A FIRST BOOK IN PSYCHOLOGY

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A

FIRST BOOK IN PSYCHOLOGY

BY

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IN WELLESLEY COLLEGE

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PREFACE

THIS book has been written in the ever strengthening conviction that psychology is most naturally, consistently, and effectively treated as a study of conscious selves in relation to other selves and to external objects — in a word, to their environment, personal and impersonal. However he defines his science, every psychologist talks and writes about selves — of myself and yourself — as conscious of people, of things, or of laws and formulæ. The psychology of self, which this book sets forth, is a conscious adoption and scientific exposition of this natural and practically inevitable conception.

The book differs in several ways from its predecessor, "An Introduction to Psychology." In general, I have tried to make a simpler, directer approach to the subject. In the earlier book, I treated psychology in a twofold fashion, both as science of selves and as science of ideas (or 'mental processes'), discussing all forms of consciousness from both points of view. I have here abandoned this double treatment, with the intent to simplify exposition, not because I doubt the validity of psychology as study of ideas, but because I question the significance and the adequacy, and deprecate the abstractness, of the science thus conceived. In a second fashion this book differs from the other. I have tried to embody what appear to me to be the important results of so-called functional psychology. That is to say, I have taken explicit account of the charac-

teristic bodily reactions on environment which accompany perception, thought, emotion, and will; and I have briefly considered the various forms of consciousness as factors in conduct, and as significant in individual and in social development. The order of topics has been radically changed. I have included in the Appendix the sections on the physiology of nervous system and sense organs, and on abnormal consciousness, as well as the brief discussions of moot points in psychology. The consideration of the different classes of elements of consciousness instead of being massed together at the beginning of the book, have been introduced singly, as subordinate parts of the chapters, or groups of chapters, on perception and imagination, recognition, and thought, emotion and will.

This is, then, a new book, not the condensation of an old one; yet it does not teach a new form of psychology. The same conception of psychology underlies the two; and I have not scrupled to transfer, though seldom without some change, pages, paragraphs, and sentences from the earlier book.

Time would fail me to name all the people whose help in the preparation of this book I gratefully remember. My greatest indebtedness is to Professor Eleanor A. McC. Gamble, for her discriminating criticism of the book as a whole. My warm thanks are due, also, to my colleague, Dr. Helen Dodd Cook, and to my former colleague, Professor L. W. Cole, for their critical reading of portions of the text. And I am glad of this opportunity to acknowledge the expert assistance of Miss Helen G. Hood, who has prepared the Index.

PREFACE TO THE SECOND EDITION

MANY minor changes have been made in the second edition of this book, but none of them affect its essential teaching, and only one—the transfer of a paragraph from page 89 to page 92 at the end of Chapter V. — alters the paging. The more important changes are, perhaps, the following: a restatement (pp. 12–14) of the distinction between perception and imagination; a withdrawal (p. 147) of the teaching that negative judgments are always analytic; a new summary (p. 91) of the forms of bodily reaction; a more accurate statement (p. 305) of the detail of the Franklin color-theory; additions (pp. 283, 284) to the Bibliography; and the substitution of a few new review questions in the last section of the book.

JANUARY, 1911.

PREFACE TO THE THIRD EDITION

THE present revision of this book has been made with three main ends in view: to emphasize the essentially social nature of the conscious self, to accentuate the fact that the study of the self, as thus conceived, involves a study of behavior, and finally to prune the book of expressions which lend themselves to interpretation in terms of an atomistic psychology. The first end has been sought

not only by the addition of sentences, paragraphs, and pages (10, 92 ff., 179, 183), but by the transfer of the contents of the chapter formerly devoted to 'the social consciousness' to other portions of the book (pp. 98 ff., 251 ff.). This change was made lest the separate treatment of the social consciousness obscure the truth that consciousness is through and through social. The second end has been furthered by adding to Chapter V. a section on 'Habit' and sections — consisting in part of passages transferred from the Appendix — on 'Instinct' and 'Learning.'

All these are shiftings of emphasis and of position, and involve no amendment, but rather a reënforcement, of the original teaching of the book. Changes in conception will be found in the discussions of attention (pp. 104 f., 112), of volition structurally analyzed (pp. 231 ff.), and of the consciousness of time (pp. 85, 140, 231, 330). The enumeration which follows is an incomplete list of the pages containing further additions or corrections: pp. 3 f., 14, 35 f., 41, 71, 143, 150, 158, 163, 183, 185 ff., 217, 226, 232, 233, 247, 252 f., 333 f. From page 90 onward the numbering of pages has of necessity been altered, yet by far the greater number of pages are entirely or essentially unchanged.

It is perhaps permissible to state explicitly that the book is intended for two classes of students and readers. Those for whom psychology is primarily (in the words of William McDougall) 'the essential common foundation on which all the social sciences must be built up' will do well, certainly in their first reading, to omit Chapters III. and IV.,

and all save the last section of the Appendix. Those, however, to whom psychology is not only a means but an end, should be aided by the specific references, topic by topic, to the manuals of experimental psychology, by the bibliographies (amplified in this edition by the Supplement, pp. 411 ff.), and by the Summaries, in the Appendix, of the recent literature, experimental and theoretical, on such difficult and disputed topics as the space-consciousness (pp. 336–352), the relational consciousness (pp. 362 ff.), and the Wundtian theory of the affective elements (pp. 370 ff.).

I venture to add, in conclusion, a comment on the proper use of a text-book in psychology. I am confident that the reading of every chapter should be preceded, accompanied, and followed by independent introspection and observation. To this end I urgently recommend the use of preliminary questions, such as those which are formulated on page 11, of review questions similar to those which are gathered together at the close of the book, and, so far as possible, of experiments performed by students themselves.

JULY, 1912.

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A FIRST BOOK IN PSYCHOLOGY

CHAPTER I

INTRODUCTION: THE NATURE, METHODS, AND USES OF PSYCHOLOGY

I. The Nature of Psychology

Psychology has most often been defined as science of consciousness, but this definition 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. And this somebody is not an isolated self but a self which is affected from without and which expresses itself in its behavior. In view of these facts psychology is more exactly defined as science of the conscious self in relation to its environment.[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.

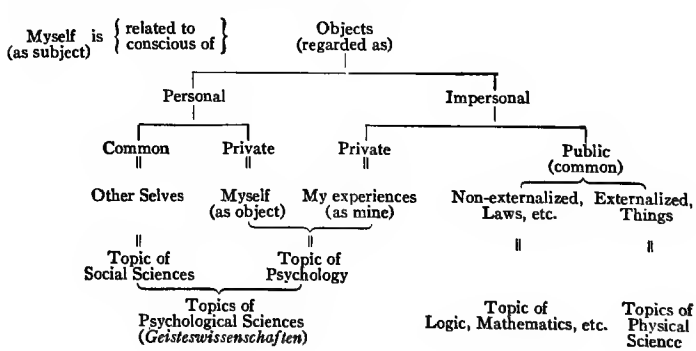
Psychology has been defined as science of the self-being-

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. I immediately experience myself as (1) relatively persistent — in other words, I am in some sense the same as my childhood self; as (2) complex — I am a perceiving, remembering, feeling, willing self; as (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. I experience myself 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). It would be impossible to enumerate all the 'personal attitudes' or relations of self to its objects. The following, however, are fundamental and will be named again and again in the description of different forms of consciousness: receptivity and activity; sympathy, in the wide sense of the consciousness of community of experience; attention, and its modifications: egoism, that is, attention to myself, and altruism, or attention to my object. My relation to a personal object is called a social relation.

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.

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. Three further statements must be made concerning the different sorts of object: First, I am always, inattentively or attentively, conscious of the private, personal object, myself, whatever the other objects of my consciousness. Second, there are certain externalized objects, in particular my body, of which I am so persistently and attentively conscious that I often seem to regard them as part of myself. And, finally, preëminent among the objects of my environment, are the other selves with whom I find myself in close and constant relation. I cannot indeed adequately describe myself except in terms of these social relations as child of my parents, friend of my friends, citizen of the state.

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 in-

dependent 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, com-

parative 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 fuller understanding of these relations in their complexity and 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, to social science, and to pedagogy rather than to psychology; but psychology is the necessary foundation for all these sciences, and the study of psychology may therefore contribute directly to my social efficiency.

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.

Perception, finally, is reflectively regarded as my consciousness of my relation to a present external object, whereas the object of my imagination is never conceived as present and need not be conceived as external, that is, as independent of me. The remembered breakfast table, for

example, is external, the fancied mermaid is creation of my mind, but neither is regarded as a present object. On the other hand, the perceived pen is realized as an external object present here and now.

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 present. 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. To summarize our results: Perception has been described as sensational, passive consciousness reflectively realized as impersonal, particularizing, common to other selves, and as related to present external objects. Imagination has been described as sensational, impersonal, and particularizing,

but as lacking the consciousness of passivity, the relation to present objects, and the community.

II. Perception and Imagination as Sensational

We have already enumerated certain fundamental personal attitudes, or relations of self to environment: receptivity and activity, sympathy, attention, and others. Another sort of analysis of consciousness must now be undertaken. If, in introspection, we arbitrarily drop out of account the persistence, the uniqueness, and even the relatedness of the self we are still conscious of a complex. The simplest terms which attentive introspection can distinguish in this complex are called structural elements of consciousness. They differ from the personal attitudes just enumerated, in that each belongs to a particular moment of time and in that each may be regarded as impersonal. These structural elements seem to fall into three main classes which have been called 'sensational' (or 'substantive')*; (2) 'attributive,' and (3) 'relational.' 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, 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-factors. 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-

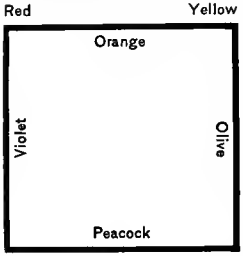


FIG. 1. — The Color Square. Adapted from G. E. Müller.

chologists believe that only the four 'principal' color-qualities are elemental and that all the others are fusions of 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 which includes 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

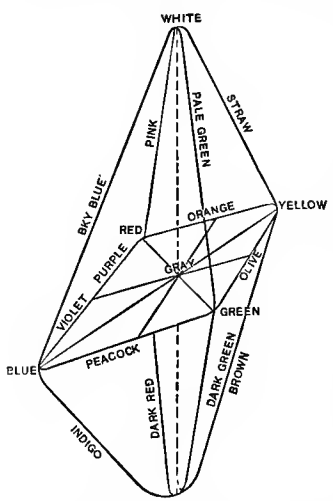


FIG. 2. — The Color Pyramid. (From Titchener, with altered wording.*)

* 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 with our consciousness of color we have the experience of 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.

