced account of our attitude to other people. But though we rarely expose our personal relations to the dissecting knife of the psychologist, there is yet no reason why the text-book in psychology, in so far as it treats of the relations of selves, should not supply the lack of scientific analysis in our own lives, by furnishing us with a series of studies of typical, personal relations — studies, for example, of the filial, the fraternal, or the civic relation, or even more general studies,

after the fashion of Hegel's analysis of typical moods of youth — the romantic, the Quixotic, and the Byronic. But there is a practical reason why the text-book on psychology does not, ordinarily, include such studies of typical and universal relations. The novel and the drama have already usurped this function of the psychological treatise, and just because their characters, however typical, are also particular and highly individual, therefore the psychology of novel or of drama is more absorbing and closer to life than that of any treatise. It follows that the novel has become, in some degree, the popular introduction to psychology.

The novel or drama is, of course, a study in the psychology of personal relations only. With the enumeration of structural elements of consciousness and the assignment of each to a physiological condition, it is only incidentally concerned; but the complexity and richness of the relations of its *dramatis personæ* are the very soul of it. The interest of a Shakespeare play does not centre in the scene — the witches' heath or the field of Agincourt — nor in the rhythm and melody of the verses, but in the developing and contrasting relations of the central figures to each other and to the lesser characters. Thus, the plays of which King Henry the Fifth is hero are a study of a youth of prominently active nature, in whom the emotions are undeveloped and unaccentuated. The love scene is sufficient proof of this: King Henry complains that he has "no genius in protestation," and that he "cannot look greenly nor gasp out his eloquence," but though he doubtless himself believes that he lacks only expression, the discriminating reader realizes that he is not capable of deep emotion, and that even while he laughs and plays pranks with Falstaff, and makes love to Kate, he is never carried out of

himself, never a prey to feeling; in a word, never in passive emotional relation to anybody, even to his sweetheart. Always, therefore, on the battle-field or in the court of love, he is the plain soldier, actively and imperiously related to men, whether he hand them their death-warrants or give them his gloves as favors, whether he boast of his army's prowess or hearten his soldiers in their discouragement.

But though, for the most part, we are content to leave in the hands of dramatist and of novelist the treatment of concrete personal relations, there is one such relation so universal, so significant, and so often misapprehended, that we shall here consider it. This is the relation of human to divine self.

II. The Religious Consciousness

The study of religion may be undertaken from several points of view. One may study the history of religions, tracing the development of one from another and taking note of the place of religion in the life of different peoples; or one may study the philosophy of religion, assigning to its objects a place in the whole universe of reality. Fundamental, however, both to the history and to the philosophy of religion is the psychological study of the religious consciousness. Such a study must begin, like every psychological investigation, by a study of my own consciousness, but will be supplemented by reference to historical records of religious experience. Its specific starting-point must be some admitted definition of the religious consciousness. Many definitions may be found, but simplest and most adequate, in the opinion of the writer, is the conception of religion as the conscious relation of human self to divine self, that

is, to a self regarded as greater than this human self or than any of its fellows.[2]*

If there were space to argue in detail for this conception of the religious consciousness, one would first of all point out that it lies at the base of all historical forms of religion. As is well known, living beings and nature phenomena are the objects of the primitive religious consciousness. Ancestor-worship is the most important form of the worship of conscious beings; fetichism and the worship of the heavenly bodies are the extreme forms of the nature religions. Now it is obvious that the worship of the dead warrior or patriarch, and indeed the worship of any person, or even of any animal, living or dead, is a conscious relation of the worshipper to another self. But it seems, at first sight, as if the worship of a nature phenomenon could not be in any sense a conscious relation to a greater self. A fetich is an insignificant object, a bit of bone or a twig or a pebble, not a living being; and sun, moon, air, and water, the gods of the nature religions, are inanimate beings. A closer study, however, shows that these objects, fetiches as well as sun and moon and stars, are worshipped, not for what they are, but because they are looked upon as embodiments of conscious selves. No savage is so ignorant that he fears and reverences a bit of bone, as mere bone; he worships it because he looks upon it as, in some mysterious way, the instrument or symbol of a powerful, though unseen, self or spirit. And no Aryan, we may be sure, ever bowed down before the sun, feeling that his god was a mere flaming, yellow ball. He worshipped the sun as a being apart from him and infinitely greater than he, yet none the less a self, however

* For Notes 1 and 2, cf. Appendix, Section XV.

vaguely conceived. Nature souls, in the words of Pfleiderer, a well-known historian of religion, "are originally nothing but the livingness and active power of the phenomena of nature, conceived after the analogy of animal and man as willing and feeling beings." *

If this were a book about religion, instead of being a book about psychology, it would go on to show that the systems which seem to diverge from this conception are no true exceptions. It would show, also, that the history of religion chronicles, in a sort of pendular succession, a reaction of two motives, one upon the other. A given religion, while it must include both factors, emphasizes either the superior power of its gods or else their essential likeness to human beings. In the lower forms of animism, for example, there is little difference between god and worshipper; and the gods of the Hellenes, who live among men, feasting, plotting, making love, come perilously near to losing the divine attribute of power. The higher nature-deities, on the other hand, are revered as immeasurably greater than human beings.

The history of religious rite offers another proof of the personal nature of the religious consciousness. "To speak boldly," Clement of Alexandria says, "prayer is conversation with God." † In similar fashion, Tylor defines prayer as "the address of personal spirit to personal spirit." †† The prayer, often quoted, of the Samoyed woman on the steppes shows very clearly how simple may be this communication of the human with the divine. In the morning, bowing

* "Philosophy of Religion," Vol. III., p. 237. Cf. E. B. Tylor, "Primitive Culture," Vol. II., pp. 185 and 294.

† "Stromatum," Vol. VII., 242, d.

†† *Op. cit.*, Vol. II., p. 364.

down before the sun, she said only, 'When thou risest, I too rise from my bed,' and in the evening she said, 'When thou sinkest down, I too get me to rest.' * Here we have neither petition, confession, nor explicit adoration, but mere intercourse, that is, acknowledgment of common experience. Prayer may be, indeed, a mere request for material good like the Gold Coast negro's prayer, "God give me rice and yams, gold and agries, give me slaves, riches, and health," * or it may be a prayer for forgiveness, like the Aryan's cry, "Through want of strength, thou strong and bright God, have I gone wrong; have mercy, almighty, have mercy;" † but whatever its form, prayer, like sacrifice, is always the communion of the human with the more-than-human spirit.

This introductory reference to the history of religions and of religious rites prepares us for our specific problem, the nature of the religious consciousness. The conception which we have gained enables us, in the first place,†† to limit the essentials of the religious experience. Ritual and ceremonial, theories of heaven and hell, and even hopes of immortality, are religious only in so far as they grow out of the consciousness of God or grow up into it; in the realization and immediate acquaintance with God, the religious experience has its centre and its circumference. We shall gain a truer understanding, therefore, of the religious consciousness, if we do not regard it as an experience radically different from the other personal relations of our lives. For if God be just a greater self, then one's attitude toward him

* Tylor, *op. cit.*, Vol. II., pp. 291, 292; and p. 367.

† Quoted by Tylor, *op. cit.*, Vol. II., p. 374, from the Rig Veda, VII., 89, 3.

†† This sentence, and a few of those which follow, are quoted from a paper, by the writer, in the *New World*, 1896.

cannot be utterly unlike one's attitude toward a powerful human friend or chief. In our study of the religious consciousness, we must thus be guided throughout by the analogy of human relationships.

Now human beings are, first of all, liked or disliked, feared or thanked, loved or hated, and in the same way the religious experience is always, certainly in part, emotional. At its lowest emotional terms, it includes at least the feeling of the dependence of the human on the divine. But ordinarily the religious experience is far richer in emotion, and there is, indeed, no significant phase of human feeling which may not as well characterize the relation of man to God as that of man to man. Abject fear, profound gratitude, bitter hatred, or devoted love may be factors of the religious experience. The savage, who bribes his gods through fear of them, and the rebels who cry out, "All we are against thee, against thee, O God most high," are as truly religious in their emotion as the humblest and most self-forgetful worshippers.

We have found, however, in our analysis of personal relations, that there is an active as well as a passive attitude to other selves, a relation of faith or will, as well as an emotional relation of fear or reverence. This active acknowledgment of loyalty or faith is the second characteristic phase of religious experience. It may be touched by emotion, yet it is sometimes an utterly unemotional acknowledgment of the divine self, a submission to what one conceives to be his will, an adoption of what one looks upon as his ideal, a resolute loyalty unlighted by emotions supported only by a sober and perhaps rather dreary conviction of duty. It may be questioned whether there is a

more heroic type of religious experience than just this cold adoption of what one conceives to be the right relation to God.

We are thus brought, face to face, with the significant problem regarding the connection between the religious and the ethical experience. Our definition of religion, as relation of the human self to the divine, provides us with a standard by which to test the frequent claim that morality is religion. This claim is often strongly opposed on historical grounds. It is pointed out that primitive religions are full of positively immoral customs and rites, that the Borneans, for example, gain new spirits by head-hunting, and that the Oceanians have a god of thieving, to whom they offer a bit of their booty, bribing him to secrecy with such words as these: "Here is a bit of the pig; take it, good Hiero, and say nothing of it." * Such an argument, however, is inadequate, no matter how firmly established the facts on which it is based. For though Borneans and Oceanians and all other savage people perform acts, which we call wrong, as parts of their religious observance, it may be that they do not thereby violate their own moral codes.

The opposition between religion and morality lies deeper. The religious experience is fundamentally a consciousness of God or of gods, a realized relation of the worshipper to a spirit or to spirits who are greater than he and greater also than his fellow-men. The moral consciousness, on the other hand, is, as has appeared, a form of the social consciousness, a man's recognition of his place in the whole interrelated organism of human beings. Now, just as any human relation is incomplete and unworthy, if it lacks the

* Cf. Ratzel, "History of Mankind," Vol. I., p. 304.

moral experience, the consciousness, in some sense, of obligation toward another self, so the religious consciousness is superficial, unhealthy, and fragmentary, if it does not include the acknowledgment of duty toward God. But though religion without morality is ethically degrading, it is none the less religion. Any conscious relation to God, however low and lifeless, however destitute of moral responsibility, is religion; and no morality, however sublime, no life, however noble, is religious, if it lack this conscious relation to God. It follows, of course, that a bad man may be religious and that a good man may lack the consciousness of his relation to God. Undoubtedly, therefore, certain ethical systems are better and safer guides than certain religious creeds. Religion, however, is not and cannot be morality, simply because religion is, and morality is not, a conscious relation of human self to the divine.

The æsthetic, almost as frequently as the moral, experience is mistaken for religion. The profound emotion, with which one falls upon one's knees with the throng of worshippers in a great cathedral, is named religious awe, though it is quite as likely to be what Du Maurier calls mere 'sensuous *attendrissement*.' The stately proportions of nave and transept, the severe beauty of pillar and arch, the rich coloring of stained glass, the thrilling sounds of the organ, and the heavy odor of the incense may hold one's whole soul enthralled, and leave no room for the realization of any personal attitude to a God who is in or behind all this beauty. In the same way, the absorbed study of nature beauty is a self-forgetful, but not, for that reason, a religious, experience.

This teaching, it must be admitted, is in opposition to the

modern tendency to class experiences as religious if they do not deal directly with material needs and conditions. But the very breadth and comprehensiveness of these conceptions make them, in the writer's opinion, valueless. It is indeed true that the religious, the ethical, and the æsthetic consciousness are alike, in that they are, in a greater or less degree, altruistic rather than merely egoistic experiences. It is, however, misleading to confuse relations which, though similar in one respect, are none the less sharply distinguished.

Our study of the religious experience has not yet even named what is ordinarily accounted its most important factor: the conviction of God's reality, or — as it is commonly called — belief. The truth is that belief, in this sense, is not a part of any personal experience, that is, of any relation of one self with another. We are not occupied, in our personal relationships, with reflections upon one another's reality: we merely like or dislike each other, and are loyal or imperious. We may, to be sure, be conscious of the reality of God and of our human fellows, but this reflection upon reality is usually a phase of the philosophical consciousness, and not even an ingredient of the religious experience. Certainly, a bare conviction of the actual existence of another self, human or divine, by whom one does not feel oneself affected, to whom one is utterly unrelated, is not a personal experience at all. A belief of the reality of the deposed Turkish Sultan, Abdul Hamid, is no personal relation with him; and the mere persuasion that there exists a Supreme Being does not constitute a religious experience.

But though the conviction of reality does not enter into the immediateness of the personal experience, it is evident

that no relationship with God is possible to one who is distinctly convinced that there is no God. Some degree of the conviction of God's reality must, therefore, form the background of every religious experience, except the primitive personal relation in which one neither questions nor believes.* But this sense of God's reality has unsuspected gradations of assurance, lying between the extremes of doubt and reasoned conviction. The consciousness of God's reality may attain the completeness of philosophical dogma, but it may, on the other hand, be incomplete and illogical; it may be firmly held or it may be feeble and vacillating. For the truth is, as we have seen, that this consciousness of reality is, at most, a secondary and unemphasized part of religious experience; and religion is, as we cannot too often repeat, a relation with God, like our relations with our fellow-men. In Fichte's words: "Herein religion doth consist, that man in his own person and not in that of another, with his own spiritual eye and not through that of another, should immediately behold, have, and possess God."

* Cf. Chapter XIII., p. 239.

APPENDIX

This Appendix contains: (1) Bibliographical lists and footnote references. (2) Critical discussions of disputed problems in psychology, and supplementary notes upon topics briefly treated in the body of the book. (3) An account (Section III.) of the human body, in particular, of the nervous system and of the sense-organs, which amplifies the condensed statements of the preceding chapters. (4) A brief section (XVI.) on abnormal psychology. (5) A collection (Section XVII.) of questions, designed to test the student's first-hand understanding of the facts of psychology, and following the order of topics discussed in the successive chapters of the book.

The references to literature are in no sense exhaustive. They are fullest in the case of the difficult subjects and with reference to the topics most under dispute. Few references have been given to the standard text-books and, on the other hand, an effort has been made to take account of recent periodical and monograph literature. For other bibliographies, the student may consult: M. W. Calkins, "An Introduction to Psychology," 1901, pp. 492 ff. (with supplement to the bibliography in the second edition, 1905); E. B. Titchener, "Experimental Psychology, Qualitative Experiments, Instructor's Manual," 1901, *passim*, and Appendix II., and "A Text-book of Psychology," 1909, *passim;* also, the yearly Index of periodical literature published by the *Psychological Review.*

APPENDIX

SECTION I.*

I. The Conception of Psychology as Science of Related Selves contrasted with Other Conceptions

a. psychology as science of ideas

§ 1. Psychology, as we have studied it, is the science of self in relation to environment. This conception must be compared with two others widely held. According to the first of these, psychology studies not the self but the succession of ideas (so-called mental processes) one upon the other, each as belonging to a definite moment. From this point of view, the psychologist is concerned not with the self as perceiving, but with the percept; not with the self as willing, or in assertive relation to other self or thing, but with the volition — in a word, not with the self as conscious of objects, but with consciousness regarded impersonally without reference to any self.

In the opinion of the writer of this book, this conception of psychology is self-consistent and possible. In other words, consciousness may be treated, scientifically, as series of ideas; and percepts, images, thoughts, and the rest may be analyzed, classified, and explained by reference to parallel physical and physiological phenomena. But there are two conclusive objections to such a procedure. In the first place, it arbitrarily neglects a part of our immediate consciousness, and, in the second place, it offers an

* Sections I.–XV. of this Appendix correspond, each for each, with the fifteen chapters of the body of the book. Each section is divided into subsections, indicated by Arabic numerals; and indices from each chapter of the book refer to these numbered subsections. The page headings of the Appendix refer back to those pages in the body of the book on which the Appendix comments.

inadequate description of consciousness. To begin with the first of these criticisms: on this view, psychology is science of ideas. But I cannot be conscious of an idea except as idea of a self; implicitly, if not explicitly, I am always conscious of a self, as having the idea or experience. If, therefore, I define psychology as science of ideas, I raise the inevitable question: "whose idea?" and then refuse arbitrarily to answer the question.

Idea-psychology, in the second place, though it unquestionably offers a scientific treatment of consciousness, does not adequately describe the different forms of human experience. The characteristic methods which it shares with all forms of psychology are, (1) structural analysis and (2) classification and explanation* by reference to regularly preceding, accompanying, and following physical and physiological conditions. But our study of psychology has surely shown that perception and recognition and thought, and, more obviously but no more truly, emotion, will, and faith, are incompletely described when analyzed into merely structural elements and referred to bodily conditions. Perception is, indeed, indistinguishable from imagination except as it is regarded as a shareable and not a private experience; emotion is not merely pleasant or unpleasant: it is an individualizing and a receptive experience. For both the reasons which have been named, the conception of psychology, as science of ideas, must be rejected as an unsatisfactory programme for the psychologist.

b. PSYCHOLOGY AS SCIENCE OF MENTAL FUNCTIONS

A second contemporary conception of psychology is as science of mental functions, or functional psychology. This doctrine is not so clearly cut nor so precisely formulated as that of idea-psychology, for the word 'function' is used with different shades of meaning by different writers of this group. Common to all 'functional' theories is the conception of function as activity; but — partly, no doubt, because of the indefiniteness of this term 'activity'

* On the sense of explanation in psychology, see a paper by the writer, *Journal of Philosophy*, 1908, V., pp. 16 ff.

— many functional psychologists define it more precisely as reaction directed toward environment; and often proceed to describe the reaction as biologically useful.*

To this, as a complete conception of psychology, there is an objection exactly parallel to the first of those advanced against idea-psychology. A function, whether defined merely as activity or as useful reaction to environment, is the function of a functioner; and there is no activity which is not the activity of an actor. Therefore, I simply cannot study mental functions without at the same time studying the functioning self. For just as the study of ideas raises the unavoidable question, "whose idea?" so the consideration of mental functions directly involves the question: "functions of whom?" To define psychology as science of mental functions without referring the functions to the functioning self, is, therefore, an entirely artificial proceeding.

More closely scrutinized, functional psychology turns out, in the second place, to be either a synonym for self-psychology or else, once more, only a partial psychology. If the term 'function' be taken with the meaning 'reaction to environment,' and if the environment be then described, in Professor Angell's words, as 'social' and not merely 'physical,'† it must follow that a 'function' is a social relation, — in other words, a personal attitude. If, on the other hand, the term 'function' be taken in a strictly biological sense, then the account of different sorts of consciousness as different reactions to environment, — as adaptations or variations, as self-preservations or propagations, — these accounts will explain and classify psychic phenomena, but will in no sense describe them psychologically. To call fear, for example, an instinctive, self-preservative reaction of withdrawal, classifies and (in a way) explains the emotion of fear, but no more describes it than the statement, "a Watteau painted fire screen protects from the heat of the fire" describes the Watteau figures. The classification of a psychological experience as biologically useful is both correct and significant, but so far from fulfilling the requirements

* Cf. *Journal of Psychology*, 1907, IV., pp. 681 ff., with citations.

† "Psychology," p. 7.

of psychological analysis, it is not psychological description at all. Such description is, indeed, impossible without the study of a self, in personal relation, emphasized or unemphasized, receptive or assertive, egoistic or altruistic, to an environment which is personal as well as biological.

c. CONSIDERATIONS IN FAVOR OF SELF-PSYCHOLOGY

1. *Answers to Objections*

The discovery that many psychologists oppose or ignore this conception of psychology, as science of self, obliges us to marshal the arguments for the theory. We may profitably begin by considering the objections which have been urged against it. These are chiefly three. It is objected, in the first place, that the conception of self, however justified, is a philosophical rather than a scientific conception. This objection is, perhaps, too technical to be discussed here in detail. Those, however, who believe with the writer, that any fact open to everyday observation — a stone, a word, a manœuvre — may be scientifically studied will see no difficulty in the conception of a scientific study of facts so universally admitted to exist as selves.

One form which this objection takes must, however, be opposed with energy. Briefly stated, it consists first in identifying the self of psychology with some philosophical conception of self and then in arguing, rightly enough, that the philosophical conception is out of place in psychology. But between the philosophical and the psychological conception of the self there is a well-marked distinction. The psychologist does not ask whether or not the self is material or immaterial, inherently worthy or worthless, endless or finite. By self (or subject, ego, mind, soul) the psychologist may mean much less than the philosopher means. Certain characters of the soul as conceived by mediæval and modern philosophy are entirely excluded from the psychologist's self. Obviously, therefore, the self cannot be drummed out of the psychologist's camp by arguments directed against one form or another of the philosophical conception.

A second objection to the doctrine of self as set forth in this book is brought forward by some of the functional psychologists. This conception of the self is, they urge, too exclusively psychological. We know no disembodied selves, and the psychologist should therefore study the mind in the body. Or, as this theory is sometimes stated, the unit or basal conception of psychology is the psychophysical organism, the unity of mind and body. To this objection the following reply may be made: Unquestionably, the self whom, as psychologists, we study, is a self in close relation to a body; and the study of the physical conditions and of the bodily reactions accompanying consciousness is of great importance. But there is no complete 'unity of mind and body.' Even the advocates of this theory are obliged to distinguish between purely physiological functions, such as digestion and circulation, and purely psychical, or conscious, functions. By this distinction they implicitly refer the physiological functions to the physiological organism, the body, and the psychical functions to a conscious functioner, the self.* Psychology may well treat this conscious functioner as its peculiar subject-matter.

A final objection is urged against self-psychology (and, for that matter, against functional psychology) by the idea-psychologists. These claim that the structural analysis into elements — sensational, affective, and the like — is possible only if consciousness be conceived as stream of ideas. If this objection were well-founded, it would be decisive; for it is evident that perception, for example, is sensational; that emotion is affective — in a word, that consciousness is incompletely described without the structural analysis into elements. But the self-psychologist rightly denies the premiss of this argument. One can as well analyze 'my perceiving' as 'a percept' into sensational elements; one can as well reduce 'my fear' as 'a fear' to elements among which unpleasantness and organic sensations are prominent.

* Cf. *Journal of Philosophy*, V., p. 13.

2. *Positive Considerations*

The answer to objections is an insufficient basis for any theory. The doctrine of psychology as science of self has, however, a more independent foundation — the testimony of introspection. Because I am directly conscious of a unique, a relatively persisting self in relation to its environment, therefore I assert the existence of a self and scientifically study its constituents and relations.

It follows that the self-psychologist has no way of answering an opponent who asserts, "I have no consciousness of self." In other words, psychology as science of selves can be studied only by one who believes, or assumes, that he is directly conscious of himself. But even to an opponent who denies the fact from which he starts, the self-psychologist can at least show the plausibility or respectability of his position by pointing out, first, that some or all of those who deny the existence of a self-for-psychology implicitly assume the existence of such a self; and second, that many psychologists of admitted worth explicitly adopt the conception.

To substantiate the first of these statements, one has only to read the books of the idea-psychologists and to notice how constantly they describe and define consciousness in terms of the self, or I. Professor Ebbinghaus, for example, though he describes the soul as "nothing save (*nichts ausser*) the totality" of mental contents, none the less says that the soul is "a being," that it "has thoughts, sensations, wishes, is attentive or inattentive, remembers (*erinnert sich*), etc."* And Dr. Witasek, though he teaches that "we (!) find in our consciousness only ideas, feelings, etc., and not something else besides which should be fundamental to them," yet says unequivocally: "Psychic facts belong to individuals: a feeling, for example, is either mine or somebody else's." †

The idea-psychologist has, it is true, two answers to this charge of making implicit use of the conception of self. In the first place, he urges that he means by 'self,' as he uses the term, merely my

* "Abriss der Psychologie," 1908, 4, p. 41.

† "Grundlinien der Psychologie," 1908, I. Teil, Kap. 2, pp. 42, 38. (The exclamation point mine.) Cf. pp. 100, 231, 350.

body — either my physical organism as a whole or my nervous system in particular. But in this case he should regard the body, not the mind, as the real object of psychology; and this is foreign to the point of view of idea-psychology. Again, the opponent of self-psychology justifies his use of its words by the observation that, provided he define his terms, he has a right to employ everyday language in a technical sense. If, then, he define 'mind' as 'sum-total of ideas,' and 'self' or 'I' as 'human body,' he may say "I fear," and should be understood to mean: "A process occurs which is referred to the human body, and is analyzable into unpleasantness and organic sensations." The conventional expression, 'I,' he holds, no more binds the user to the obvious everyday meaning of it than the remark "the sun has set" marks an advocate of the Ptolemaic theory of astronomy. One may reply to this argument by carrying the illustration further. Surely, no Copernican, particularly in the days when the doctrine was still in dispute, would have claimed the right to describe astronomical phenomena in terms of the Ptolemaic theory. Similarly, the opponent of self-psychology should describe the phenomena of consciousness without use of a term which, to say the least, predisposes his reader to substitute for the conception of self as body, and of mind as sum of ideas, the conception, explicitly denied, of conscious self in relation to environment. The self-psychologist has then some right to urge that idea-psychologists are implicitly assuming or leading their readers to assume the existence of a self, when they describe consciousness in such words as "I attend to a color," "I perceive objects"; and still more when they mark off certain experiences as peculiarly personal; that is, as especially related to myself.

In addition to these challenged implications of self, many uncompromising assertions that psychology is science of the self may be found in the writings of contemporary psychologists, though they often substitute, for the word 'self,' some one of the expressions, subject, ego, mind, or even soul. Thus, Professor Ward defines the standpoint of psychology as that 'of the living subject in intercourse with his special environment.' And Professor Judd says ex-

plicitly, "Psychology deals with the self." Other supporters of self-psychology, and its critics as well, are cited in the bibliography at the close of this section.

II. The Conception of the Object in Psychology

§ 2. The conception of object which this book sets forth is so likely to be misunderstood, that it will here be amplified. It should first be noted that the standpoint from which one speaks of objects of the self is, as James says, dualistic; but that it is psychologically, not ultimately, dualistic, so that the monist in philosophy may, as psychologist, unconcernedly adopt it. The basis of the conception is the fact that I always find myself conscious of an object: of myself or my experience, of other self or thing or relation. More fully stated: In being conscious, I am always conscious (even if vaguely conscious) of myself as related either to an object or to that totality of objects which I call my environment. Psychology, if it is to take account of the self, must, therefore, take account of the object. Indeed, all psychologists, whether or not they purport to study the self, really describe and classify consciousness with reference to objects. They classify attention, for example, as sensational or intellectual, according as one attends to sensational or to unsensational objects; or they refer to color and to tone not only as sensations, but as existing outside eye or ear. This book follows Ward and James in the explicit recognition of the object of consciousness. In the words of the former: "Psychology deals with the subjective standpoint of individual experience, but we find that in this experience both subject and object are factors." * Or, to quote Professor Mitchell (who, however, for 'object' uses the word 'content'), "When conscious, I am always conscious of a definite something or other; and this is called the content of my experience or consciousness." †

It is important to emphasize the wideness of application of the word 'object,' thus used, and expressly to repudiate certain incor-

* *British Journal of Psychology* (cited p. 283), I., 1, p. 17.

† "Structure and Growth of the Mind," Lecture I., § 3, p. 11. Mitchell defines 'object' as content of knowledge or thought.

rect uses of the term. The object of the psychological self may take one of several forms, and cannot therefore be forthwith identified with any one of them. These forms, already enumerated,* are the following: (1) public objects of many or all selves whether (*a*) personal (that is, other selves) or (*b*) impersonal, and in this case, either external physical objects, or non-external relations, laws, and the like; (2) private, or psychological, objects, either (*a*) myself, in relation to environment, or (*b*) my experiences. Our greatest danger is that of confusing the object, in the general and inclusive sense, with the public object — what Ward calls the epistemological object — and especially with the external object of the physical sciences. It is permissible, however, but only where no ambiguity thereby arises, to use the word 'object' in what was perhaps its primary meaning, as indicating the 'other-than-myself' (that is, as including all forms of object except the private personal object), † and even to use the term, in either of the narrower senses, to mean 'public' or 'external' object.

A common confusion of the object with one special form of external object must be avoided with particular care. By the object of the self or of consciousness is never meant the stimulus, physical or physiological, of consciousness. The two are, indeed, to be contrasted sharply. When the object of my consciousness is, for example, the theatre curtain, the physical stimuli are ether vibrations, and the physiological excitations are obscure processes in retina and in brain of which I need never have heard and which, at best, I infer and do not perceive. In a word, the physical and physiological stimuli of consciousness are the phenomena of physical science, usually inferred, not perceived, whereas the object of consciousness is that of which I am conscious, without reference to which I cannot adequately describe my consciousness.

It has been pointed out in Chapter I. that important questions are raised by the conception of the object of consciousness: a fundamental question about the identity of subject and object; a second question about the alleged externality of objects of percep-

* Cf. Chapter I., p. 4.