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 600,000,000,000,000 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 trillion each second, condition the retinal process which accompanies the sensational quality 'red'; and the swiftest vibrations, about seven hundred and eighty trillion 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 trillion	687+ millionths of a millimeter
Yellow	*D*	526 trillion	588+ millionths of a millimeter
Green	*E*	589 trillion	526 millionths of a millimeter
Blue	*F*	640 trillion	484 millionths of a millimeter
Violet	*H*	790 trillion	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 trillion to the second, six hundred and ninety millionths of a millimeter long) — partially decomposes a chemical substance in 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 which totally decomposes this cone-substance conditions the consciousness of colorless light. (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 in 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.[36]

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. No fully satisfying explanation of contrast phenomena has yet been found. The following, in terms of the special case, may be proposed: the green light partially decomposes the photochemical substance on the cones of the retina and thereby leaves this substance in a state of unstable equilibrium. After the removal of the green light, and because of the instability of the cone-substance, the remaining decomposition-processes set in; and these processes, in combination, 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 studied the visual elements in 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," 1909, 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 discovering in the experience 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 effort to discover

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, including 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 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. 184, 210 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 consciousness of warmth and of cold we have come to the end of our account of the elemental sensational experiences embedded in perception and imagination.† 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 XV.

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, and present. 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 present. 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 this 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 been shown, in the preceding chapters, that sensational elements may be distinguished within perception and imagination. 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, in after-reflection, we discover these factors in the tone-consciousness, 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 due to several end-organ excitations, and in which therefore after-reflection can distinguish different 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, the absence of discrimination, in an experience realized as including 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

In my consciousness of space are structural 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. 137 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. 1. The Consciousness of 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 or of 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.

2. *The Consciousness of Form*

(*a*). 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 makes merely the first part of the movement; or he makes a slight and unnoticed movement. But 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 consciousness of two-dimensional, or surface,

*For experiment, cf. L. Witmer, "Analytic Psychology," Exp. XVII., pp. 61 ff. With regard to the nature of the eye-movements which condition or accompany the space-consciousness, cf. Appendix, Section IV., § 5, in particular, the account (pp. 342–343) of the experiments performed by Stratton, Dodge, and Judd, and the consequent qualification (p. 342) of the statement made in this chapter.

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] has been held to show 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.

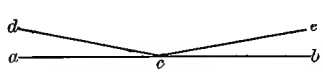


FIG. 3.

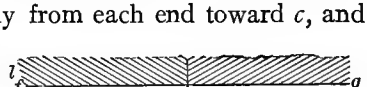


FIG. 4.
A variation by Hering of the Zöllner figure. (From Sanford, after Ladd.)

(*b*) 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.*

3. *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.

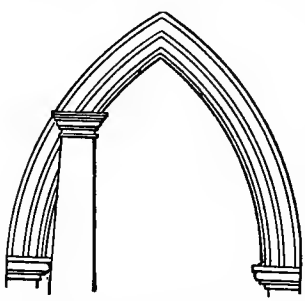


FIG. 5. — (From Sanford, "Experimental Psychology," p. 205.)

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 are never confused with sounds from the left, that sounds from in front are constantly confused with sounds from behind, and yet that two sounds, close together, are best discriminated when given in front or behind.

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, a sound from exactly in front and a sound from behind stimulate right and left ears with equal intensity and are readily confused. Two sounds, finally, given close together, in front or behind, are well discriminated because a change in the ratio of intensities, received by the two ears from sounds which readily reach both, is easily perceptible. 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. Just what this really is it is very hard to tell. Many psychologists hold that, at its core, the consciousness of time is a unique and indescribable experience. But such a view leaves open many questions: the relation, for example, of the consciousness of duration to the consciousness of succession, and the fundamental question whether our time-consciousness is (or includes) a unique personal attitude or a structural element. The writer of this book inclines to the view that the immediate experience of the self as changing is the foundation for all forms of temporal consciousness, but that the temporal experience may, by abstraction, be regarded as impersonal; and that essential to all temporal consciousness, when structurally analyzed, is a certain elemental experience comparable to the elemental consciousness of extensity embedded in all experience of space. It is doubtful, however, whether such a time-element should be grouped with the sensational elements of our experience.

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 con-

sciousness 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, 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 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.

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, chiefly habitual, relatively immediate, and impulsive.

(1) Perceptual reactions, and even sensational reactions of the more developed type, are coördinated, or unified. The significance of this character 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 coördination 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, as will appear, of twofold origin — instinctive or acquired.*

(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 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 environ-

* On instinct and learning cf. the later sections of this chapter and Appendix, Section V.

ment, 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.

The distinctions made in the last two paragraphs may be summarized as follows:—

BODILY REACTIONS

A. Reflex Movements

(*Without antecedent consciousness of movement; immediate; either uncoördinated or coördinated.*)

I. Without *accompanying* consciousness of movement.
II. With *accompanying* consciousness of movement.

B. Ideo-motor Movements

(*With antecedent consciousness of movement.*)

I. Impulsive movements.
(*Relatively immediate; unpremeditated.*)
a. Sensational.
(Either uncoördinated or coördinated.)
b. Perceptual.
(Coördinated.)
II. Volitional.
(*Delayed; premeditated.*)
a. Simple.
b. Deliberative.

Bodily reactions of every type are further distinguished as either acquired or instinctive, and as either habitual or seldom performed. In the remainder of this chapter, we shall study instinct, habit, and acquisition, or learning; but instead of confining our attention to bodily reactions we shall consider also the instinctive, the habitual, and the learning consciousness.

II. Instinct, Habit, and Learning

a. INSTINCT

The instinctive bodily reaction is the innate, or unlearned reaction; and similarly the instinctive consciousness is the natural, the temperamental psychic attitude. For example, the movements which I make in drinking are instinctive, whereas my reactions to my knife and fork have been learned, perhaps with toil and pain. The study of biology substantiates the fact, open to ordinary observation, that instinctive reactions are common to all members of a family or species — that all ducks take to the water, all dogs bark, all normal children learn to talk. Obviously, these instinctive reactions are hereditary; and all permanent instincts are useful in the perpetuation or development of the race.

Instincts may be classified from several points of view. Most fundamental, perhaps, is the distinction between the altruistic, adaptive instincts of approach and surrender, the instincts of caressing and giving, for example, and the egoistic instincts of aversion and opposition, such as flight and pugnacity. A study of instincts, grouped in this way, discloses the fact that the greater number of them are primarily social — reactions to persons and not to a merely impersonal environment.

Other classifications of instinct may profitably be considered. There is a contrast between habitual instincts such as walking and swimming, and the instinctive movements which are seldom, or even once, performed — the reaction, for example, of the yucca-moth to the flower which, once only, it fertilizes with the pollen of another

flower that opens on one night only. More important, practically, is a chronological distinction. There are early instincts, such as pecking and sucking, and deferred instincts — biting, for example. Indeed, specific instincts, mental as well as bodily, mark off successive life stages from each other.* The final distinction, pedagogically most important of all, is that between modifiable and unmodifiable instincts. Professor James is probably correct in his contention, that the main difference, from this standpoint, between animals and men is not, as usually stated, that animals have many instincts and human beings only a few. On the contrary, the difference seems to be simply this: that animal instincts are largely unmodified, whereas human instincts are altered, transformed, sometimes completely checked (or inhibited). A later paragraph of this chapter will discuss this control of the instincts.

b. HABIT

An aim of all study is to promote efficiency, and accordingly my psychological study of myself is largely for the purpose of making me more efficient, more ready in my responses to the stimulations of my environment. To secure this end I must not only make fresh acquisitions but I must "hold fast what is given" to me in the game of life and must reproduce it as it is needed. My mental endowment is twofold, consisting of my involuntarily received perceptual experience and of my instinctive interests and capacities; and the preservation and recurrence of these experiences is called habit. For just as we call recurring bodily reactions habitual, so we designate recurring feelings and modes of

* Cf. pp. 94–95.

consciousness mental habits. (In the case of the repeated sensational experience, the mental habit is called memory.) Of course, not merely our instinctive interests and reactions, but our acquired feelings and activities may recur and become habitual; and habits are commonly, therefore, classified according as their origin is or is not instinctive.

Habits, whether mental or physical, contribute to our efficiency by economizing our time and our attention. This is evident to any one who reflects upon the history of his own activities. Suppose for a moment that dressing had not become a habit and that I had to force buttons into buttonholes and shoe-laces into eyelets with the same expenditure of reflection and effort which I once devoted to these operations. Or, suppose that the casting up of columns of figures had not become a habit and that I had to face each new grocer's bill in the way in which I used to turn to my problems of addition in arithmetic. It is obvious that I accomplish all these operations in a fraction of the time they required before they became habitual; and, as will later be shown in more detail,* I perform them more accurately, as well as more swiftly. The practised hand, not the novice however well trained and painstaking, hits the bull's eye, keeps the straight course, recites without error.

The problem of efficiency is, at this stage, to discover means by which one may convert the useful, transitory instincts and the acquired proficiencies into habits. The permanent instincts become habitual of themselves, but the transitory instincts, as well as the acquirements, will lapse without voluntary exercise. The wise teacher will

* Cf. Chapter XII., pp. 240 ff.

therefore foster and stimulate such transitory instincts as should survive in permanent habits, and will limit the outflow of the dangerous instincts. He will, for example, take advantage of the age at which the child is instinctively social in order to form gracious habits of intercourse by which to tide over the shallows of the shy age; and he will see to it that the child outgrows the tormenting instinct without forming habits of cruelty.

In his classic chapter on habit, Professor James has emphasized the fixedness of early habits, and has formulated certain practical maxims which may well be quoted in conclusion: "The first is that in the acquisition of a new habit, or the leaving off of an old one, we must take care to *launch ourselves with as strong and decided an initiative as possible.* . . . The second maxim is: Never suffer an exception to occur till the new habit is securely rooted in your life. . . . A third maxim may be added: Seize the very first opportunity to act on every resolution you make, and on every emotional prompting you may experience in the direction of the habits you aspire to gain." *

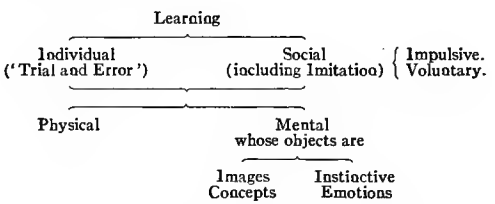
c. LEARNING

Not only by repeating, and thus preserving, my original experiences, do I gain mental efficiency. I must change, supplement, modify, control my experience if I am to live fully and effectively. Such change or modification of sense-images and of instincts is called learning, or acquisition.

Learning may be either individual or social, and either form may, like habit, be mental or physical. Normally,

* "Principles of Psychology," I., pp. 123, 124.

however, mental and physical learning are combined. The education of hand and arm implies a corresponding training of reasoning and will; and the coördination of movements accompanies the coördination of thoughts. The two fundamental forms of mental learning have, as objects, percepts and images on the one hand, instinctive feelings on the other. These distinctions may be summarized and amplified as follows:



The acquisition of images and concepts is through creative imagination and reasoning, and the control of instincts and emotions is, in large part, through volition. Thus, most of the succeeding chapters of this book will contribute to the discussion of these various kinds of learning. It will, however, prove useful to make, at this point, the distinction between individual and social learning, and to notice the changes brought about in the mental life by the control of the instincts.

1. To begin with the last point: the control of the instincts should take two forms: the drastic form of inhibiting, crushing, stamping out the positively harmful instincts, such as cruelty and jealousy, and the milder form of transforming or making over instincts which are harmful only in certain applications or relations. Acquisition, for example, becomes useful when fused with generosity, and a child may be taught to save for the purpose of giving. Or, again,

an instinct may become of value when a suitable object is provided for it; for example, a boy may profitably spend his combative fury on a woodpile in the place of a human foe, and may wisely hoard minerals, postage-stamps, or quotations in place of pennies. The methods of control will become clearer in later chapters* but we may anticipate by pointing out that the modification of an instinct is usually, if not always, brought about by the premeditated or else involuntary occurrence of a counter-instinct. To the little child, for instance, a strange object is naturally both interesting and terrifying; and it therefore arouses in him the opposite instincts of approach and of withdrawal. The child may slowly come close to the strange dog or to the new motor car, or he may gradually shrink back, or finally one instinct may balance another and he may hold his ground, neither advancing nor fleeing, but revealing by hesitating movement and changing expression the conflict of instincts. In quite parallel fashion, the instinctive selfishness of the older child may struggle with his instinctive generosity. One may watch his vacillation between the egoistic impulse to snatch from his playmate the coveted marble and the altruistic instinct to give up those which he has himself won.

2. This consideration of the control of the instincts has evidently taken for granted the social relation of pupil to teacher, or of child to parent. Learning, however, as has been stated, sometimes occurs through individual experience, and it is important clearly to distinguish the two forms, individual and social. Learning through individual ex-

* Cf. Chapter XI., pp. 218 ff.: Chapter XII., pp. 238, 240 ff.; Chapter XIII., pp. 253 ff.

perience, is clearly to be found among animals. Contemporary psychologists have largely concerned themselves with the experimental study of animal learning and have abundantly shown that animals learn by accidental successes and failures ('trial-and-error'), that is, by individual experience. Thus, Yerkes has shown by his experiments that turtles can learn new reactions: his turtles, while crawling to the base of an inclined plane for food, accidentally fell from its side, and learned to repeat this fortunate method of shortening the path to food.* Evidently this perpetuation of an accidental reaction indicates that the turtles remembered the fall and its results. Similar experiments on birds, rodents, and the higher vertebrates, offer conclusive proof of their ability to obtain food by escaping through novel barriers, and by finding their way through strange labyrinths. In parallel fashion, a baby may learn to grasp a ball by repeating and adapting his accidentally and partially successful movements toward it.

3. It is evident also, from experiments such as have just been described as well as from everyday experience, that animals can be trained; in other words, that they learn through social *means*. But it is not so certain that this learning involves social *consciousness*, that is, that animals reflectively obey or imitate their teachers. It is, in fact, a moot question whether animals acquire new movements or new images through imitation. Many experiments, notably those of Thorndike, have told against the probability of animal imitation. Dogs, cats, and monkeys have been shut up with other animals which have learned to perform certain simple movements, by which to release themselves from

* Popular Science Monthly, 1901, LVIII., pp. 519 ff.

captivity or to obtain food, and yet the newcomers have failed to imitate the successful reactions of their companions. With still other animals, however, notably with anthropoid apes, experiments have indicated the presence of imitative reflection; and the unsuccessful cases are perhaps due to the difficulty of inducing animals to fix their attention on each other.

The contrast between the human and the animal consciousness is nowhere more striking than at this point. Like an animal, a child may learn through individual trial and error, but unquestionably most of his learning is of the definitely social type; and whereas there is, as has appeared, a doubt of the animal's capacity for imitation, most human learning, of whatever sort, is definitely social, and much of it consists in the imitation of other selves — of their feelings and thoughts and of the movements of their bodies. Most of our daily acts and experiences are, in truth, imitations of those of other people. To be sure, not all resembling activities are imitative, for example, roosters crow not in imitation of each other, but through a common instinct. But when 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

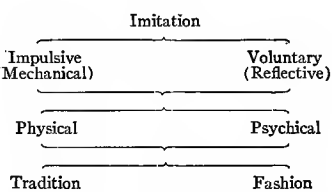
from the ground, from mats or from tables, partly because people have taught us these ways, and partly because these are the manners of those about us. Again, our wanderings from place to place are unimitative, instinctive activities, but the manner of our travelling, on horseback, by automobile, or 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.

These illustrations suffice to show that imitation, like habit and instinct, may be psychical or physical, imitation of thought or of movement. And imitation, whether psychical or physical, may take the form of fashion, imitation of the present, or of tradition, imitation of the past. In Paris, for instance, dress is regulated by fashion which

changes with every season, and every woman dresses as her neighbor dresses. In Brittany, dress is a tradition and every woman's coif is like her great-grandmother's.

Far more important than either of these distinctions is that of voluntary or reflective imitation from the undeveloped, or mechanical, imitation, in which the subject does not recognize his own act as the repetition of another. So, a very young child will be attracted by the rhythmically moved finger of a person opposite to him in a street car, and will presently attempt, evidently without premeditation, a similar movement of his own fingers. This is movement of the impulsive, perceptual type which forms the special topic of Part I of this chapter. It is wholly different from the reflective, voluntary imitation which will later be discussed in more detail.* These distinctions are indicated in the following summary:



The study of imitation suggests a final remark about the human body. At the beginning of this chapter, my body was described as standing in close relation to myself. An equally important character is the following: my body, through its gestures and motions, serves as means of communication with other selves. Accordingly, the complete notion of the body presupposes the conception of socially

* Cf. Chapter XIII., pp. 253 ff.

related selves.* And long before reaching an explicit consciousness of bodily reactions as social media, every child shows instinctive interest in gesture and expression — follows movements with his eyes, listens eagerly to human speech.

* Cf. G. H. Mead, Journal of Philosophy, 1910, VII., pp. 176.

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 to-morrow, 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 sloop 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]* Attention is, in truth, a unique attitude, a basal relation of self to object, comparable with receptivity or sympathy or activity. This conception may, but need not, be combined with the teaching that there is a structural element of clearness, or attended-to-ness.† From either point of view, attention is unique and indescribable, not to be reduced to more elemental constituents. Attention is — just attention.

We best realize what attention means 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. So-called inattentiveness, however, is usually a lower degree, or 'level,' of attention; and there is dispute among psychologists as regards the number — two or

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

† Cf. pp. 4, 330 ff.

three or four — of these 'attention-levels.' It is not unlikely that individuals differ in this capacity to attend simultaneously, with varying degrees of attention, to different objects.

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-

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. 237.

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 a fundamental personal attitude; 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. 124.

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.

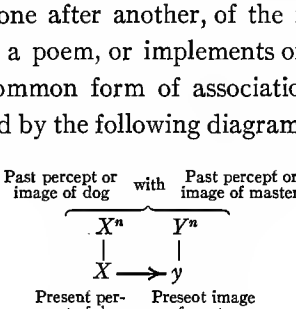
II. The Nature of Association

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.

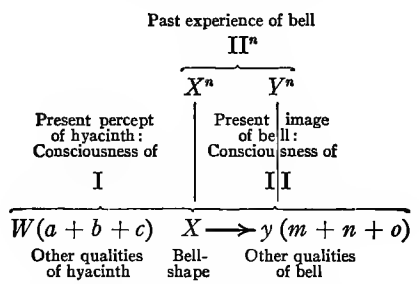
Partial association is that of structural elements of consciousness or of groups of elements. Its most extreme case, which James aptly calls 'focalized association,' is the observed connection between one single element and another elemental or complex experience. This type of association is more varied 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 XVI., 31.