† This is Ward's use of the term 'psychological object.'

tion; and, we may here add, a special problem about the precise nature of the objects of the relational consciousness. None of these questions, it must be reiterated, force themselves upon the psychologist so long as he holds steadily to his own business, the description and explanation of consciousness, regarded as the relation of self to environment. The psychologist, in other words, assumes, on the testimony of his direct consciousness, that a self related to object exists. By reflection, he distinguishes different attitudes of self and different forms of the object. The ultimate nature of both he leaves to the philosopher to discuss.

III. Bibliography on Fundamental Conceptions of Psychology

(a) On *psychology as science of self, as science of ideas, as science of functions:* (1) *Summary:* M. W. Calkins, Psychology: What is it About, *Journal of Philosophy, Psychology, and Scientific Method*, 1907, Vol. IV., pp. 673 ff.; 1908, pp. 12 ff., 64 ff., 113 ff.

(2) On *structural psychology:* E. B. Titchener, The Postulates of a Structural Psychology, *Philos. Review*, 1898, VII., pp. 449 ff.; A Textbook of Psychology, 1909, §§ 2–9. F. H. Bradley, A Defence of Phenomenalism in Psychology, *Mind*, 1900, N.S. IX., pp. 26 ff. H. Münsterberg, Grundzüge der Psychologie, Kapitel II.

(3) On *functional psychology:* J. R. Angell, The Province of Functional Psychology, *Psychol. Review*, XIV., pp. 63 ff. K. Stumpf, Erscheinungen und psychische Funktionen, 1907.

(4) For *criticisms of self-psychology:* W. B. Pillsbury, The Ego and Empirical Psychology, *Philos. Review*, XVI., pp. 387 ff. E. B. Titchener, *ibid.*, 1906, XV., pp. 93 ff. M. F. Washburn, *Journal of Philosophy*, II., p. 716.

(5) On *self-psychology:* M. W. Calkins, An Introduction to Psychology, 1901, 1905, Der doppelte Standpunkt in der Psychologie, 1905; A Reconciliation between Structural and Functional Psychology, *Psychol. Review*, 1906, XIII., pp. 61 ff.; Psychology: What is it About (cited above). W. Mitchell, Structure and Growth of the Mind, 1907, Lecture I., esp. §§ 3, 5, 7. J. Rehmke, Lehrbuch der Allgemeinen Psychologie, 1ter Teil, esp. §§ 11, 12. W. Stern, "Person und Sache, System der philosophischen Weltanschauung," I. J. Ward, On the

Definition of Psychology, *British Journal of Psychology*, 1904, I., pp. 1 ff.; Encyclopædia Britannica, Vol. XX., article Psychology, pp. 38, 39.

(b) On *the conception of the object:* Cf. Mitchell and Ward, cited above. Also, W. James, The Principles of Psychology, Vol. I., Chapter VIII., pp. 218 ff.; Chapter IX., pp. 271 ff. H. Münsterberg, Grundzüge der Psychologie, pp. 65 ff., esp. p. 72; and Psychotherapy, VI., pp. 130 ff.

(c) On *parallelism in psychology:* H. Ebbinghaus, Grundzüge der Psychologie, 1902, I., §4, pp. 27 ff. (For the opposite view, cf. James, *op. cit.*, I., Chapter V., esp. pp. 128–138. G. S. Stratton, Modified Causation for Psychology, *Psychol. Bulletin*, 1907, IV., 129 ff.

(d) For *criticisms (mainly metaphysical) of the conception of consciousness:* W. James, Does Consciousness Exist? *Journal of Philosophy*, etc., I., pp. 477 ff. R. B. Perry, Conceptions and Misconceptions of Consciousness, *Psychol. Review*, XI., pp. 282 ff. F. J. E. Woodbridge, The Problem of Consciousness, *Garman Commemorative Volume*, pp. 137 ff. (Cf. *Journal of Philosophy*, 1907, IV., p. 677, for further references to James, Bawden, Montague; and for comments.)

SECTION II.

Perception and Imagination

Note on the 'reflective observation' of perception and imagination (*cf. Chapter II., p. 12*). The discussion of perception introduces the important distinction between an immediate consciousness and the reflective observation of such a consciousness. Reflective observation is the after-consciousness of an earlier experience, the psychologist's awareness of an experience — his own or another's. To say that I am immediately conscious of the characters or relations which only after-reflection attributes to my experience is to commit what James calls the psychologist's fallacy. Yet, on the other hand, immediate and reflective observation may coincide. In any case, it is as allowable to classify an experience by taking account of the characters regularly attributed to it in after-reflection as to classify it by reference to physiological conditions.

Bibliography. — G. T. Fechner, Elemente der Psychophysik, 1860, Bd. II., XLIV. F. Galton, Inquiries into Human Faculty. W. James, *op. cit.*, Vol. II., Chapter XVIII. O. Külpe, Outline of Psychology, English translation, 1895, §§ 27, 28. W. Lay, Mental Imagery, *Psychol. Review Monograph Supplement*, 1898. G. H. Lewes, Principles of Success in Literature, Chapter III. Stricker, Studien über die Sprachvorstellungen, 1880. J. Sully, The Human Mind, Vol. I., Chapter X. M. G. Caldwell, A Study of the Sense-Epithets of Shelley and Keats (Wellesley College Psychological Studies). *Poet Lore*, 1898, Vol. X., pp. 573 ff.

SECTION III.

A. The Human Body from the Psychologist's Standpoint

§ 1. It is not the specific province of psychology to study the human body, yet the psychologist must possess an acquaintance with the structure and functions of the body in order to explain and to classify those facts about the conscious self which are the proper objects of his investigation. A formal definition of 'the body' need not here be attempted. It may be described first in its relation to myself; second, in comparison with other objects. From the first point of view, my body is an object of which I am sensationally conscious; it is the object of which I am most persistently conscious; and it is, finally, a medium of relation between me and other external objects. From the second standpoint, — that is, in comparison with other objects, — the body is an organism, a systematic complex of structures and activities such that each is subordinated to the whole.

The function of the body as, so to speak, mid-term between self and external things is due to two fundamental characters: it is readily affected by environing objects and, in turn, it easily affects them. Though it consist, as in the case of the protozoön, of a single cell, that cell affects, and is affected by, its environment. The amœba, for example, moves aside from an obstacle, attaches itself to a solid body, and unites these forms of reaction by projecting parts of its body and closing them over food.*

But though all living cells are fundamentally alike in function, yet with the development of the animal body there goes on in the cells a progressive differentiation both in structure and in function. The changes of especial importance to the psychologist are the

* M. F. Washburn, "The Animal Mind," pp. 39–40.

following: Certain structures, known as sense-organs, situated for the most part on the bodily surfaces, become specially adapted to excitation by the environment; other organs, bones and muscles, take over the essential function of motor reaction to the environment; and connecting the two (though histologically closely related to the sense-organs) is the group of structures known as the nervous system.

I. THE MOTOR STRUCTURES OF THE BODY

§ 2. For the purposes of the psychologist it is sufficient merely to name the *muscles*, masses of contractile tissue, penetrated by blood-vessels, most of them ending in *tendons*, fibrous cords which are connected with the more than two hundred *bones* of the body. The bones, moving on each other at the joints, form a peculiarly flexible framework.

Motions of internal organs — for example, heart-beat and movements of the alimentary canal — are the contractions of the muscles composing these organs.

II. THE CEREBRO-SPINAL NERVOUS SYSTEM

§ 3. From this reference to the specifically motor and the definitely sensory organs of the body, we turn to the closer study of the structure connecting the two. Rudimentary forms of such a connective system are found low in the biological scale, among the simpler (if not the simplest) of the metazoa. Beginning with the lowest of the vertebrates, we find the essential features of a cerebro-spinal nervous system — a central system of nerve-centres connected on the one hand with all the sensory surfaces and, on the other hand, directly connected with all the skeletal muscles, and indirectly connected with the internal organs. (Besides the cerebro-spinal nervous system, the body contains both scattered 'sporadic ganglia,' and a number of nerve-centres, loosely united, the so-called 'sympathetic nerve system.' These centres, which are partly 'self-directing,' partly excited through the central nervous system, control the activity of the internal organs, digestive, respiratory, and circulatory.)

a. Nerve-elements: Neurones

§ 4. The cerebro-spinal nervous system is made up of connected nerve-centres; and a nerve-centre is a tangled mass of neurones, or branching cells which are anatomically distinct. The structurally distinguishable parts of a typical neurone are the following:

FIG. 6. — Motor cell of gray matter of cord. From human fetus. The asterisk (*) marks the axone; the other branches are dendrites. From W. H. Howell, "A Text-book of Physiology," Fig. 54 (after Lenhossek.)

(1) the cell-body, a bit of protoplasm containing a nucleus; and (2) nerve-processes, prolonged from the cell-body, of two sorts, (*a*) the dendrites, broad in their origin from the cell-body and devious in their course, which give off intricately branching, 'antler-like' processes beginning near the cell-body, and (*b*) the axone, a narrow fibre, usually direct in its course. The axone is either a long

fibre, enclosed in an albuminous covering (the medullary sheath), giving off few branches until it breaks up into a bunch of fibres at the end, or it is a short fibre "breaking up in a dendritic manner into a large number of fine branches." * As a whole, the neurone has been said to resemble "a bit of string frayed out at both ends and here and there along its course." †

Neurones are embedded in a spongy substance, called neuroglia. Masses in which cell-bodies predominate are called ganglia and are grayish in color, because the fibres which they contain are without medullary sheath. Masses in which nerve fibres predominate are called 'nerves,' and look white. The nerve impulse is conducted, in the human body, at the rate of approximately 33 meters (100 feet) per second, by the nerve fibres; it spreads from the terminal fibres of the axone of one neurone to the contiguous dendrites — sometimes to the cell-body — of another. According to the direction in which the nerve impulse is conducted, nerves are distinguished as (1) afferent, or ingoing, nerves which convey inward the impulse communicated from some outer stimulus; and (2) efferent, or outgoing, nerves which convey the nerve excitation to a muscle. Midway between the two are found (3) the neurones of the nerve-centres of brain and spinal cord, whose function seems to be the redistribution, perhaps the modification, of the excitation conveyed by afferent nerves. Some psychologists hold that the function of redistribution belongs peculiarly to the cell-bodies.

b. Nerve-centres

1. *The Spinal Cord*

§ 5. Aside from the sympathetic system, there are two main groups of nerve-centres; that is, of neurones massed together, those of spinal cord and of brain. The spinal cord, enclosed in its bony sheath of linked vertebræ, contains fibres which run (1) inward from the surface of trunk and of limbs, (2) outward, and (3) up and down

* L. F. Barker, "The Nervous System and its Constituent Neurones," p. 12.

† E. L. Thorndike, "The Elements of Psychology," p. 126.

within the cord. The afferent (ingoing) fibres enter through the spinal ganglia, which lie inside the spinal column but outside the cord in the posterior nerve-roots. The efferent (outgoing) fibres are found in the anterior roots. Of the up-and-down fibres, some connect different levels of the cord, while others connect the cord with the brain. The outer portion of the cord is made up mainly of axones each in its medullary sheath; the inner portion consists chiefly of cell-bodies and of dendrites, but contains also axones with and without medullary sheaths.

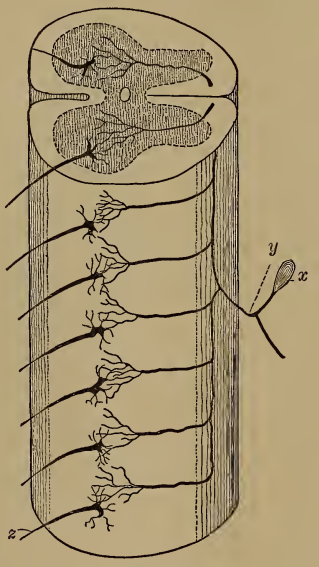


FIG. 7. — Schematic figure of the spinal cord. Posterior ganglion, *x;* efferent nerve, *y;* afferent nerve, *z*. From W. H. Howell, "A Text-book of Physiology," Fig. 62 (after Kölliker).

When an excitation is transmitted by an afferent nerve to the spinal cord, it may either be immediately redistributed by the spinal nerve-centres to an efferent nerve, or it may be transmitted along one of the upward fibres to a redistributing centre in the brain. The immediate spinal reaction is unaccompanied by consciousness, a fact established by the experimental observation that unconscious movements of a limb, in response to stimulation of the skin, occur after such injury to the spinal cord as prevents transmission of excitation to the brain. The spinal cord is thus, first, a centre for unconscious reflex movements from cutaneous stimulation, and second, a transmitter of excitations to the brain. Many of the fibres running downward from the brain to the spinal cord cross from the right side of the brain to the left side of the cord (Figure 8); and consequently the stimulation of one side of the brain is followed by motion of the opposite side of the body.

2. *The Brain*

§ 6. It is not possible to give an accurate verbal description of the brain; and its complicated structure can be fully understood only if one trace its development from the lowest vertebrate form. For the present purposes of psychology the student should familiar-

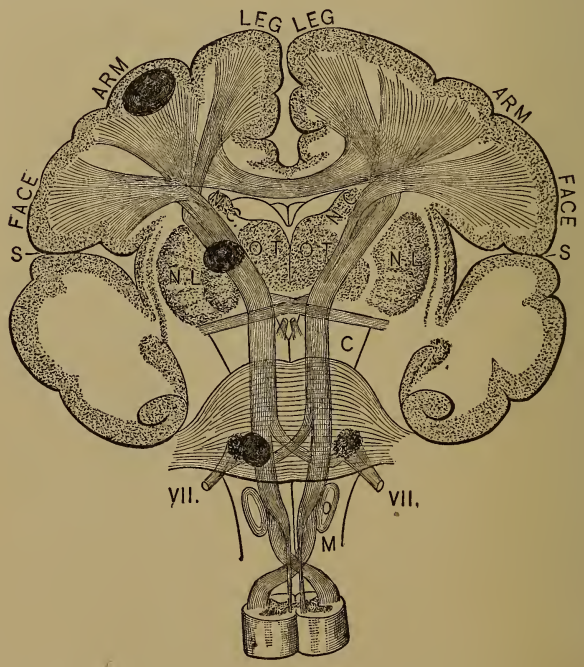


FIG. 8. — Schematic transverse section of the brain through the Rolandic region. *S*, Fissure of Sylvius; *N.C.* and *N.L.* (parts of a *corpus striatum*) and *O.T.* (optic thalamus), interior ganglia of the brain; *C*, one of the *crura cerebri* (bundles of up-and-down neurones); *M*, one side of the *medulla oblongata; VII.*, the facial nerves. From James, "Psychology, Briefer Course," Fig. 43 (after Starr).

ize himself with diagrams, or preferably with models of the brain, and should distinguish between (1) lower brain (medulla, cerebellum, pons, and crura, (2) interior brain (the basal nerve-centres enclosed within the hemispheres, *N. C.*, *N. L.*, and *O. T.* in

Figure 8), and (3) the hemispheres, or cortex. Lower brain and interior brain consist of nerve-centres, connected by transverse fibres, and penetrated also by upward and downward fibres, connecting them, as the diagram suggests, with the spinal centres and with the hemispheres. They therefore transmit to the hemispheres excitations originated in lower portions of the body, and they are also centres for the redistribution both of nervous impulses, transmitted by the spinal cord, and of excitations conducted to them directly by the facial nerves and by the nerves of the special senses. In one centre of the lower brain (the *medulla*) there are also automatic centres, masses of cells which coördinate excitations from the interior of the body and regulate such automatic movements as the heart-beat, breathing, and sneezing. (The two hemispheres, also, are connected with each other by transverse neurones.)