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., II. *c*.

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" Goethe'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, in which (it will be remembered) we distinguish 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 our structurally elemental experiences are exclusively sensational; and still 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. 182, and Appendix, Section XI., § 1.

† Cf. Chapter VI., p. 104, 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. For, in the first place, as has been shown, recognition is an essentially personal attitude and can not be described by the mere enumeration of structural, impersonal elements; and, in the second place this enumeration, as just given, is palpably incomplete. For the recognition of a picture, that is, the consciousness of it as familiar, is the realization of the sameness of my present with my past experience of it. This includes not the mere sensational imagination of the word 'same' but the obviously relational consciousness of 'sameness.' It includes also the temporal consciousness of 'past,' and this is not a purely sensational, nor a sensational and affective, experience. In an earlier chapter it has been briefly suggested that the time-consciousness contains a unique factor and that, structurally analyzed, it probably includes an unsensational and distinctive element.* The

* Cf. Chapter IV., p. 85.

experiences of past, of present, and of future are evidently, however, very complex and must include much besides such a time-element. Thus, a consciousness (partly affective) of irrevocableness seems to distinguish the consciousness of past from that of present and future. No serious attempt is made in this book to settle these difficult problems, but so much is certain: the consciousness of time is an awareness of moments, past, present, and future as linked together, and it therefore includes certain relational elements of connectedness.

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. 229.

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. By its thinking, therefore, it organizes and unifies the objects of common experience. We 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 '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 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. The conception has been well described as a 'tool of the mind,' a means of simplifying both my mental attitudes and my bodily reactions. By grouping my experiences in conception, 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 mainly a preserving function, lays the foundation for creative experience, for acquisition. It will be shown, also, in our study of will, how conception

* Cf. I. E. Miller, "The Psychology of Thinking," Chapters XV.–XVII.

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 will, 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. 238.
† Cf. Chapter X., p. 172.

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

JUDGMENT is still another kind of organizing consciousness. 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. 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 this relational consciousness. 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) perceptual or conceptual,

* 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 judgment 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.'

It is impossible to distinguish unambiguously by our language between an analytic judgment of reflection and a synthetic judgment of discovery. For the same proposition may express what for one person is an analytic, for another a synthetic judgment, or what for the same person is at first a synthetic and later an analytic judgment. When, for example, one first handles aluminum one makes the synthetic judgment, "Aluminum is light," but after one is familiar with aluminum its lightness may become as much an inherent character of it as the 'feel' of its surface, so that the judgment "Aluminum is light" becomes analytic. The best way in which to learn the distinction is by examining extreme instances of both sorts of judgment.

III. Reasoning

a. The Nature and Classes of Reasoning

Judgment is best known as reasoning, that is, as continuous, or mediate, judging. A reasoning 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. Usually inductive reasoning leads to the formation of a new concept or else to the reconstruction of an old one; and deductive reasoning modifies our consciousness of an individual by bringing a new individual into a class already known.

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. Most scientific reasoning is, in truth, a combination of induction with deduction — a series of particular judgments leading to general conclusions confirmed 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 immediate judgments: axioms or assumptions. 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 158, for instance, the first judgment is negative, the others positive; the first, second, and last are perceptual judgments referring to my own table bell, but the third is a conceptual 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 fourth of these judgments are analytic, and that the third is synthetic. 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 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. Cases of supposed reasoning, for example of animal reasoning, are often of this sort. On the other hand, reasoning from a suppressed premiss may be mistaken for imagination. So, if I say, "You should not drink tea, for you are nervous," I am probably reasoning from the unexpressed premiss, "Nervous people should not drink tea."

b. The Uses and Dangers of Reasoning

The chief function of reasoning is to make discoveries, to carry us beyond the limit set to observation, memory, and the simpler forms of thought. Reasoning is thus an important form of self-development, or learning, a means of acquiring new outlooks, new points of view, new bases for action. It follows that effective reasoning furnishes the means for solving the problems which confront us, for escaping dangers, making use of novel materials, acquainting ourselves with strange situations. Analytic-synthetic reasoning attains these ends primarily 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 is not likely to convince. 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 does not work permanent change in their intellectual convictions. We are constantly hearing that argument is futile, and yet there seems no other way of deliberately trying to share 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., pp. 138 f.

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. 148.

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. 216.

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 is primarily a social phenomenon, an aggregate of bodily reactions (or results of bodily reaction) — in particular 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.

It will be well to emphasize, in closing, the truth already so often illustrated that thinking is a social experience. The so-called 'lonely thinker' is a pure fiction, for every thinker assumes — or, at the least, may assume — community of experience with his fellow-thinkers; and objects of thought, scientific, mathematical, and logical laws, differ from images precisely, though not wholly, in this social reference. Conventional language, a product of thought, is the most significant proof of the social nature of conception and reasoning; but other specific illustrations may be found. The revival of classic learning, the reformation, the rise in the nineteenth century of the theory of evolution — all these are examples of social movements of thought characterized, though in greater and less degree, by a quickening of thinker by thinker, a response of thought to thought, a growth upon one man's hypothesis of another's conclusion.

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 regarding perception, without explicit reference to the perceiving self, as a complex of impersonal elements, — of color, 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. Besides containing relational elements, 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] —

SOCIAL EMOTIONS. (With Personal Objects.)

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

NON-SOCIAL EMOTIONS. (With Impersonal Objects.)

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. Social Emotion

We have first to study the most primitive and most significant of the forms of emotion — social 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 social 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 social 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 social 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. Non-social Emotion

This chapter has so far been concerned with social 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 social. 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 social 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.

Non-social emotion, the conscious relation of happy or unhappy self to event or to thing is, like social 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 non-social 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 non-social 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 non-social 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 non-social 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 which a structural analysis finds in 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 a similar 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 and moderate stimuli usually 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. 210[2]–214,[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, swifter and shallower breathing, as well as other changes (due to the contraction of skeletal muscles) such as smiles and hand-clapping.

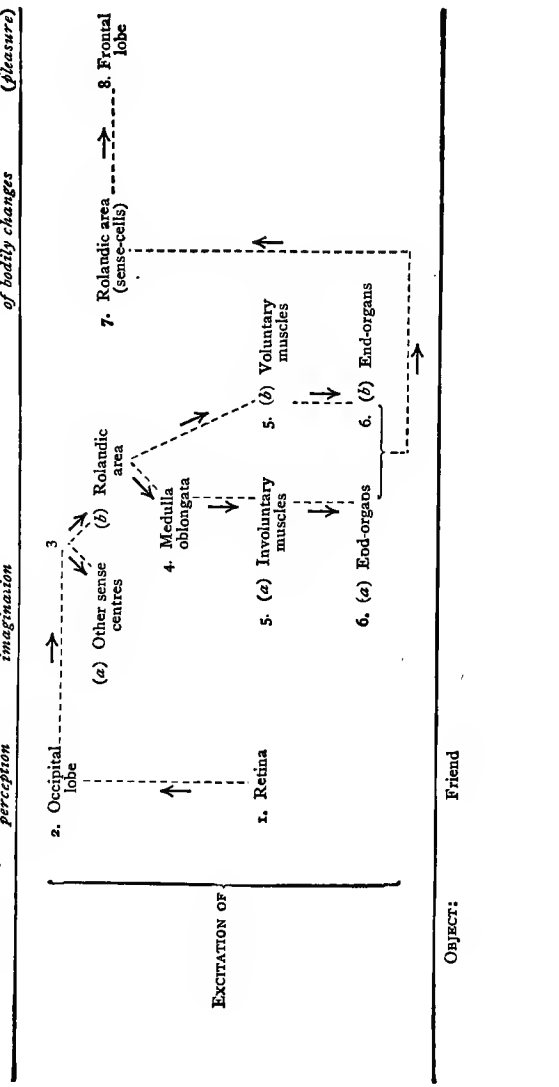
Fourth, (*a*) excitation of end-organs of pressure, occasioned by the internal bodily movements which always occur, and by the external muscular contractions when they occur; and (*b*) the upward spread of these excitations to sense-cells of the Rolandic area. The excitation of one group of these sense-cells 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 in this instance. 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
Object:
Friend
1. Retina
2. Occipital lobe
3
(a) Other sense centres
(b) Rolandic area
4. Medulla oblongata
5. (a) Involuntary muscles
6. (a) End-organs
6. (b) End-organs
5. (b) Voluntary muscles
7. Rolandic area (sense-cells)
8. Frontal lobe

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 pathways," and thus resulting in aimless, futile movements, "and partly, through hereditary influences, to the voluntary system," resulting in useful and coördinated, though unplanned, reactions.

Like all instinctive movements, emotional reactions are also distinguished, in the second place, as (1) altruistic, or adoptive, reactions of approach, such as the baby's outstretching of his arms to his mother, and as (2) egoistic movements of withdrawal or of aggression, such as the child's shrinking from the unfamiliar or his striking in anger. 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. 210.

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 XV.

† "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 social nor the non-social 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 social 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 non-social 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 social 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 iteration, and grewsome scenes may thrust themselves upon me. 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,

* For 'will' and 'faith' the terms 'self-assertive' and 'adoptive will' may be substituted; and these may be regarded as coördinate forms of will taken in the wider sense of self-activity. For preliminary questions, cf. App. XVI., 66, 67.

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. They are often, but not inevitably, conceived as pleasant.

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. 144.

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

b. The Structural Elements of Will
'The Feeling of Realness'

Many psychologists have held that will is a complex of structural elements consisting mainly in sensational elements and, in particular, in the consciousness of 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 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,

* Cf. Chapter XIII., p. 246 f.

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 merely imagination antecedent to movement.