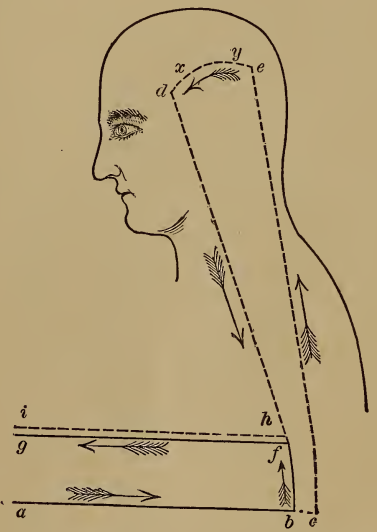


FIG. 9. — Schematic figure to illustrate reflex and ideo-motor movements. Adapted from W. James, "The Principles of Psychology," Fig. 4 (after Meynert).

It is a moot question whether sense-consciousness accompanies the functioning of these lower and interior centres. The probability,* however, is that in the case of the lower vertebrates, with less developed hemispheres, the excitation of lower and of interior brain is accompanied by consciousness, and that, on the contrary, excitation of the hemispheres is necessary to human consciousness. It is certain that excitation of the hemispheres is the es-

* H. Donaldson, *American Journal of Psychology*, Vol. IV.

sential cerebral condition of memory and of foresight. The bodily movements characteristic of cerebral activity are, therefore, no longer the unconscious reflexes of the spinal cord nor even acts of which one has a bare sense-perception; they are deliberative acts performed with a memory of past results and an image of future happenings. It follows that the response to a particular stimulation is not, as in the case of a spinal reflex, inevitable and determined. We may illustrate this by a diagram (Figure 9). The unconscious spinal reflex (*a-b-f-g*), following upon the touch of a hot surface, is the withdrawal of the hand. Suppose, however, that the stimulus conducted by the afferent nerve (*a-b-c*) is transmitted to the hemispheres instead of being at once redistributed in the spinal centres. The centre (*e*), corresponding with the sensation of warmth, is first stimulated, but the impulse is at once transmitted to other brain-centres (*y* and *x*) and the total cortical excitation is accompanied by the conscious reflection that a hot application will cure neuralgic pain. The efferent nerve (*d*), which is finally stimulated, in turn excites a muscle whose contraction checks the instinctive movement away from the hot surface. Thus the motor response (*d-h-i*), to the excitation transmitted to the hemispheres, is a firmer grasp of the heated object, whereas the instinctive spinal reflex (*a-b-f-g*) would have consisted in the withdrawal of the hand. The following table summarizes these distinctions of bodily activity and consciousness as associated with different nerve-centres: —

Organ	Function	Activity	
Spinal cord.	Conduction, Redistribution.	Cutaneous reflex.	No consciousness.
Lower brain.	Conduction, Redistribution.	Automatic.	No consciousness.
Interior brain.	Conduction, Redistribution.	Special-reflex.	Sense-consciousness (?)
Cerebral hemispheres (cortex).	Redistribution.	Deliberative.	Perception, Memory, Thought, etc.

§ 7. It is possible to study, in even greater detail, the relation of the excitation of the cortex to different functions of consciousness. For this purpose, it is necessary to gain a clearer notion of the conformation of the hemispheres. It has been shown already that the immense expansion of each hemisphere results in a folding of its surface in upon itself. Each hemisphere thus consists of an irregular mass of folds, the convolutions, separated by deep gullies, the fissures. The most important of these appear

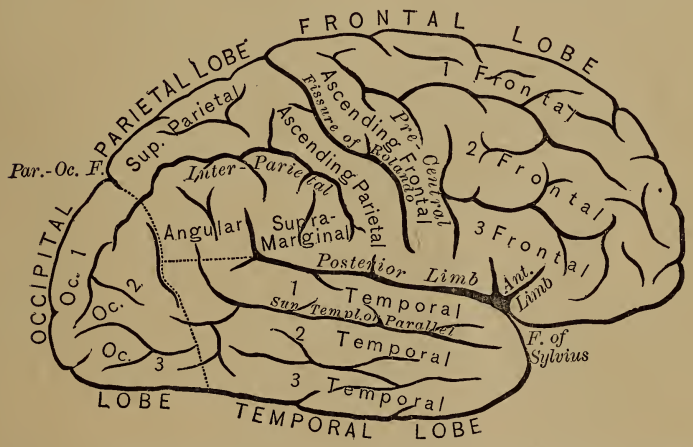


FIG. 10. — Outer surface of the right hemisphere. From M. Foster, "A Text-book of Physiology," Fig. 134.

very early in the growth of each embryonic hemisphere, on its outer surface. They are the fissure of Sylvius, which starts from a point below and in front of the middle of each hemisphere (cf. Figure 9), and runs backward, curving upward at its termination; and the fissure of Rolando, which runs downward and forward, from the median, upper part of each hemisphere (Figure 9) to a point near to that where the fissure of Sylvius begins. These fissures and others form the basis of the ordinary division of the hemisphere into five areas, or lobes. Roughly speaking, the frontal lobe lies forward of the fissure of Rolando and above the fissure of Sylvius; the parietal lobe lies back of the frontal, and also above the fissure

of Sylvius; the occipital lobe lies behind the parietal, and is separated from it by a fissure which appears most definitely on the median side of the hemisphere; and the temporal lobe lies below the fissure of Sylvius and forward of the occipital lobe. (The fifth lobe, the 'island of Reil,' is folded in within the temporal and the parietal lobes, and is not represented in the diagram.) On the median surface of the hemisphere (cf. Figure 10), it is important to distinguish, first, the triangular area of the occipital lobe, called

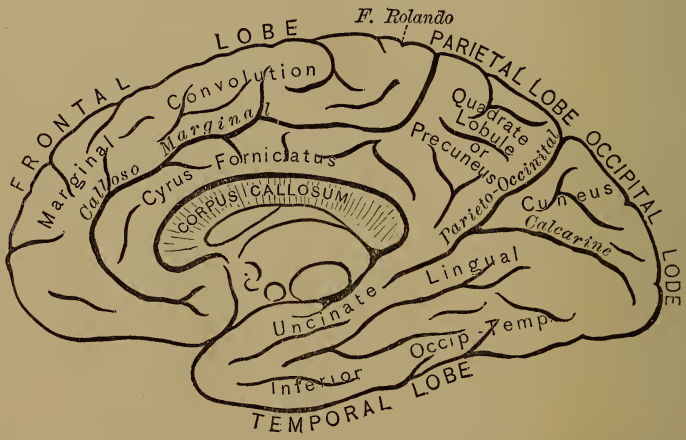


FIG. 11. — Median surface of the right hemisphere. From M. Foster, *op. cit.* Fig. 135.

from its wedge shape the *cuneus;* second, the convolution along the upper edge, called 'marginal'; and finally, the curving convolution, called the *uncinate* (or *hippocampus*).

The study of cortical areas is important to the psychologist only for the following reason: investigation has shown that the excitation of certain parts of the cortex is accompanied by definite forms of sense-consciousness and of bodily movement. There is much dispute, among the anatomists, about special features of cerebral localization, but the following results may be accepted as practically assured: —

The excitation of the occipital lobe, especially of that portion of

its median surface known as the cuneus (Figure 11), is the cortical 'centre' of the visual perception of the different colors and hues, and is the centre, also, of movements of the eye-muscles.*

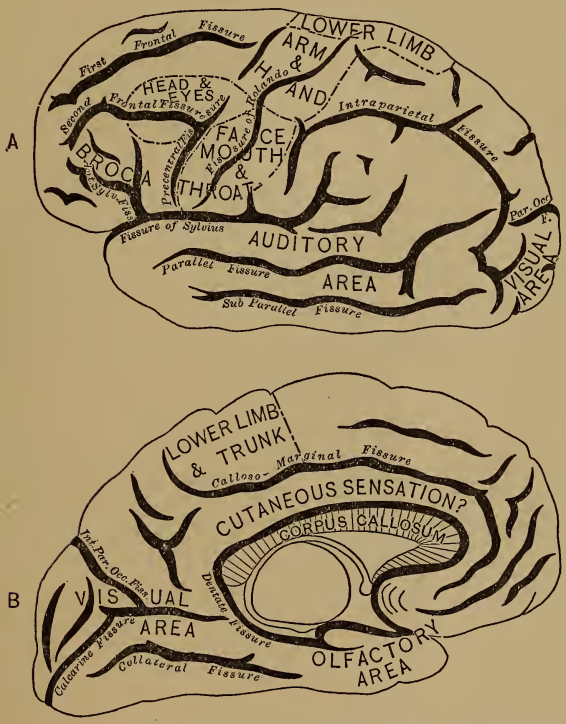


FIG. 12. — Figures representing the probable location of the chief motor and sensory areas of the cerebral hemispheres in man. *A*, outer surface. *B*, median surface. From W. H. Howell, "A Text-book of Physiology," Fig. 82 (taken from E. A. Schäfer, "Text-book of Physiology," Fig. 340).

Nerve-fibres connect the right halves of both retinæ with this visual centre in the right hemisphere, and the left halves of both retinæ with the left visual centre.

* Cf. Donaldson, *American Journal of Psychology*, Vol. IV., p. 121; Flechsig, "Gehirn und Seele," 2d edition, 1896, p. 77; Nagel, "Handbuch der Physiologie des Menschen," Bd. IV. 1, pp. 94 ff., esp. p. 99.

The area forward and back of the fissure of Rolando is admitted to be a centre of bodily movements — of all movements of trunk and limbs, and of such movements of eyes, tongues, nostrils, and ears as are indirectly brought about by mechanical stimuli. Many psychologists believe that the Rolandic area is the centre also of cutaneous sensation; but Schäfer, supported by some others, holds that the median gyrus fornicatus is the centre of cutaneous sensation and the direct centre of the movements initiated by cutaneous stimuli.*

The centre of hearing is the first temporal convolution; the cortical smell-centre, and possibly the taste-centre, are in the uncinate convolution of the median temporal lobe. These probably are centres also for such movements of ear, nostrils, and tongue as are directly due to stimulation of the end-organs of hearing, smell, and taste. The following summary of the sensory centres in the hemispheres combines these data: —

Areas	Consciousness	Bodily Movements
Occipital lobe.	Vision.	Of eye muscles.
Temporal lobe:		Of the muscles:
Outer	Hearing.	Of ear (?)
Inner	Smell. / Taste (?)	Of nostrils (?) / Of tongue (?)
Gyrus fornicatus.	Cutaneous sensation (?)	
Rolandic area.	Cutaneous sensation (?)	Of all muscles.

§ 8. It has been held by some psychologists that an image is distinguished from a percept, not merely by the different degree and duration, but by the different locality of its cerebral excitation. Flechsig argues from the vagueness of some memory-images that they may occur when merely association-centres, not the sense-

* Cf. E. A. Schäfer, *Text-book of Physiology*, pp. 766 ff.

centres, are excited,* whereas the sense-centres must, of course, be active in perception. James Ward bases a similar argument on the case of patients who are able to recall familiar objects, but totally unable to recognize them when they are seen. He concludes that the centres for percept and for image must differ, however little, in locality.† But both these arguments are insufficient. The people who could recall and describe objects named to them may have had purely verbal images, and need not have visualized the objects at all. And every image, however 'vague,' contains sense-elements and must, therefore, be conditioned by the excitation of sense-centres.††

III. THE SENSE-ORGANS AND THE PHYSIOLOGICAL CONDITIONS OF SENSATION

a. The Eye

1. *The Structure of the Eye*

§ 9. The lowest form, biologically, of end-organ sensitive to light stimulus is a pigment-spot on the skin of an animal as far down in the scale as the volvox, an organism midway between unicellular and multicellular animals.§ But there is nothing to show that the consciousness corresponding to these stimuli differs from that which follows on mechanical stimulation. Next in the scale of light-adapted organs is the faceted eye, found in some crustacea and in insects, familiar to us in the fly and in the bee. It consists in a large number of little cone-shaped organs, each of which transmits only the ray of light which passes directly through it; oblique rays are absorbed by the pigmented material with which these cones are surrounded. The result is a miniature 'stippled,' or mosaic, reproduction of the field of vision, since each of the thousand cones transmits light from one point only. A third type of eye, found also in insects, is the ocellus — a small eye, consisting

* "Gehirn und Seele," p. 60.

† "Assimilation and Association," *Mind*, N.S., October, 1894.

†† O. Külpe, § 33, 6 ff.; H. Donaldson, "The Growth of the Brain," p. 34.

§ Washburn, *op. cit.*, p. 122.

mainly of lens, retina, and rods, and of use, it is supposed, in darkness and for near objects. There is, finally, the true eye, with its lens and its retina, found in crustaceans and in most vertebrates.

§ 10. The human eye has already been described, but in insufficient detail. It is a sphere, moved, in a bony cavity of the skull, by six muscles — upward, obliquely upward and inward, downward, obliquely downward and outward, outward and inward. Its three membranous layers or 'coats' are (1) the outermost sclerotic membrane (*Scl*) completely covering the eyeball, whitish and opaque except in its forward part, the transparent cornea (*c*); (2) the choroid membrane (*Ch*), containing blood-vessels, muscular fibres, and color pigment, whose forward portion is the iris (*I*); (3) the retina (*R*) which surrounds the posterior three-fourths of the eyeball. These membranes enclose three transparent bodies: the aqueous humor, a very fluid substance behind the cornea; second, and most important to vision, the double-convex crystalline lens (*L*), enclosed in an elastic capsule attached (by a circular ligament) to the choroid coat; and finally, the vitreous humor (*VH*) a jellylike substance, full of floating particles, which occupies more than two-thirds of the cavity of the eyeball and "gives it substance." Together, aqueous humor, crystalline lens and vitreous humor form a double-convex lens.