Even from the standpoint of structural analysis volition must include other than sensational elements. Attentive introspection shows that these unsensational factors are (1) the consciousness of futurity and (2) the feeling of realness — experiences corresponding with two of the characters, just discussed, of the willed object. The nature of the consciousness of futurity involves us again in the difficult problem of the nature of the time consciousness.† Evidently the consciousness of 'future' lacks the feeling of irrevocableness (partly affective, partly relational) which characterizes the consciousness of 'past.' But whatever it is, in its final analysis, the consciousness of a future moment, like the consciousness of a past moment, certainly includes unsensational experiences of relatedness.

The feeling of realness is to be grouped with 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

* Cf. Chapter V., p. 90.

† Cf. Chapter IV., p. 85; Chapter VIII., pp. 140 ff.

unlike the relational elements, the feeling of realness may be fused with one other element (and not necessarily with two or more elements) of any order.*

The truth is, however, that will — like perception, recognition, and emotion — is very inadequately described by structural analysis alone, even when such analysis takes account of more than the sensational elements. For structural elements may be regarded as impersonal, whereas will can not even by abstraction masquerade as anything save a strictly personal attitude of self-activity. This self-activity includes the consciousness of the dependence of my object (other self or future event) on myself as willing, and this awareness of dependence-on-me is itself irreducible to impersonal terms.

II. 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.

* Chapter XI., p. 183; Appendix, Section III., § 34.
† With resident or with remote end.

This outline, it will be observed, concerns itself mainly with volition directed to the future. An attempt to distinguish the delicately varying non-temporal relations of self to other selves — command from aggression, or mere opposition from inventiveness — will be found in the next chapter.* 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 XIII., pp. 253 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 the active relation of myself to movement. 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 active relation of myself to an end. 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 volitional consciousness of a consciousness, precisely similar yet not identical, is impossible. A second distinction is the following: the inner volition contains, or else is accompanied by, what James calls the 'feeling of want,' the consciousness, affective and relational, of a lack or gap.

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."

A practical outcome of this study of will is the conviction that there are some situations in which will, in any of its

* Italics mine.

phases, is out of place. A parallel statement may be made about faith, or loyalty, and the following paragraphs enforce this conclusion concerning both these forms of self-activity. 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 attitudes, 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 on which lesser men deliberate.

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 (like every act preceded by an antecedent 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 antecedent 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 origin, 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 opposition. The next chapter will further develop these distinctions.

CHAPTER XIII

FAITH AND BELIEF AS RELATED TO WILL

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. That which seems real to me at the same time seems 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., pp. 231 f.

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 myself. 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 I, as active self, have a certain influence upon 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 the result on myself.

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 and of aggression, the reactions characteristic of trust and of belief are movements exclusively of approach: they are, as will appear, 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. 242.

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. Faith and Will as Social Attitudes

Both faith and will are most completely expressed in our social relations. As social attitudes they are so closely con-

nected that we may profitably consider both 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 contrast between the two forms of mental energy has been made repeatedly. Will, in its social reference, is the egoistic and imperious attitude, whereas faith is the adoptive and acknowledging attitude, not toward event or physical environment but toward other self or selves. In other words, will and faith have here a personal object — either a single individual self or a group of selves.

Innumerable are the phases, the aspects, the forms of these two great modes of activity, will and faith. The more important of them are suggested in the following summary, and in the comment upon it: —

Will (Imperious Attitude)	Faith (Loyalty) (Adoptive Attitude)
Aversion	Approach
Opposition (including Invention)	Imitation
Command	Obedience
Leadership	
Aggression	Self-sacrifice

Aggression and self-sacrifice are alike in that each seems to aim at the destruction of a self — either at that of the object self who is tyrannized over, subjugated, trampled on in aggressive will or at that of the subject self who destroys himself in the self-sacrifice of loyalty. At the other extreme are bare aversion and approach, and (more significant) opposition and imitation in which I assert and express either my difference from another self or my likeness to him. Imitation has been discussed in an earlier chapter as a form of social learning, under the two heads, physical and psychical, with special reference to impulsive, or mechanical, imitation.* Our present concern is with active, adoptive imitation, that is, with imitation as a form of loyalty; and at once the object of imitation appears in its completeness as neither idea nor movement, but rather as other self or as social group. Active imitation consists, indeed, 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

* Cf. Chapter V., pp. 96, 100 ff.

† *Century*, 1894.

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 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."

Contrasted with imitation, and of coördinate social sig-

nificance, are opposition, the negation of other selves through mere assertion of difference from them; and invention, the constructive expression of this difference through the creation of fresh combinations and new ideals. Unquestionably this tendency has been underrated, in consequence of the almost exclusive interest of the sociologists in the function of imitation. Yet 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 sometimes without effort to influence other people.

The inventor who intends to be imitated, who produces his novel results with specific design to be imitated, partakes of the character of the commander who sets up ideals and examples for others to follow or — more accurately — sets himself up to be followed. Similarly, the obedient disciple is an imitator in the fullest sense of that word: his imitation is neither mechanical, nor emotionally impulsive, but consists rather in an active recognition and acceptance of command.

Up to this point, the transitions from one form to another of will and faith have been wavering and shadowy. But the line which divides command and obedience from aggression and self-sacrifice is sharply drawn. For command is devoid of violence and is unaccompanied by scorn and anger; and obedience may be unmixed with pain. The aggressors are "the beaked and taloned graspers of the world"; whereas the commanders dominate and control, instead of attacking and despoiling.

The hope of the world, however, is with the leaders, not with the commanders of men. Leadership is a fusion of will with loyalty, of self-assertion with comradeship. The leader shares the experiences of his followers. He is no general directing the battle from a distant position, but a captain storming the fort at the head of his men; he is no 'boss' imperiously giving orders, but a fellow-worker as well as a guide. The distinction is one of crucial importance to society. Doubtless the great commanders, the Cæsars, the Napoleons, and the Bismarcks, have played a great rôle in the drama of the world's history — have determined the fate of nations and diverted the current of events. But the work of moulding permanent character, developing individuality, raising the level of civilization has been begun and remains to be done not by the commanders but by the leaders. For many centuries the great teachers have realized this and, like Socrates, have treated their followers not as disciples but as companions, or, like Jesus, have known them not as servants but as friends. But in political and in industrial life we are still in the grasp of the conception of society as constituted of masters and servants. When the great masters have learned to be leaders of men,

the next step in our social enfranchisement will have been taken.

We have so far considered will and faith in their different phases as distinct social attitudes. But it must already have appeared that both — the dominating assertiveness of will and the adoptive assertiveness of faith or loyalty — are essential aspects of any complete self. In other words, a normal self both obeys and commands, and every fully social individual assumes the dominating, inventive attitude as well as the imitating, acknowledging position. 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 without 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 readily be imitated. The inventor of machinery so complicated that the common man can not 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 Socrates, 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

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

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.

Not only invention and imitativeness but will and faith at every stage are united, though in varying proportions, in every normal self. Most of us, unhappily, 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.

CHAPTER XIV

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 being, that

is, to a being or beings regarded as greater than this human self, or than any of its fellows, and either conceived or treated as personal.[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

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. 249.

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.

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(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.

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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:

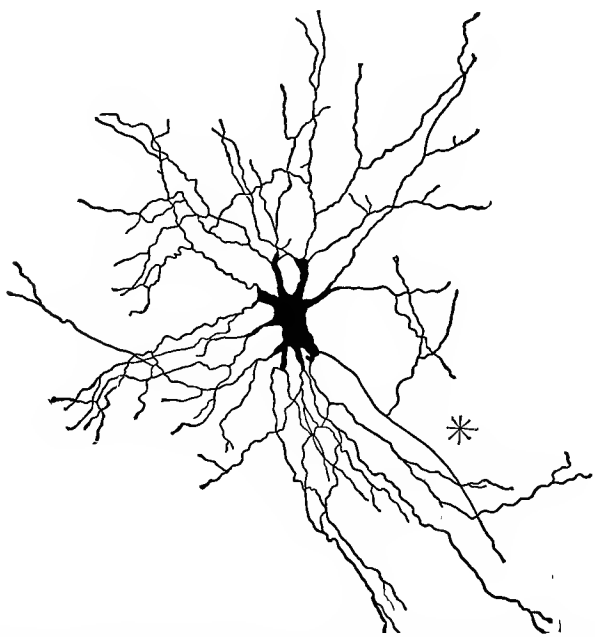

FIG. 6. — Motor cell of gray matter of cord. From human fetus. The asterisk (*) marks the axone; the other branches are dendrites. From W. H. Howell, "A Text-book of Physiology," Fig. 54 (after Lenhossek.)

(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." †

Cell-bodies are embedded in a spongy substance, the neuroglia. Masses in which these 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.

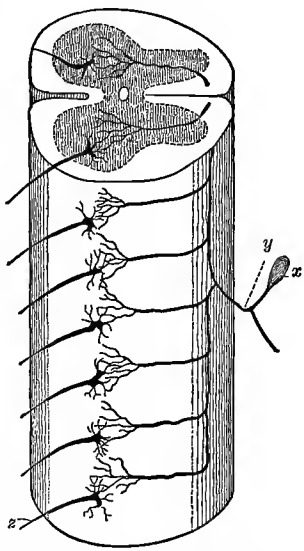

FIG. 7. — Schematic figure of the spinal cord. Posterior ganglion, *x;* afferent nerve, *y;* efferent nerve, *z*. From W. H. Howell, "A Text-book of Physiology," Fig. 62 (after Kölliker).

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-

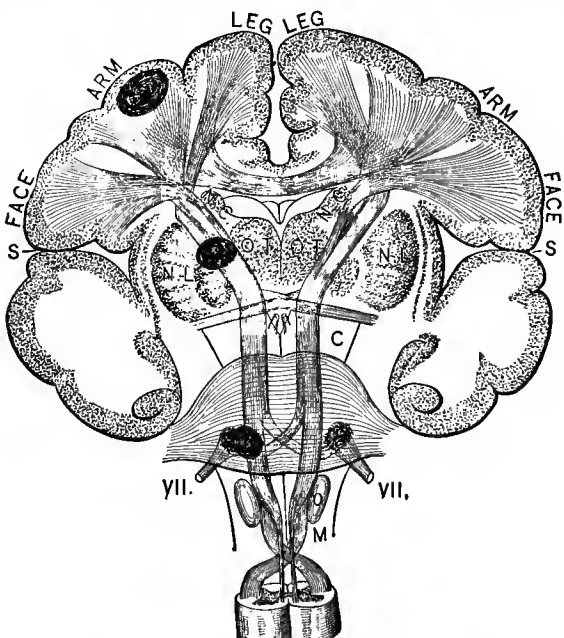

FIG. 8. — Schematic transverse section of the brain through the Rolandic region. *S*, Fissure of Sylvius; *N.C.* and *N.L.* (parts of a *corpus striatum*) and *O.T.* (optic thalamus), interior ganglia of the brain; *C*, one of the *crura cerebri* (bundles of up-and-down neurones); *M*, one side of the *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. The lower brain and the 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.)

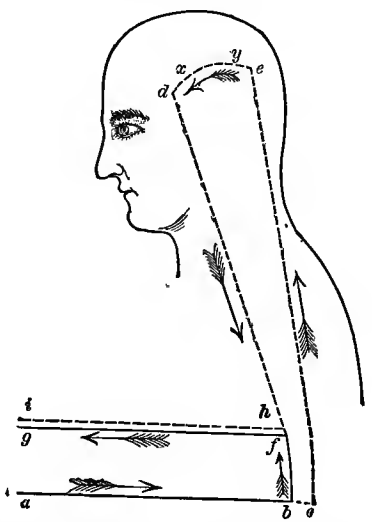

FIG. 9. — Schematic figure to illustrate reflex and ideo-motor movements. Adapted from W. James, "The Principles of Psychology," Fig. 4 (after Meynert).

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

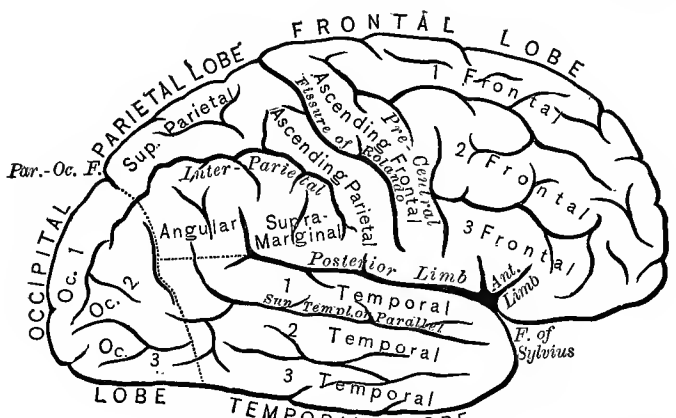

FIG. 10. — Outer surface of the right hemisphere. From M. Foster, "A Textbook of Physiology," Fig. 134.

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

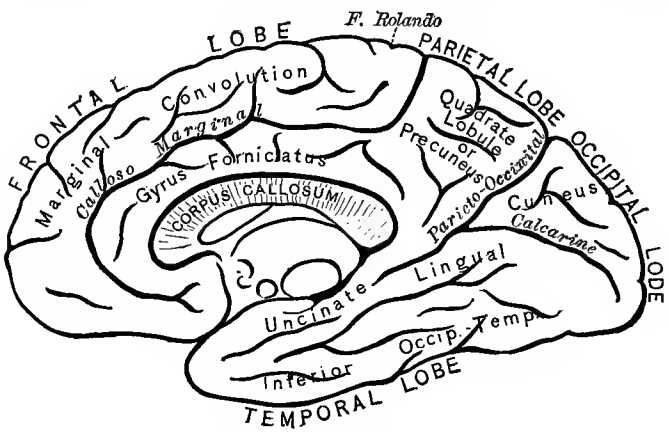

FIG. 11. — Median surface of the right hemisphere. From M. Foster, *op. cit.* Fig. 135.

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.*

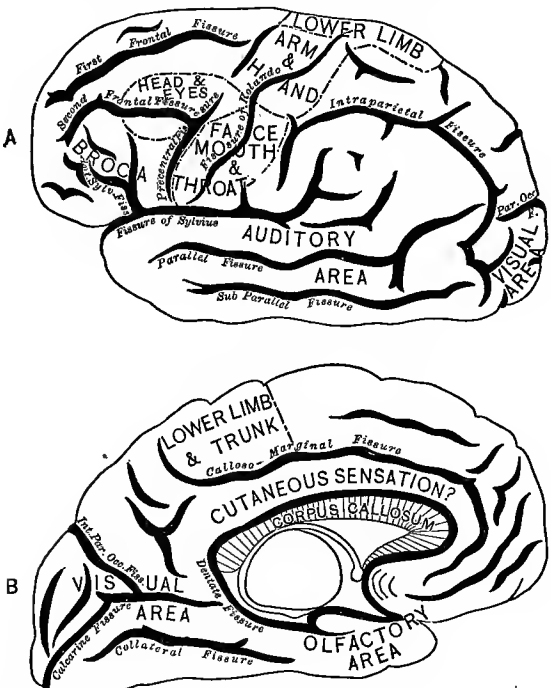

FIG. 12. — Figures representing the probable location of the chief motor and sensory areas of the cerebral hemispheres in man. *A*, outer surface. *B*, median surface. From W. H. Howell, "A Text-book of Physiology," Fig. 82 (taken from E. A. Schäfer, "Text-book of Physiology," Fig. 340).

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 which lies forward 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.

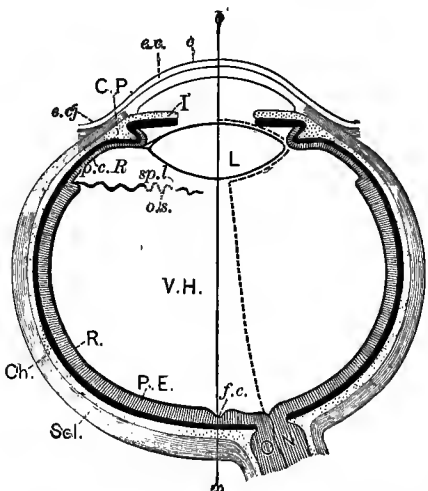

FIG. 13. — Diagrammatic outline of a horizontal section of the eye. From M. Foster, *op. cit.*, Fig. 139.

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;

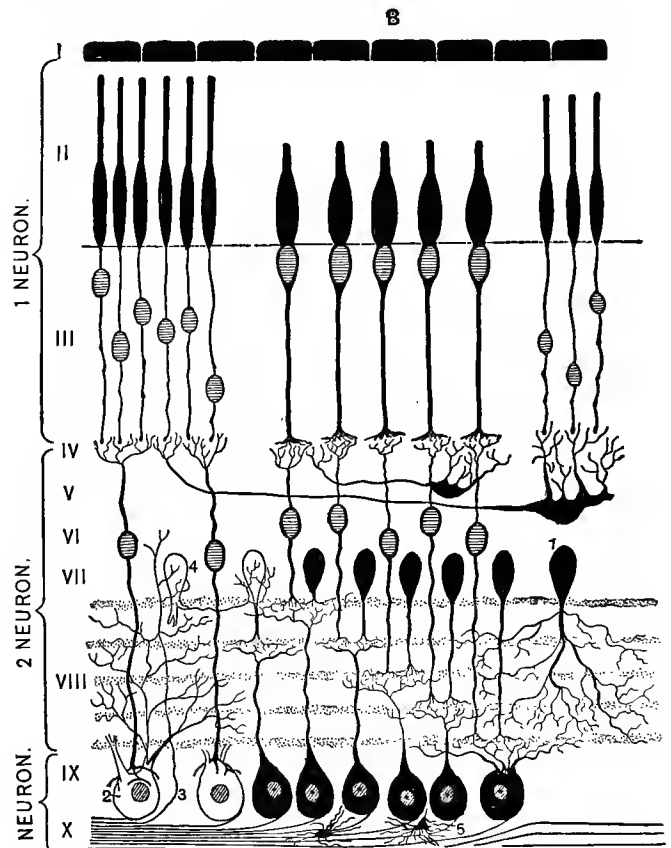

FIG. 14. — Schematic diagram of the structure of the human retina. From anterior (inside) to posterior (outside) of retina: I., Pigment layer; II., rod and cone layer; III., outer nuclear layer; IV., external plexiform layer; V., layer of horizontal cells; VI., layer of bipolar cells, inner nuclear; 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 possible 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 other 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 green. 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 small amount of light; (2) that 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. For criticism, cf. C. L. Franklin, *op. cit.* on p. 307; *et al.*

mixture of red and green lights occasions yellow not, as Hering implies, colorless-light sensation. On the contrary, the color-stimulus which, mixed with red light, produces a colorless-light sensation, is blue-green.