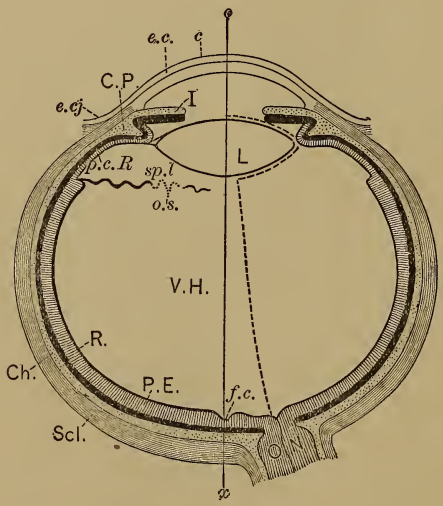


FIG. 13. — Diagrammatic outline of a horizontal section of the eye. From M. Foster, *op. cit.*, Fig. 139.

The eye is adapted by three sorts of muscular adjustment, for reaction to objects at different distances: (1) Convergence and divergence are movements of the eyeballs, by the eye-muscles, which facilitate vision of near and far objects. When the eyeballs are parallel, clear images of indefinitely distant objects, for example of the stars, are formed. As the eyeballs converge more and more, that is, as the fronts of the eyeballs roll together and the backs roll apart, rays of light from every point of a nearer object are brought together at corresponding points on the retinæ of both eyes, so that the two eyes act as one.* (2) Accommodation is a bodily process which changes the refractiveness of the lenses themselves. Accommodation is due to the contraction of the ciliary muscle (*C.P.*), "a muscle lying in the forward part of the choroid coat, outside the iris, composed in small part of circular fibres parallel to the circumference of the iris and in large part of fibres radiating from this edge of the iris." This muscle, contracting somewhat after the fashion in which a purse-string is pulled up, "draws the forward half of the choroid coat forward and inward, thus lessening the tension of the elastic capsule in which the crystalline lens is swung, and allowing the lens to bulge from front to back." † (3) The third of these muscular adjustments is the purely unconscious reflex movement by which the pupil, an opening in the iris of the eye, is enlarged or narrowed according to the distance of the object and the intensity of the light. There are great differences in these reflexes. The pupils of night-seeing animals — owls, for example — dilate far more widely in the night than the pupils of human eyes, and contract, in daylight, to a mere slit.

To sum up the main features of this description: The divergent rays from each point of a relatively near object are (1) brought together on the foveæ of both eyes by convergence; are (2) bent more sharply by the bulging of the crystalline lens through accommodation, and are (3) kept, by contraction of the pupil, from striking on the edges of the crystalline lens and producing chromatic effects.

* Cf. Appendix, Section IV., § 9. † Cf. Appendix, Section IV., § 8.

§ 11. It has already appeared that the function of the lenses and muscles of the eye is the formation of clear images on the retina;

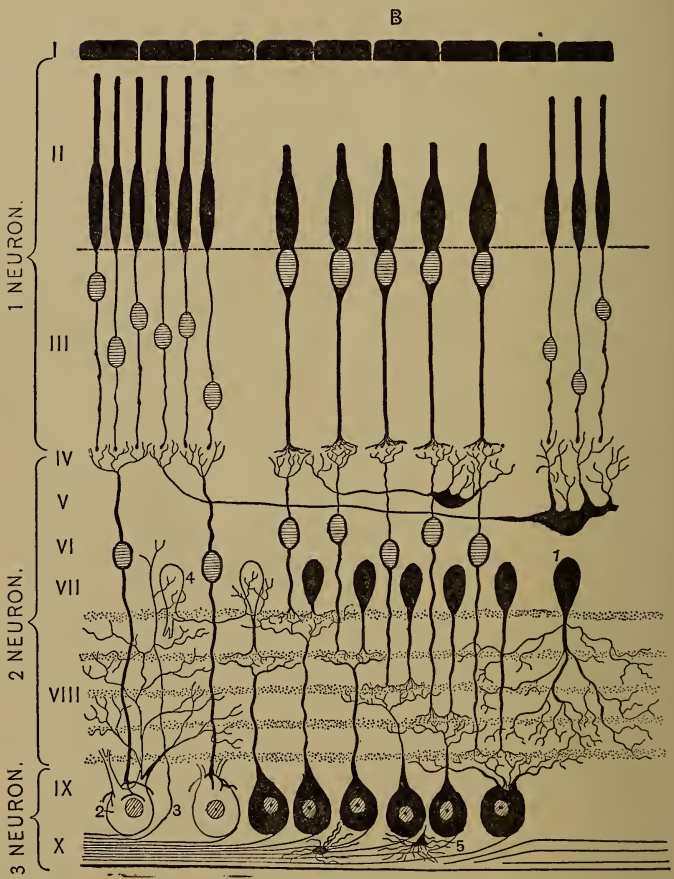


FIG. 14. — Schematic diagram of the structure of the human retina. From anterior (inside) to posterior (outside) of retina: I., Pigment layer; II., rod and cone layer; III., outer nuclear layer; IV., external plexiform layer; V., layer of horizontal cells; VI., layer of bipolar cells, inner nuclear; VII., layer of amacrucial cells (without axones); VIII., inner plexiform layer; IX., ganglion cell layer; X., nerve fibre layer. Adapted from W. H. Howell, "A Text-book of Physiology," Fig. 143 (after Greeff).

and the structure of this innermost coat of the eyeball must therefore be described in slightly more detail. It is composed throughout most of its extent of ten layers; a layer of pigment cells (I); the layer (II) containing the minute transparent structures, rods and cones, which are the only parts of the retina directly affected by light; several interconnected layers of branching neurones; and the layer (X) formed by nerve-fibres ramifying in all directions from the optic nerve (*O.N.* in Figure 13). This nerve pierces the sclerotic and choroid membranes from the rear; and the part of the retina at which it enters (displacing other retinal elements) is, as experiments show,* unaffected by the light. Outward from this 'blind spot,' in the centre of a colored yellow spot (the *macula lutea*), there is a little pit or depression (the *fovea*, *f. c.*) in which the retina has thinned so that light more directly affects the cones, which here appear in unusual numbers with few or no rods among them. The retinal excitation is transmitted by the optic nerve, to the occipital lobe of the cortex; and the following fact, already mentioned, concerning the correspondence of retina to brain-centres is important. When the branches of the optic nerve from right to left eyes meet (in what is called the optic chiasma), the fibres cross in such wise that fibres from the nasal side of the right retina and from the temporal side of the left retina are continued to the left brain hemisphere, whereas fibres from the temporal side of the right retina and from the nasal side of the left are continued to the right hemisphere. Thus, the two retinæ — including the *maculæ*, or places of clearest vision — are represented in both hemispheres.

2. *Phenomena and Theories of the Visual Consciousness*

(*a*) Color Theories

§ 12. To this account of the structure of the eye must be added a brief statement of certain theories of retinal process which differ from the hypothesis adopted in Chapter III. It must be borne in mind that these color theories are, one and all, hypothetical

* For experiments on the 'blind spot,' cf. Sanford, 113 and 114.

descriptions of retinal processes which have so far eluded direct observation. Chronologically first is the theory independently formulated by Thomas Young and Hermann von Helmholtz. It holds that there are three retinal elements or processes whose excitation conditions three color sensations — red, green, and violet. It explains sensations of colorless light as due simply to the combination in equal degrees of these three color-processes. Evidently this is a reasonable explanation of the cases in which a mixture of ether-waves of all lengths conditions the consciousness of colorless light. The Young-Helmholtz theory also explains, in the following manner, the excitation of colorless light sensations through the mixture of only two color-stimuli: ether vibrations of a given rate tend to set up in the retina not only the processes specifically corresponding with them, but also those which correspond with proximate vibration numbers. So blue light excites the retinal process which conditions the sensation-quality green, as well as that which accompanies blue; and yellow light stimulates the processes for red as well as for yellow. Therefore the combination of two complementary color-stimuli produces the same effect, physiologically, as the combination of all the color-stimuli. The specific physical condition of the sensation-qualities of colorless light is thus such a mixture of ether-waves as will stimulate simultaneously and nearly equally all physiological color-processes.

The conclusive objection, though not the only objection, to the Young-Helmholtz theory is the fact that it fails utterly to account for the four cases in which a sensation of colorless light follows upon a single color-stimulus. It is impossible to suppose that three color-processes are aroused when a single color-stimulus falls on the outer rim or on a small part of the retina, or when the color-stimulus is very faint. And, finally, the theory cannot possibly be reconciled with the facts of color-blindness. For in color-blindness one at least of the normal retinal processes is wanting, and there can therefore be no combination of three retinal processes.

A far more satisfactory explanation is that of Hering. He holds that a sensational consciousness of color is physiologically due to the activity of one of two antagonistic processes of an inferred

retinal substance. Of these substances, he believes that there are two, each capable of an anabolic, that is, assimilative or 'building up' process, and of a katabolic, that is, destructive or 'tearing down' process. To these four processes correspond the sensations of red, yellow, green, blue, whose exact relation may be seen by the following summary: —

Substances	Processes	Sensations of
Red-green.	Anabolic.	Green.
	Katabolic.	Red.
Yellow-blue.	Anabolic.	Blue.
	Katabolic.	Yellow.

So far Hering has explained simply our color sensations. To account for the colorless-light consciousness, he assumes another retinal substance with opposed processes: —

Substance	Processes	Sensations of
White-black.	Anabolic.	Black.
	Katabolic.	White.

An equilibrium between the two processes occasions a sensation of middle gray; and an unequal combination of the two processes excites sensations of light or dark gray. The white-black substance is excited by every light-stimulus, and is more widely spread than the color-substances over the surface of the retina.

With these presuppositions Hering explains as follows the various ways of exciting the consciousness of colorless light: When such consciousness is due to the combination of color-stimuli, antagonistic processes in the color-substances destroy each other by simultaneous action, and the white-black substance remains in activity. When, for example, blue and yellow light fall simultaneously on the retina, the blue tends to set the blue-yellow substance into anabolic activity, whereas the yellow tends equally to stimulate the katabolic activity of the blue-yellow substance. These opposite processes cancel each other; and so equilibrium is maintained and the blue-yellow substance, equally stimulated in two

opposite directions, remains inactive, whereas the white-black substance, as has been said, is always active. Excitation by white light, that is, excitation by ether-waves of all lengths amounts to excitation through the combination of two pairs of complementary color-stimuli, red and green, blue and yellow, and results therefore in the inactivity of both color-substances.

In explanation of the colorless-light consciousness as conditioned by a single stimulus, Hering advances far beyond Helmholtz. He supposes (1) that sensations of colorless light arise when small extents of the retina are excited by a single color-stimulus, because the stimulation of such small extents of the red-green or of the blue-yellow substance is not sufficient to rouse it to activity, whereas the ever active white-black substance is excited even by a color-stimulus; (2) that the excitations in faint light are not intense enough to affect a color-substance, but do excite the sensitive white-black substance; (3) that stimulation of the retinal periphery by color-stimuli excites sensations of colorless light, because only the white-black substance is found on the outer zones of the retina. Hering teaches finally (4) that a color-stimulus excites a sensation of colorless light when the subject is color-blind, because the retina of a color-blind person lacks one or both color-substances so that the color-stimulus affects only the easily excited white-black substance. Hering has certainly, therefore, furnished a plausible explanation for sensations of colorless light whether conditioned by a single stimulus or by a combination of stimuli. Grave objections have, however, been brought against the Hering theory. The most important of them may be briefly stated: (1) It is highly improbable that an assimilative bodily process should condition consciousness. (2) It is inconsistent to suppose that opposite color-processes, simultaneously excited, balance each other, and result in an absence of color-consciousness, whereas the opposite processes of the black-white substance, if excited together, occasion the consciousness of gray.* (3) As a matter of fact, a

* Accordingly contemporary upholders of the theory supplement it by G. E. Müller's hypothesis that the consciousness of gray is due to exclusively cerebral conditions.

mixture of red and green lights does not, as Hering implies, occasion colorless-light sensation. On the contrary, the color-stimulus which, mixed with red light, produces a colorless-light sensation, is blue-green. This shows that the red and green which are psychically elemental are not physiologically antagonistic.

The theory set forth in Chapter III. is that of Mrs. C. L. Franklin, which is in agreement with that of von Kries in the fundamental teaching that the functioning of retinal rods has to do with the excitation of colorless-light sensations. In the opinion of the writer it meets the objections to the Helmholtz and to the Hering theories, and has also certain independent advantages. Three amplifications of our earlier statement of the Franklin theory should here be made.

§ 13. It should be stated first of all, in more detail, how on this theory the partial decomposition of the cone substance is brought about. Each molecule of the cone substance is, in fact, conceived as consisting of four parts, of which each is fitted to vibrate to one only of the color-stimuli — red, yellow, green, and blue light. Therefore a colored light is regarded as partially decomposing the cone substance by 'shaking out' one of the atoms from each of its molecules.

It will be observed, also, that the von Kries and Franklin theories closely correspond with well-known facts concerning the distribution and the function of the retinal rods. For the rods, which (on this theory) are organs of such colorless-light consciousness as is due to single stimulation, are found on the periphery of the outer zones of the retina, and are known by experimental observation to be readily affected in faint light. (Mrs. Franklin supposes that the visual purple, a retinal substance actually observed on the rods, reënforces faint light vision by absorbing a large amount of the light which usually passes entirely through the transparent rods and cones.)

§ 14. In the third place, these theories accord notably well with certain facts summarized under the name of the Purkinje phenomenon. These facts are the following: (1) Green and blue seen in faint light have a greater intensity than red and yellow.* On a

* For experiment, cf. Sanford, 142.

summer evening, for example, the green of the marshes may be seen against the blue of the sea long after the goldenrod and tansy have lost their color and after the old red farm-house has turned gray. (2) If two grays — one produced by the mixture of red and blue-green lights, the other by the mixture of blue and yellow lights — be precisely matched in a bright light, the first of the two will be seen as brighter than the other when both are observed in faint light. Both facts give support to the theory that the rods, and consequently the visual purple which lies on the rods, have to do with colorless light-vision. For all forms of the Purkinje phenomenon appear only in faint illumination, and the visual purple is active only in faint light; moreover, the Purkinje phenomenon consists in the intensification of green and secondarily of blue lights, and the visual purple absorbs green rays — and, after green, blue rays — most readily; finally, the Purkinje phenomenon, as has been found,* does not occur when the foveæ of normal and partially color-blind eyes are excited; that is to say, it does not occur by excitation of the region of the retina which lacks visual purple and rods.