§ 13. The theory set forth in Chapter III. is that of Mrs. C. L. Franklin, with which that of von Kries is in partial agreement. Its main teachings are the following: (1) Sensations of color are due to the partial decomposition, or dissociation, of a photochemical substance in the retinal cones. In an early stage of its development this cone-substance is capable of two sorts of decomposition according as it is acted on by light of short or of long ether vibrations, occasioning sensations of blue and of yellow respectively. Later, " the yellow-producing constituent is in its turn broken up into two parts . . . that respond respectively to . . . red light and . . . green light." In this advanced stage, four kinds of partial decomposition are possible, one occasioning the sensation of blue, another resulting in the consciousness of red, a third conditioning the sensation of green, and a fourth, which occurs when yellow light or when red and green light together fall on the retina, conditioning the sensation of yellow. This last form of dissociation corresponds to the yellow-producing process in the more primitive form of the cone-substance. (2) A mixture of blue and yellow lights, or of blue, red, and green lights, totally decomposes the cone-substance and gives the sensation of colorless light. (3) Sensations of colorless light are conditioned also by the total decomposition of an undifferentiated photochemical substance in the rods of the retina which " goes to pieces all at once under the influence of light of any kind." The special advantages of this theory are these: First, it admits with Hering the psychical distinctness of the sensations of red, yellow, green, and blue, while yet, with Helmholtz, it explains the facts of color-mixture. Second, it readily explains the facts of peripheral and of twilight vision. For rods, not cones, 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.* (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 visual purple absorbs green rays — and, after green, blue rays — most readily; finally, the Purkinje phenomenon does not occur by excitation of the foveæ of normal and partially color-blind eyes which lack 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

* For experiment, cf. Sanford, 142.

† Von Kries u. Nagel, *Ztsch. f. Psych. u. Physiol. d. Sinnesorgane*, Vol. XXIII., p. 161. Cf. 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

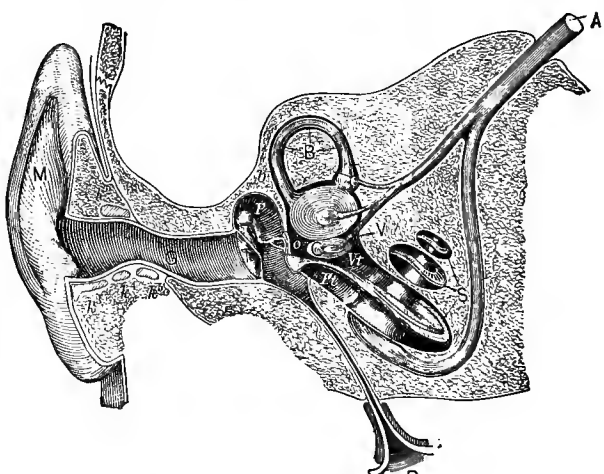

FIG. 15. — Diagrammatic section through the right ear. *A*, acoustic nerve; *B*, one semicircular canal; *S*, cochlea; *Vt, Scala vestibuli; Pt, Scala tympani.* For meaning of other symbols, see text. From H. N. Martin, "The Human Body," Fig. 143 (after Czermak).

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.

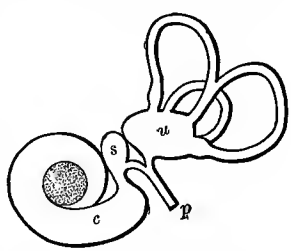

FIG. 16. — Schematic figure of the semicircular canals (to the right of the diagram). Utricle, *u*; saccule, *s*; cochlea, *c*. From J. R. Angell "Psychology," Fig. 44 (after McKendrick and Snodgrass).

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

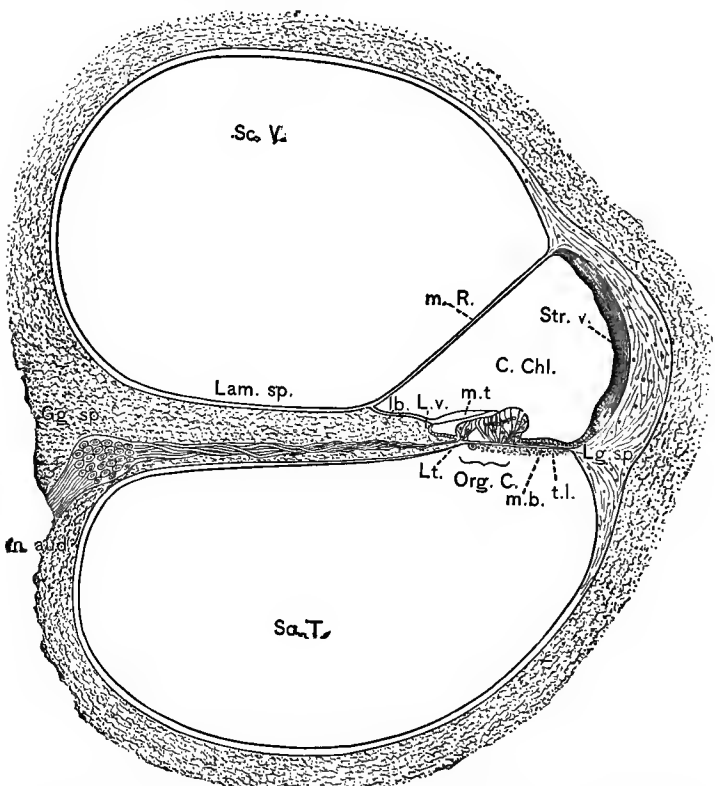

FIG. 17. — A transverse section of a circle of the cochlea. *Org. C.*, organ of Corti; *m.t.*, tectorial membrane. For meaning of other symbols, see text. From M. Foster, "A Textbook of Physiology," Fig. 180.

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 a projecting spiral shelf, made up of a bony part, the *lamina spiralis* (*Lam. sp.* in Figure 17), and of the basilar membrane (*m. b.*), divides the coil 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, where the *lamina spiralis*, or bony side of the partition, is narrower. 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

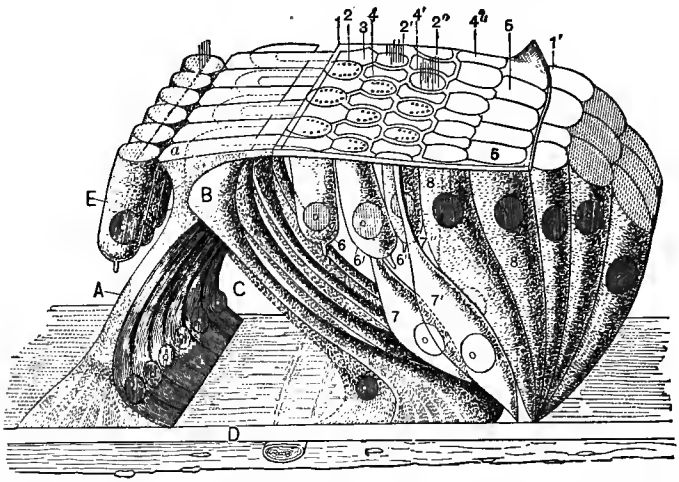

FIG. 18. — Diagrammatic view of the organ of Corti and the accessory structures. *A*, inner rods of Corti; *B*, outer rods of Corti; *C*, tunnel of Corti; *D*, basilar membrane; *E*, single row of inner hair cells; 6 ,6′, 6″, rows of outer hair cells; 7, 7′, supporting cells of Deiters. (There are supporting 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-hook 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.

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* 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.*

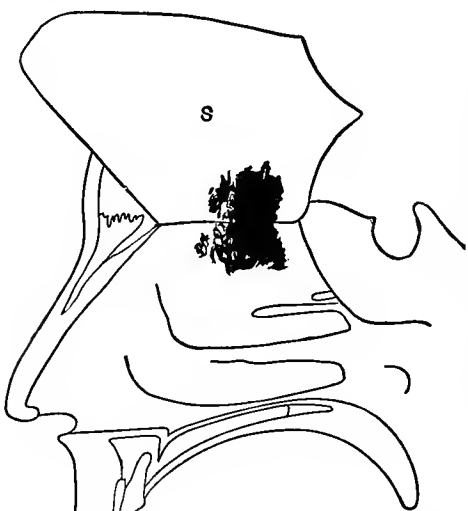

FIG. 19. — Schematic figure of the interior of the right nostril. *S* represents the septum, or partition between the nostrils as artificially turned upward. The shaded portion represents the olfactory membrane. From W. Nagel, "Handbuch der Physiologie des Menschen" Fig. 106 (after V. Brunn, taken from 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

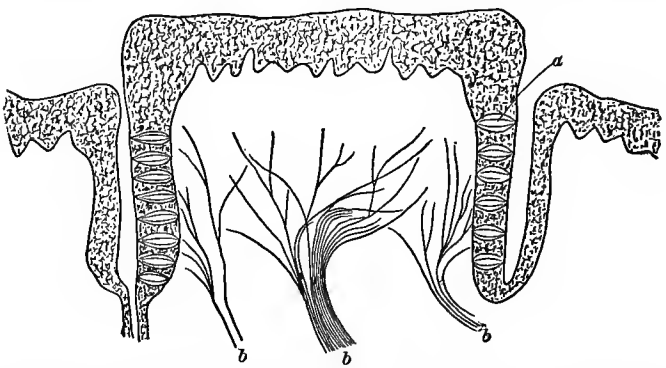

FIG. 20. — Section through the circumvallate papilla of a calf, greatly enlarged. Taste-hud, *a*; nerve-endings, *b*. From Th. W. Englemann, Fig. 270, in Stricker, "Lehre von den Geweben," Bd. II.

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.

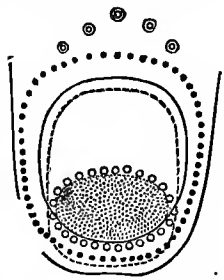

FIG. 21. — Schematic diagram of the surface of the tongue. The area surrounded by —— was insensitive, in the case tested, to sweet; that surrounded by o o o was insensitive to sour; that surrounded by . . . was insensitive to bitter; that surrounded by - - - was insensitive to salt. The shaded area was entirely insensitive. From W. Nagel, *op. cit.*, Fig. 114 (after Schreiber).