§ 15. The von Kries and Franklin theories, finally, offer a plausible explanation of color-blindness. The facts, though not undisputed, may be summarized as follows: There are two general classes of color-blindness, partial and total. Red-blindness (in which the spectrum order of colors appears as gray, yellow, blue) and green blindness (in which the order is yellow, gray, blue) are the most common form of dichromasia, or partial color-blindness; but there are also a few alleged cases of yellow-blue blindness, in which the patient sees grays, reds, and greens, but no blues and yellows. There are two forms of achromasia, or total color-blindness: in one, probably retinal in origin, the fovea is totally blind, and there are accompanying defects of vision; in the second form of achromasia, very likely due to cerebral defects, the fovea is not totally blind, and there are no defects of vision other than

* Von Kries u. Nagel, *Ztsch. f. Psych. u. Physiol. d. Sinnesorgane*, Vol. XXIII., p. 161, discussed by C. L. Franklin, *Psychological Review*, Vol. VII., p. 600.

the color-blindness. These facts absolutely contradict the Helmholtz theory; are with difficulty harmonized with the Hering theory; support, or at least do not oppose, a theory of the general type of the Franklin hypothesis.

The conformity of the Franklin theory with these facts may best be shown by a somewhat more detailed discussion of red and green blindness. The red-green blind person has a normal vision of blue and of yellow, but confuses red and green objects with each other. Dalton, for example, could not see his scarlet academic gown as it lay on the grass; and another red-green blind man could not distinguish one branch, turned scarlet, of a maple tree from the rest of the tree which was still green. In these cases Hering assumed that both objects were seen as gray, and explained the color-blindness as due to the total lack in the retina of the green-red substance and the ceaseless functioning of the white-black substance. But this explanation does not cover the distinction, experimentally discovered, between two sorts of red-green blindness. In that of the first type, the red is matched with gray and the green with yellow; for example, color-blind subjects examined by the Holmgren test, that is, required to sort a lot of worsted skeins of different color and hue,* throw the unmixed red skein into the pile of the grays and the green into the pile of the yellows. In color-blindness of the second type, the red is matched with yellow and the green with gray. But according to the Hering theory there is no reason to suppose that, because the red-green substance is lacking from the retina, red or green light should affect the blue-yellow substance.† The Franklin theory certainly has a negative advantage in that it does not meet this difficulty. Positively, it offers a plausible explanation of the two forms of red-green blindness by the teaching that color molecules in their primitive form contain two, not four, vibrating parts or atoms, one which excites the sensation of blue and one which excites the sensation of yellow,

* For experiment, cf. Sanford, 135.

† More recently, Hering explains the distinctions in red-green blindness as due to individual differences in the *macula lutea*, or yellow spot. For comment on the inadequacy of this view, cf. C. L. Franklin, *Psychological Review*, VI., p. 82.

and that this yellow-exciting part is later differentiated into the parts which excite sensations of red and of green. This hypothesis explains both the greater commonness of red-green blindness, since organs and functions latest acquired are always first lost, and the tendency of red and green light to set in vibration the yellow-exciting atom.

BIBLIOGRAPHY. — On *color-theories:* H. L. F. von Helmholtz, Handbuch der physiologischen Optik, 1896, esp. §§ 19, 20, 23. E. Hering, Zur Lehre vom Lichtsinne, 1874; and Grundzüge der Lehre vom Lichtsinn, I. II., 1905, 1907. G. E. Müller, Zur Psychophysik der Gesichtsempfindungen (reprint from *Zeitschrift für Psychol. u. Physiol. der Sinnesorgane*, 1897). C. L. Franklin, *Mind*, 1893, pp. 472 ff.; The Functions of the Rods of the Retina, *Psychol. Review*, Vol. III., pp. 71 ff.; J. von Kries, *Zeitschrift*, IX., pp. 82 ff., and XV., pp. 247 ff.; Abhandlungen, 1897; Die Gesichtsempfindungen, in Nagel's Handbuch der Physiologie des Menschen, Bd. III., pp. 109 ff. J. W. Baird, The Color Sensitivity of the Peripheral Retina, 1905.

For *summary* (to 1901): M. W. Calkins, An Introduction to Psychology, pp. 464–473, with citations.

On *color-blindness*, add: W. Nagel, Der Diagnose der praktisch wichtigen Störungen des Farbensinns, 1899.

(*b*) Contrast Phenomena

§ 16. Brief reference has been made in the text of Chapter III. to the phenomena of color and light contrast. A little more must be said of simultaneous contrast. There are many everyday illustrations of it; for example, the decided blue of the shadows on a sun-lighted field of snow. There are also many experimental verifications of the phenomenon.* The simplest is the examination of squares or rings of gray, on colored surfaces, through a tissue paper covering, which obscures the outline of the gray figures; these gray figures will then appear in the color complementary to the background, yellow on a blue background, red on bluish green, and so on.

* For experiments, cf. Sanford, 152, *b*, *c*, *d*; Seashore, Chapter II.; Titchener, § 10, especially Exp. (1), (2), (3).

An exact explanation of this curious phenomenon has never been given, but it has been established by Hering, against the teaching of Helmholtz, that the explanation, whatever it is, of simultaneous contrast, must be physiological in its nature. Helmholtz taught that simultaneous contrast is no more nor less than a psychological illusion. According to his theory, we 'really' see, not a complementary contrast-color, but the physically excited, actual gray figure, though we fallaciously suppose that this gray is yellow, if it lies on a blue background, or green, if it is seen against purple. The explanation, for so widespread an illusion, is found in the admitted fact that people are accustomed to look at familiar, colored objects through a complementary colored medium which makes them seem gray. For example, we see a red brick wall through the green lights of a hall door; the wall seems gray, but we still think of it as red. Or again, the blue gown looks gray in the yellow gaslight, but is known to be blue. The gray figures of the simultaneous contrast experiences are thus, Helmholtz holds, inferred — not actually seen — to be of a color complementary to that of the background. But opposed to this theory of Helmholtz are insurmountable obstacles. In the first place, it directly contradicts our introspection. We not only do not naturally see objects, in simultaneous contrast, as gray, but in most cases we cannot force ourselves to do so; the gray ring on the colored background is immediately, and inevitably, blue or yellow or red. It is highly improbable, in the second place, that our comparatively infrequent and unnoticed experiences of colored objects, in light of a complementary color, should have formed in us such a habit of inference as this theory supposes. The Helmholtz theory is disproved, finally, by direct and unambiguous experiments.*

It is fair to conclude, with Hering, that simultaneous contrast is physiologically conditioned; in other words, that when one part of the retina is directly excited by a colored light, retinal processes which condition a complementary color are set up in the neighboring retinal regions. This undoubted fact can be stated in terms

* For experiments, cf. Sanford, 155, *a* and *b*; 156, *a* and *b*.

of any color-theory, but it has never been, in any strict sense, explained, or accounted for.

Bibliography. — On *successive contrast:* cf. E. Hering, Zur Lehre von Lichtsinne, esp. § 18.

On *simultaneous contrast:* H. von Helmholtz, Handbuch der Physiologischen Optik, 2te Aufl., § 24. E. Hering, Beitrag zur Lehre vom Simultan-Kontrast, *Zeitschr. f. Psych. u. Physiol. d. Sinnesorgane*, I., 18. C. L. Franklin, in *Mind*, N.S., II., 1893.

b. The Ear

1. *The Structure of the Ear*

§ 17. The simple structure from which, biologically speaking, the ear seems to be developed, is a sac (the so-called otocyst or

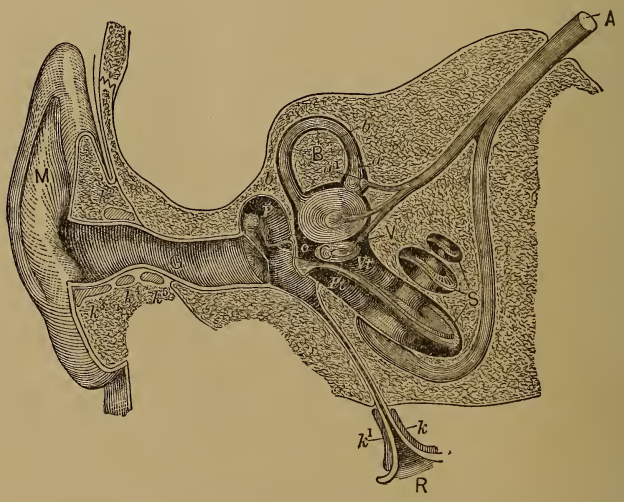


Fig. 15. — Semi-diagrammatic section through the right ear. *B*, one semicircular canal; *S*, cochlea; *Vt*, *Scala vestibuli; Pt*, *Scala tympani.* For meaning of other symbols, see text. From H. N. Martin, "The Human Body," Fig. 143 (after Czermak).

statocyst) enclosed in the skin, filled with liquid, always containing one or more calcareous bodies and often containing, also, hairs

varied in length. These structures are found in certain of the lower invertebrates — for example, in jellyfish, in crustacea, and, in insects — and in the lower vertebrates. It is probable, however, or at least very possible, that these are organs not of hearing, but of pressure consciousness, and that the sensations which accompany the excitation of these organs do not qualitatively differ from sensations due to mechanical stimulation. The vibration of air or water striking on these organs then acts merely as a jar. It will appear that one part of the human ear has probably the same function.

§ 18. The human ear has three rudely distinguished divisions: the outer ear, inner ear, and middle ear. The *outer ear* consists in the pinna or concha (*M*) opening into a hollow tube, the external meatus (*G*); and this tube is closed by a surface, the tympanic membrane (*T*). This is thrown into vibration by the motion of air-particles, and its motion is transmitted to a series of three bones, called, from their shape, *malleus*, *incus*, and *stapes* (that is, hammer, anvil, and stirrup). These bones lie within the drum or *middle ear* (*P*), a hollow in the temporal bone from which the Eustachian tube (*R*) leads downward to the pharynx. The middle ear communicates by two foramina, or windows, with the *inner ear*, a complex bony tube embedded in the spongy part of the temporal bone of the skull. The inner ear has three main divisions, and these must be described in some detail. They are (1) a middle chamber, the *vestibule* (*V*), which is an irregularly rounded envelope containing two small membranous bags, or sacs, the saccule and the utricle; (2) the three *semicircular canals*, at right angles to each other — one horizontal, one running forward and back, one running right to left, all of them opening into the utricle.

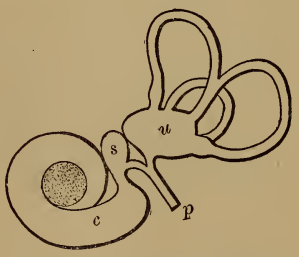


FIG. 16. — Schematic figure of the semicircular canals (to the right of the diagram). Utricle, *u*; saccule, *s*; cochlea, *c*. From J. R. Angell "Psychology," Fig. 44 (after McKendrick and Snodgrass).

Each bony canal contains a membranous tube, of the same general shape yet more nearly completing a circle, and each tube ends in a dilation, or ampulla, opening into the vestibule. Each sac of the

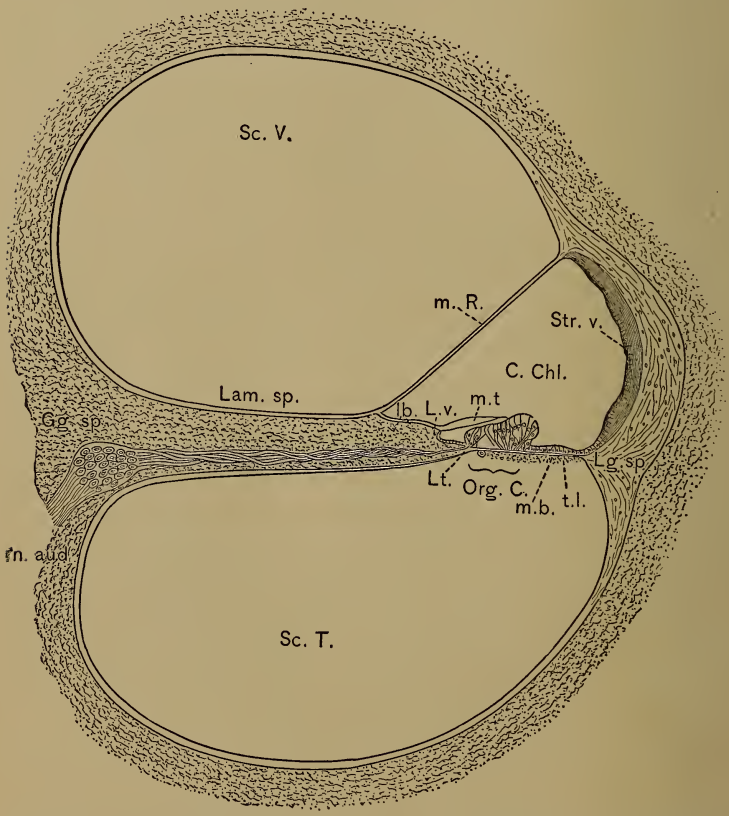


FIG. 17. — A transverse section of a circle of the cochlea. *Org. C.*, organ of Corti; *m.t.*, tectorial membrane. For meaning of other symbols, see text. From M. Foster, "A Textbook of Physiology," Fig. 180.

vestibule and each membranous canal is surrounded by a liquid, the perilymph, and filled with a liquid, the endolymph. A branch of the auditory nerve penetrates each of these ampullæ and the vestibule as well, ending in cells from which hairs project; and in

the vestibule, at least, there are small, hard substances, the ear stones, or otoliths. The essential feature of the apparatus is its extreme sensitiveness to changes of bodily position. The slightest movement which tends to unbalance the body must alter the position of the semicircular canals, and thus put in motion the endolymph. This movement, with or without the additional pressure of an otolith, bends the hairs of the ampullæ and stimulates the vestibular section of the acoustic nerve, and this excitation reaches the cerebellum, which is the subcortial nerve-centre for the movements affecting bodily equilibrium. Actual experiments show the connection of these organs with the preservation of balance. Animals deprived either of cerebellum or of semicircular canals stagger and fall about in an unbalanced and helpless way; and deaf people whose semicircular canals are injured cannot preserve their equilibrium if they are blindfolded and therefore unable to regulate their movements by the visual perceptions of bodily position.

As so far described, the ear, like the otocyst, seems an organ adapted rather for excitation of pressure sensations, due to change of position, than for the excitation of the auditory consciousness. Auditory consciousness results, in all probability, from processes excited in (3) the *cochlea*, a bony spiral of two and one-half coils around an axis. From this axis projects a bony shelf, the *lamina spiralis* (*Lam. sp.* in Figure 17), which decreases in width toward the apex of the cochlea and ends in the basilar membrane (*m.b.*). Together, bone and membrane divide each spiral into two winding half-coils, the *scala tympani* (*Sc.T.*) and the *scala vestibuli* (*Sc.V.*). The former opens by the round foramen into the middle ear; the latter is connected with the vestibule. Each contains a liquid, the *perilymph*. A third division, the cochlear canal, or *scala media* (*C.Chl.*), is partitioned off by a membrane (*m.R.*) from the *scala vestibuli*. The cochlear canal forms the membranous cochlea and contains a liquid, the endolymph, whose vibrations, as will appear, excite the auditory end-organs.

§ 19. The basilar membrane consists of cross-fibres, radially stretched strings varying in length from bottom to top, base to apex, of the cochlea — the longest strings near the top. Some of

these fibres support the inner and the outer rods of Corti, which number respectively about six thousand and about four thousand. These are tiny membranous rods increasing in size from base to apex of the cochlea and leaned against each other to form an arch. The cochlear branch of the auditory nerve runs through

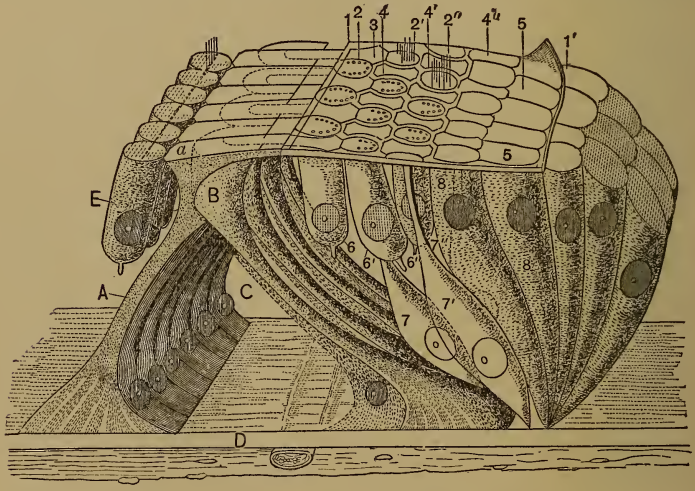


FIG. 18. — Diagrammatic view of the organ of Corti and the accessory structures. *A*, inner rods of Corti; *B*, outer rods of Corti; *C*, tunnel of Corti; *D*, basilar membrane; *E*, single row of inner hair cells; 6 ,6′, 6″, rows of outer hair cells; 7, 7′, supporting cells of Deiters. (There are supporting cells beneath the inner hair cells, also.) The hairs of the inner cells are seen projecting through the meshes of the reticulate membrane. From W. H. Howell, "A Text-book of Physiology," Fig. 162 (after Testut).

the whole length of the *lamina spiralis*, and terminates in hair-cells which lean against the rods of Corti. Hairlike filaments grow upward from these cells.* Just above, and apparently projecting from the edge of the *lamina spiralis*, is another delicate membrane, the tectorial membrane (*m.t.*, in Fig. 17).†

* These 'hairs' extend through minute openings in a thin membrane, the reticulate membrane (*R*) which extends in both directions from the summit of the arch formed by the rods of Corti.

† Some physiologists believe that the tectorial membrane normally lies

It is impossible to state with certainty the function of all these structures in hearing. It used to be thought that the rods of Corti play the part in our ears of strings in a piano, vibrating because of their differing length and span with air-waves of different rates. Several arguments, however, tell strongly against this view. The rods are neither sufficient in number, nor sufficiently varied in size, to serve this purpose; they are not found in the auditory end-organs of birds whose ability to discriminate pitches can hardly be doubted; and finally, they are not directly connected with the fibres of the auditory nerve, which terminate, as has been said, in the hair-cells of the basilar membrane. The following is a more probable, though by no means a definitely justified, account of the function of these structures. It is based on the general assumptions of the Helmholtz theory: When certain fibres of the basilar membrane are thrown into sympathetic vibration, the rods of Corti are moved upward, and with them hair-cells lying on their sides. The filaments projecting from these hair-cells are, thus, pushed against the tectorial membrane and the downward reaction from this contact excites the auditory nerve-endings in the hair-cells.

2. *Phenomena and Theories of the Auditory Consciousness*

(*a*) Beats and Combination Tones

§ 20. A noticeable feature of the auditory consciousness excited by the simultaneous vibration of two sounding bodies is the occurrence of beats, swift and regular alternations of loud and weak sound. Beats are occasioned by a combination of pendular air-waves whose vibration numbers are near each other. Such air-waves "reënforce the vibration of air particles which they affect so long as their phases are alike," but when one of these air-waves by itself would set the air particle vibrating in one direction while the other would affect the air particle in the opposite way, the two counteract each other; and at a given moment the air particle will be held in equilibrium so that it will not vibrate at all. Professor Myers distinguishes "four stages" in the beating of two tones

free in the endolymph. Cf. Howell, "Text-book of Physiology," 1906, p. 368, with citation.

according as a tone of, say, 256 vibrations beats (1) with a tone of fewer than 264 vibrations, (2) with a tone of 264 to 284 vibrations, (3) with a tone of 284 to about 300 vibrations, and (4) with a still higher tone. "In the first stage," he says, the beats "have a surging, in the second a thrusting, and in the third a rattling character; finally they fuse and pass into a stage where only roughness remains, beyond which they completely disappear."* Helmholtz attributed disagreeable auditory combinations of pitch, or dissonances, to the occurrence of beats.

Simultaneous pendular vibrations, not too closely alike, produce so-called combination tones of two sorts — difference tones and summation tones. In the first case, the attentive listener hears not merely two fundamental tones, but a sound whose vibration number equals their difference, sometimes also a second difference tone whose vibration number is the difference between the lower primary and the first difference tone, and sometimes even lower difference tones. In the second case, but with more difficulty, the practised listener hears a sound whose vibration number is the sum of the two fundamentals. Combination tones are sometimes 'objective'; that is, they are due to external air-waves, but more often they are 'subjective,' that is, due to conditions within the ear. Indeed, difference tones must always be in this sense subjective, unless produced by some secondary vibration of the sounding body. It is likely that combination tones are due to the vibrations of the tympanic membrane — perhaps also to the vibrations of the membrane of the fenestra rotunda.†

(*b*) Theories of Hearing

§ 21. Certain alternatives proposed by contemporary psychologists to the Helmholtz theory should briefly be named. In criticism of the theory it is urged, first, that the basilar membrane fibres are not capable of vibrating so freely as the theory requires; and

* C. S. Myers, "A Text-book of Experimental Psychology," Chapter III., p. 39. For experiments, cf. Sanford, 79–81; Titchener, §§ 13, 14.

† Cf. Myers, *op. cit.*, pp. 43 ff. For experiments, cf. Sanford, 82; Titchener, § 15.

second, that their variations in length — only 0.04 to 0.49 between the longest and the shortest of the 24,000 fibres — is too slight to permit vibrations ranging from 15 to more than 20,000 per second. In lieu of the Helmholtz hypothesis, and to avoid these difficulties, the following theories, among others, have been advanced: —

(1) The hypothesis of Rutherford (the so-called telephone theory) regards the cochlea merely as a transmitting instrument, and holds that the special characters of a sound sensation have purely cerebral explanation.

(2) The theory of Ewald is based on experiments with elastic membranes, some of them of minute size and of great delicacy. Ewald found that such a membrane vibrates throughout its length at each stimulation and that, examined under a microscope, it presents the picture of a series of waves, visible as 'dark, transverse streaks.' These sound-pictures, as Ewald calls them, vary, that is, the crests of the waves vary in their interval for each tone; and Ewald supposes that, at these intervals, hair-cells and nerve-fibres are stimulated.

(3) The theory of Max Meyer is not easily stated in abbreviated form. He supposes that successive sound waves, of a given vibration number, travelling up the *scala vestibuli*, press down the basilar membrane, and that pitch is due to the number per second of these downward pressures, and loudness to the extent of basilar membrane, and thus to the number of nerve terminations, excited.

The first of these theories is rather a confession of ignorance than a positive hypothesis. The objection to them all is that they fail to take account of the very elaborate differentiation of structures in the organ of Corti.* Yet both the Ewald and the Meyer hypotheses are worthy of further study.

Bibliography. — On *theories of hearing:* Rutherford, Report to British Association for the Advancement of Science, 1886. K. Ewald, Zur Physiologie des Labyrinths, *Archiv für die gesammte Physiol.*, 1899, LXXVI., pp. 147 ff.; 1903, XCIII., pp. 485 ff. Max Meyer, An Introduction to the Mechanics of the Inner Ear, *Univ. of Missouri Studies*,

* Cf. M'Kendrick in E. A. Schäfer, "Text-book of Physiology," pp. 1192, 1194.

Scientific Series, 1907, II., 1 (cf. *Zeitschrift*, 1898, XVI.). H. L. F. von Helmholtz, Sensations of Tone, transl. by A. J. Ellis, 1895. C. Stumpf, Tonpsychologie, Bd. I., 1883, Bd. II., 1890. K. L. Schäfer, Der Gehörsinn, in Nagel's Handbuch der Physiologie der Menschen, Bd. III.; J. G. M'Kendrick, in E. A. Schäfer's Text-book of Physiology, Vol. II., pp. 1179 ff.

(*c*) The Qualities of Pitch

§ 22. The hypothesis that there are as many elemental qualities of pitch as there are distinguishable qualities in an octave is suggested by McDougall, and supported by the following considerations: "(1) The analogy of the other senses, in which . . . the elementary qualities are few, renders improbable the assumption of a very large number in the case of hearing. (2) We know that it is impossible for some ears to analyze complex tones or clangs which are easily analyzed by others, and that even a well-trained ear may find difficulty in analyzing the complex form of a tone and its octave or first overtone. (3) Pure tones are not merely more or less different in pitch; some that are of very different pitches have nevertheless a great resemblance; . . . The first overtone or octave of any tone differs from it, as regards pitch, more than any of the intermediate tones of the scale, and yet is, in another indefinable fashion, more like it, so much like it that even a trained ear may mistake a tone for its first overtone. This fact suggests that each pure tone is a fusion of at least two elementary qualities, one of which is common to it and all its upper and lower octaves, another which is peculiar to it and . . . constitutes its pitch. (4) If each distinguishable tone were an elementary quality, we should expect to find that when the air is made to vibrate at a steadily increasing rate, as when a violinist runs his finger up the bowed string . . . the pitch would rise by a series of steps from one elementary quality to another; but this is not the case; the transition is perfectly smooth and continuous. . . . We are therefore driven to believe that the so-called simple tones are . . . complexes, and we have no certain guidance as to the number of elementary qualities by the fusions of which all the tones are pro-

duced. . . . Perhaps the most satisfactory view, if the physical mechanism of the internal ear can be shown to admit of its adoption, is that all the elementary qualities are contained in a single octave, which might be likened to the complete color-series, and that the differences of pitch that distinguish the same qualities in different octaves are not properly differences of quality, depending upon specific differences of the psycho-physical processes, but are rather of the same order as differences of extensity or voluminousness in the case of visual, tactual, or temperature sensations, and are due to differences in the number of sensory neurones excited, the deep pitch (the voluminous) being due to simultaneous stimulation of many neurones, high pitch to stimulation of few."* The physiological assumption of this theory is not, on *a priori* grounds, incompatible with any one of the theories of tone.

c. End-organs of Taste and of Smell

§ 23. Evidently, the ability to respond to the chemical stimulus of food is at least as potent a factor in the preservation and development of animal life as the sensitiveness to mechanical stimulation from external objects. As a matter of fact, certain unicellular animals, amœbæ and many metazoa of simple form, respond by a special reaction to chemical stimulation. A hydra, for example, always avoids mechanical objects, but seizes on food with its tentacles.† We must guard ourselves, however, from attributing either taste or smell, as we know them, to animals who have no trace of distinct taste and smell end-organs and who give no evidence of reacting in different fashion to liquid and to gaseous stimulus. Such differentiated organs and reactions are not found in animals lower in the scale than insects, and are lacking in many of the lower vertebrates.†† The comparative psychologists give the name 'chemical sensations' to the simple consciousness which may be supposed to accompany the undifferentiated reactions to chemical stimuli.

* "Physiological Psychology," by W. McDougall, pp. 72–73.

† Washburn, p. 67.

†† Washburn, *op. cit.*, 86–87; 101–102.

§ 24. In the human body the end-organs both of smell and of taste are structurally similar to those of contact, though they occur neither on the outer or joint surfaces nor in the muscles, but in the epithelial linings of nose and throat cavities. The end-organs of smell are situated in the upper part of the nose. The nasal cavities are divided, one from another, by a wall or septum, of bone and cartilage; and the bony part of each nostril is partly divided within itself by the three turbinate bones. The lower bony surfaces of each nostril are covered with a pink mucous membrane. The olfactory membrane, containing the smell end-organs, covers a very small area (about 250 mm., that is, less than a square inch) on the septum and on the upper turbinate bone in the very peak of the nose. Olfactory particles, naturally rising or sniffed into the nose, reach the olfactory membrane only by diffusion.*

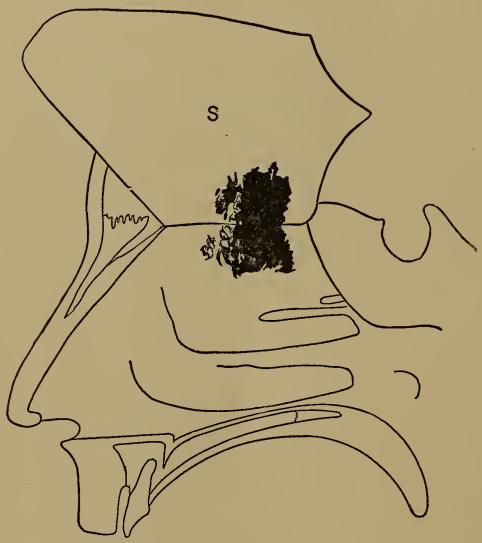


FIG. 19. — Schematic figure of the interior of the left nostril. *S* represents the septum, or partition between the nostrils as artificially turned upward. The shaded portion represents the olfactory membrane. From W. Nagel, "Handbuch der Physiologie des Menschen" Fig. 106 (after V. Brunn, taken from Zwaardemaker," Physiologie des Geruchs.")

Two facts experimentally observed seem to show that the end-organs of smell are of differentiated structure, and thus fitted to respond, some to one olfactory stimulus, some to another. These

* For experiment, cf. Sanford, 57, 58; Titchener, § 28.

facts are (1) partial anosmia, or permanent insensibility to some smells, not to all, an infrequent but well-established experience; and (2) the normal effect of fatigue. A person, for example, whose end-organs of smell have been fatigued by continuously smelling camphor, can smell creosote as well as ever, almond but faintly, and turpentine not at all. If smell end-organs were of one type only, all would be alike fatigued, and complete insensibility would be the result.* We have, however, no list of elemental smell qualities by which to test in an exact way the differentiation of smell end-organs. Zwaardemaker has, to be sure, proposed a classification on the basis of that of Linnæus, into ethereal, aromatic, balsamic, amber-musk, alliaceous, burning, hircine, repulsive, and nauseating smells.† Obviously, however, this is no list of elemental qualities, but an empirical grouping of complex odors.

The olfactory nerve leads from the smell end-organs in the peak of the nostril to the olfactory lobe, originally a projection from the hemispheres, but, in the adult brain, lying on the lower surface of the frontal lobe. From the olfactory lobe, nerve-fibres lead to the median surface of the temporal lobe. The olfactory lobes and tracts are much more developed in other vertebrate brains than in the human brain: and it will be remembered that the sense of smell, in the higher vertebrate animals, though perhaps less differentiated, is far keener than ours.

§ 25. The end-organs of taste are situated near the entrance to the alimentary canal, within the papillæ or folds formed by the membranous covering of the tongue and the forward part of the palate. Two kinds of papillæ have to do with taste excitation: large circumvallate papillæ, like castles surrounded by moats, found mainly near the root of the tongue; and elongated fungiform papillæ, visible as red dots on the forward and middle part of the tongue. All the circumvallate papillæ and some of the fungiform papillæ carry taste-buds, minute globular bodies containing

* For experiment, cf. Sanford, 59; Titchener, § 29.

† H. Zwaardemaker, "Die Physiologie des Geruchs," pp. 233–235.

certain rod-cells, among which nerve-fibres end.* These taste-buds are end-organs of taste; but are not as yet proved to be

FIG. 20. — Section through the circumvallate papilla of a calf, greatly enlarged. Taste-bud, *a*; nerve-endings, *b*. From Th. W. Englemann, Fig. 270, in Stricker, "Lehre von den Geweben," Bd. II.

essential organs, since taste is also produced by exciting such fungiform papillæ as lack taste-buds.†

In children, all parts of the tongue and even the mucous membrane linings of the cheeks are sensitive to taste stimulation; in adults, the cheek linings and the middle part of the tongue are completely insensitive. Different parts of the tongue are sensitive to different stimuli — in general, the back of the tongue to bitter, the tip to sweet, and the borders of the middle part to sour. The insensitive areas differ for different stimuli as the accompanying figure representing the work of one investigator indicates. It

* Excitations of the taste end-organs are carried to the hemispheres from the back part of the tongue and from the throat by the glosso-pharyngeal nerve; from the forward two-thirds of the tongue by the lingual part of the fifth and by the seventh nerve. (For discussion of the respective functions of the lingual and the seventh nerves, cf. Howell, "Text-book of Physiology," p. 270; Nagel, in "Handbuch der Physiologie der Menschen," III., pp. 624 ff.; and Foster, "A Text-book of Physiology," one-volume edition, 1895, p. 1036.)

† Cf. Nagel, *op. cit.*, p. 624.

is important also to know that a given papilla may be sensitive to several stimuli as well as to one.* This fact, taken in connection with the phenomena of ageusia, or loss of taste, indicate that the taste-buds (or other taste end-organs, if there be such) are differentiated to respond, some to one stimulus, some to another; and that they are distributed in varied proportions in the different regions of tongue and of palate. The cerebral centre of taste is probably in the median temporal lobe.

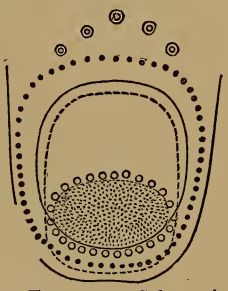


FIG. 21. — Schematic diagram of the surface of the tongue. The area surrounded by —— was insensitive, in the case tested, to sweet; that surrounded by o o o was insensitive to sour; that surrounded by . . . was insensitive to bitter; that surrounded by - - - was insensitive to salt. The shaded area was entirely insensitive. From W. Nagel, *op. cit.*, Fig. 114 (after Schreiber).

BIBLIOGRAPHY. — On *sensations of smell:* Zwaardemaker, Die Physiologie des Geruchs, 1895. W. Nagel, Der Geruchsinn, in Nagel's Handbuch der Physiologie der Menschen, Bd. III., 1905. E. Aronsohn, Zur Physiologie des Geruchs, *Archiv für Physiologie*, 1884, pp. 163 ff.; Experimentelle Untersuchungen, usw., *ibid.*, 1886, pp. 32 ff. E. A. McC. Gamble, The Applicability of Weber's Law to Smell, *American Journal of Psychology*, X., 1898, pp. 82 ff.; and The Physical and Physiological Conditions of Smell, in M. W. Calkins, An Introduction to Psychology, pp. 480–482.

On *sensations of taste:* W. Nagel, Der Geschmacksinn, in Nagel's Handbuch (cited above), Bd. III. F. Kiesow, Beiträge zur physiologischen Psychologie des Geschmacksinnes, Wundt's *Philosophische Studien*, X. and XII. C. S. Myers, The Taste-names of Primitive People, *British Journal of Psychology*, 1904, I., pp. 117 ff.; G. T. W. Patrick, *American Journal of Psychology*, 1899, pp. 160 ff. H. Zwaardemaker, Geschmack, in K. Asher und Spiro's *Ergebnisse der Physiologie*, II., ii., 1903.

* Cf. summaries of Oehrwall's experiments by Howell, *op. cit.*, p. 273, and Nagel, *op. cit.*, p. 642. For experiments, cf. Sanford, 53; Titchener; § 24.

d. Cutaneous Sense-organs

§ 26. The lowest forms of animals respond to mechanical and thermal stimulation; and all other sense-organs (save the retina)

FIG. 22. — Semi-schematic section of the skin of the pulp of the fingers. *Sp*, papillary layer of the skin ; *Sr*, reticular layer of the skin ; *za*, fat ; *cM*, Meissner's corpuscles ; *cP*, transverse sections of Pacinian corpuscles ; *ON*, Ruffini's endings ; *At*, arteriole ; *gs*, sudoriparous glands. From L. F. Barker, "The Nervous System and its Constituent Neurones," Fig. 245 (after Ruffini).

have been developed from differentiated structures in the skin. The uncritical observer thinks of the skin as 'organ' of contact, of temperature, and of pain sensations; but the skin — besides serving as excretory organ — merely contains and protects the minute organs affected by the external physical stimulus. The most important of these organs are: (1) Hair-bulbs, from which project the fine hairs which transmit any movement with accelerated force. (2) Tactile corpuscles (Meissner's), found chiefly in the papillæ of the dermis of hand and of foot. (3) Touch cells (Merkel's) 'of the same essential structure,' but receiving only one nerve-fibre each, distributed all over the skin. (4) Pacinian corpuscles widely distributed in the skin, the periosteum of the bone, the covering of the viscera, the muscles, and the tendons. (4) Articular end-bulbs, found on joint surfaces. (5) The so-called end-bulbs of Krause, found in tendons, cross-striated muscles, outer skin, cornea, and lining of the mouth. (6) The endings of Ruffini, cylindrically shaped, deep-lying bodies.

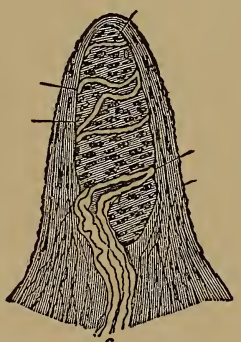


Fig. 23. — A dermic papilla containing tactile corpuscle (Meissner's). From H. A. Martin, "The Human Body," Fig. 152.

§ 27. The specific functions of these different structures are not certainly known. There is, however, much plausibility in the hypothesis of Van Frey that both the hair-cells and the Meissner corpuscles are organs of pressure sensation due to stimulation of the skin. For the hairy parts of the skin are especially sensitive to pressure; and one or more pressure spots are almost always found near the place where each hair leaves the skin. On the hairless surfaces (which however are few and of small extent) the corpuscles of Meissner correspond fairly well in number with the actually discovered pressure-spots. Furthermore, with the exception of the hair-cells and the Meissner corpuscles, no end-organs occur in numbers at all equal to those of the pressure-spots of any given locality.

Experimental Psychology and Its Bearing upon Culture

By GEORGE M. STRATTON

Professor of Psychology in Johns Hopkins University

Cloth, 8vo, $2.00 net.

This book will be of particular value to the teachers of psychology in the universities and colleges where as yet the psychological laboratory has been developed only to a very slight degree. This does not mean that the book is a very elementary laboratory manual, but that it is in such a form that it may be used as a text-book when students are unable to pursue a laboratory course in psychology. At the same time it gives a very good idea of how laboratory methods are conducted and the value and accuracy of the results obtained.

Contents

PUBLISHED BY

THE MACMILLAN COMPANY

64-66 Fifth Avenue, New York

By EDWARD BRADFORD TITCHENER

D.Sc., Ph.D., LL.D., Sage Professor of Psychology, Cornell University; Associate Editor of "Mind" and of the "American Journal of Psychology"

A Primer of Psychology

This is intended as a first book, comprehensive enough to give the general reader a fair idea of the field of modern psychology, its methods of research, and an outline of its most important results. Every statement is made with as little of technical detail as is practicable. It is sufficient to meet the needs of the ordinary reader who wishes to understand something of the subject so prominent in all discussions of education and business life; the student who proposes to make a special study of psychology will find it time well spent if he reads this book first.

Cloth, 316 pages, 12mo, $1.00 net.

Experimental Psychology

A Manual of Laboratory Practice

I. Qualitative Experiments

Student's Manual	*Cloth, 8vo, 214 pages, $1.60 net.*
Instructor's Manual	*Cloth, 8vo, 456 pages, $2.50 net.*

II. Quantitative Experiments

Student's Manual	*Cloth, 8vo, 208 pages, $1.40 net.*
Instructor's Manual	*Cloth, 8vo, 453 pages, $2.50 net.*

"Dr. Titchener's lucid and fascinating text-book . . . is a triumph of industry and competence." — *The Speaker*, London.

The Psychology of Feeling and Attention

A Course of Lectures, delivered by invitation at Columbia University, which bring together all we at present know of the elementary affective processes and of the attentive state. The entire discussion constitutes a sort of critical résumé of experimental work up to 1908.

Cloth, 8vo, 404 pages, with a bibliography and index, $1.40 net.

A Text-Book of Psychology

A much enlarged and revised edition of the well-known work, "An Outline of Psychology."

Cloth, 12mo, $1.30 net.

PUBLISHED BY

THE MACMILLAN COMPANY

64-66 Fifth Avenue, New York

TRANSLATED BY

EDWARD BRADFORD TITCHENER

AND ASSOCIATES

Outlines of Psychology

By OSWALD KÜLPE, Professor of Philosophy in the University of Würzburg. Based upon the Results of Experimental Investigation.

New Edition, 1909; Cloth, 462 pages, 8vo, $2.60 net.

Introduction to Philosophy

By OSWALD KÜLPE.

A Handbook for Students of Psychology, Logic, Ethics, Æsthetics, and General Philosophy. Translated by Professors W. B. PILLSBURY and E. B. TITCHENER.

Cloth, 256 pages, 12mo, $1.60.

Principles of Physiological Psychology

By WILHELM WUNDT, Professor of Philosophy in the University of Leipsic. From the Fifth German Edition (1902).

Volume I. Introduction. Part I. The Bodily Substrate of the Mental Life. *Cloth, 347 pages, 8vo, $3.00 net.*

Lectures on Human and Animal Psychology

By WILHELM WUNDT.

Translated by J. E. CREIGHTON and E. B. TITCHENER.

Third Edition, 459 pages, Large 8vo, $2.60 net.

Ethics

By WILHELM WUNDT.

Translated from the Second German Edition by EDWARD BRADFORD TITCHENER, JULIA H. GULLIVER, and MARGARET F. WASHBURN.

Vol. I. The Facts of the Moral Life. Second Edition (1902). *399 pages, $2.25 net.*

Vol. II. Ethical Systems. Second Edition (1906). *196 pages, $1.75 net.*

Vol. III. The Principles of Morality and the Departments of Moral Life. Second Edition (1907). *$2.00 net.*

PUBLISHED BY

THE MACMILLAN COMPANY

64-66 Fifth Avenue, New York

By MARY WHITON CALKINS

The Persistent Problems of Philosophy

An Introduction to Philosophy through a Study of Modern Systems. Systems of thought are classified and estimated by their varying answers to certain fundamental questions. Exposition and criticism are supported by detailed and specific references to available texts. The last chapter of the book summarizes contemporary systems and tendencies.

Cloth, 8vo, $2.50.

By ARTHUR KENYON ROGERS

A Student's History of Philosophy

"A distinctive mark of Professor Rogers's book is that it is readable. Nobody can say as much honestly of the larger histories of philosophy. . . . But Rogers is right good reading." — *School.*

" Professor Rogers brings to the handling of philosophical problems and systems a profound and sympathetic mind; his exposition, except where he is cramped by limitations of space, is invariably luminous and fair; he possesses in a remarkable degree the gift of bringing metaphysical questions home to 'men's business and bosoms'; and it may be safely predicted that his book will lead many a reader past the presentation of them to the masters themselves — and this, no doubt, is what he desires." — *The Scotsman,* Edinburgh.

Of the first edition Professor ELIAS COMPTON, of Wooster University, wrote:

"It is a college text-book which, in my opinion, combines more merits than any of its predecessors in the same field. . . . I have adopted the work as a text-book for my class of seniors in the history of philosophy, and recommend it to the general reader who desires a readable book that will give a just, generous, and definite knowledge of the subject."

Cloth, 8vo, $2.00 net.

By JAMES EDWIN CREIGHTON

An Introductory Logic

A presentation of the fundamental ideas of philosophy from both the practical and theoretical side. The author is Professor of Logic and Metaphysics in Cornell University.

Cloth, 12mo, $1.40 net.

PUBLISHED BY

THE MACMILLAN COMPANY

64-66 Fifth Avenue, New York