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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)

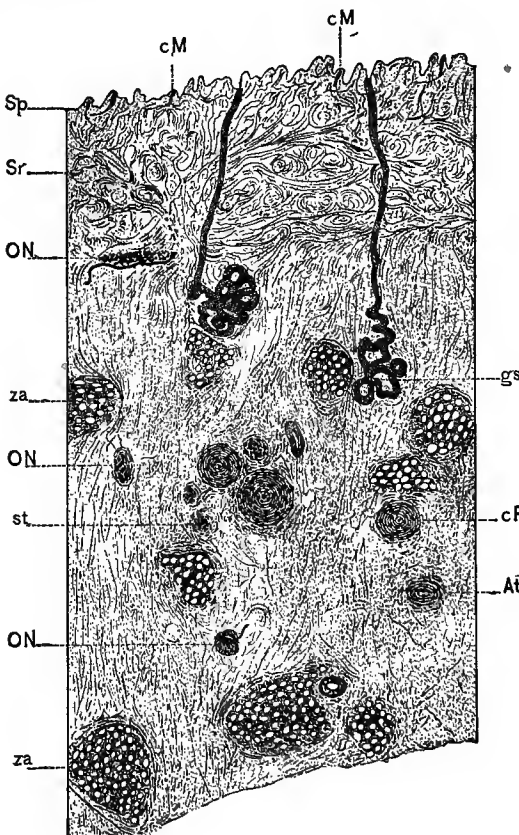

FIG. 22.—Semi-schematic section of the skin of the pulp of the fingers. *Sp*, papillary layer of the skin; *Sr*, reticular layer of the skin; *za*, fat; *cM*, Meissner's corpuscles; *cP*, transverse sections of Pacinian corpuscles; *ON*, Ruffini's endings; *At*, arteriole; *gs*, sudoriparous glands. 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.

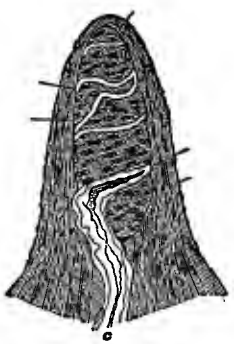

FIG. 23. — A dermic papilla containing tactile corpuscle (Meissner's). From H. A. Martin, "The Human Body," Fig. 152.

§ 27. The specific functions of these different structures are not certainly known. There is, however, much plausibility in the hypothesis of Von 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.

There is less certainty concerning the end-organs of pain, cold, and warmth. Von Frey teaches that the end-organs of cutaneous pain sensation are the so-called 'free' nerve-endings — that is to say, the endings of nerves without differentiated terminal organs — in the epidermis, or bloodless upper layer of the skin.* He reaches this conclusion on the ground that the relation of weight of stimulus to intensity of sensation proves that the pain end-organs lie above the pressure organs, a condition fulfilled by the free nerve-endings only.* An apparent objection to this theory is the fact that pain, with end-organs nearer the surface, is less easily excited than pressure. This difficulty is met by the supposition that, in the case of stimuli of moderate intensity and duration, the inelastic epidermis, in which are the free nerve-endings, simply transmits the stimulus to the lower-lying cutis, in which are the pressure organs. The fact that the warmth spots on the skin are so much less easily determined than the cold spots suggests the possible identification of organs of cold with the 'end-bulbs of Krause' and of warmth organs with the deeper-lying 'endings of Ruffini.' The excitation of cold spots by a stimulus above 45° centigrade gives the so-called 'paradoxical sensation' of cold.

Comparing the sensitive spots of the skin — the pressure spots, pain spots, warmth and cold spots which cover end-organs of these various sorts — we reach the following results: In spite of the differences in distribution, already noted,† the greater part of the skin may be said to contain pressure, pain, cold, and warmth spots. The pain spots are most frequent, though pain is less easily excited than pressure sensation. There are on the average at least 100 pain spots,‡ 25 pressure spots, 12 cold spots, and 2 warmth spots on a square centimeter of the skin. All the end-organs, except those of pain, seem to become adapted to long-continued stimulation: for example, we no longer notice the warmth

* For fuller discussion, cf. von Frey, cited below, "Über die Sinnesfunctionen," pp. 257 ff.

† Cf. pp. 56^3, 59^1.

‡ Cf. von Frey, *op. cit.*, p. 264, and Titchener, "Text-book," I., pp. 154, 147, 150.

of the room or the pressure of our clothes; but pain does not wear away while the stimulus persists, even though we grow relatively inattentive to it.

It should be added that recent experiments point to the existence of a second, previously undiscovered, cutaneous sensory apparatus. Phenomena which attend the healing, after cutting, of afferent cutaneous nerves indicate that accurately localized sensations (of light contact and of moderate cold and warmth, not of pain) occur independently of the sensations due to excitation of the end-organs just described.*

§ 28. In addition to the sense-organs in the skin, end-organs differing from these in external form which are yet (in all probability) modifications of essentially similar endings are found in the muscles and joints. These deeper-lying end-organs condition sensations of which the greater number, at least, seem to be of the same nature as cutaneous sensations: pressure, cold, warmth, and pain. Among these deeper-lying organs are the Pacinian corpuscles in the muscles and joints, to whose excitation are due the sensations, probably of pressure, following on the independent stimulation of muscle and of joint.† Strain-sensation, due to excitation of the tendons, very likely has as end-organs the so-called 'spindles of Golgi.'

Some psychologists have attributed to subcutaneous end-organs what they regard as the sensational consciousness of bodily position and of bodily movement — so-called 'static' ‡ and 'kinæsthetic'

* Cf. the writers cited in paragraph 3 of the Bibliography. This newly discovered 'epicritic' sensory mechanism is distinguished from the ordinary 'protopathic' system in that excitation of this 'epicritic' system is not punctiform. In other words, not specific areas of the skin but the whole surface seems sensitive to light contact, cold, and warmth. Furthermore the sensations due to excitation of the epicritic system (not those due to excitation of the protopathic apparatus) may be graded in intensity and accurately localized. The relation between these two systems of sensibility and the cutaneous end-organs, described in the text, has not been satisfactorily determined.

† On the excitation of joint-surfaces and muscles, cf. p. 52^2 above, and T., § 32.

‡ Cf. W. Nagel, "Handbuch," III., cited above, pp. 737 ff., and Ebbinghaus, Grundzüge, pp. 365 ff.

sensation. In the opinion of the writer of this book these are however, complex not simple experiences, perceptions not sensations. According to this view, the perception of bodily position includes along with pressure sensations due to supporting objects — chair, couch, or floor — a visual consciousness, perceptual or imagined, of the body. Where this visual consciousness is lacking, as when one wakes suddenly, there is a loss of consciousness of position. Similarly the consciousness of movement of the body is made up of the pressure consciousness due somewhat to muscular contraction but mainly to the movement of joint-surfaces on each other and supplemented by the visual consciousness of the body in successive positions.

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On the *consciousness of heat:* S. ALRUTZ, *Zeitschr. für Psychol.,* Bd. XLVII., 161 ff., 241 ff.; *Mind,* N.S., VI., 445 ff., VII., 141 ff.

On *sensations following nerve-division:* HEAD, RIVERS, and SHERREN, The Afferent Nervous System from a New Aspect, *Brain,* 1905, XXVIII., pp. 99 ff.; RIVERS, *Psychol. Bulletin,* 1908, V., pp. 48–49. RIVERS and HEAD, A Human Experiment in Nerve-division, *Brain,* 1908, XXXI., pp. 323 ff. S. I. FRANZ, Sensations following Nerve-division, *Journal of Comp. Neurology,* 1909, XIX., 107–123, 216–235.

On *sensations due to internal excitation:* GOLDSCHEIDER, *op. cit.,* II. W. NAGEL, in Nagel's Handbuch, III., 735 ff. SHERRINGTON, as cited above, 1002.

B. STRUCTURAL ELEMENTS AND PERSONAL ATTITUDES

§ 29. The *theory of elements of consciousness* which this book upholds is based on the conception of an 'element of consciousness,'

as a further unanalyzable result of a structural* analysis of consciousness — a distinguishable, though never separate, constituent of experience. Other criteria which have been proposed are 'independent variation' (cf. M. F. Washburn cited below) and absolute, atomic distinctness (cf. H. Münsterberg, "Grundzüge der Psychologie," Kap. XV., sec. 4). For defence of the conception of qualities, intensities, and extensities as 'attributes' of the sensation, regarded as element, cf. E. B. Talbot, *Philos. Review*, 1895, IV., pp. 154 ff.; for summary, cf. M. F. Washburn, *Philos. Review*, 1902, XI., pp. 445 ff.

§ 30. The conception of sensational intensity and extensity as elements of consciousness has been opposed on the ground that no physical and physiological conditions of intensity and extensity can be assigned. For detailed consideration of this objection, cf. *Psychological Review*, 1899, pp. 506 ff.

§ 31. Within the class of sensational elements, psychological method recognizes three subclasses, usually distinguished as qualities, intensities, and extensities. The fundamental ground for this division is the observed distinctness of these groups of elements, the fact that the experiences of hue, of pitch, and of taste seem, from one point of view, to belong together, and to be equally distinct from the experiences of brightness, of loudness, and of taste intensity, or from the consciousness of visual and auditory bigness. The experiences of intensity and of extensity are further distinguished on the ground of their capacity for being ordered in direct and simple sensational series. For amplification of this distinction, cf. the writer's "An Introduction to Psychology," second edition, 1905, pp. 43 ff., 105 ff., with citation, and Münsterberg, "Grundzüge," Kap. VIII., pp. 276 ff., 283 ff.

§ 32. For further discussion of sensational extensity, cf. Chapter IV., pp. 66 ff., and Appendix, Section IV., § 2, pp. 333 ff. For emphasis on the distinction between the elemental experience of extensity, or bigness, and the complex consciousness of position, cf. pp. 67 ff. It is still a moot question, even among psychologists who admit the elemental nature of visual and pressure extensity,

* For the meaning of this term, cf. pp. 14, 182, above.

whether we may be said to have a consciousness of extensity accompanying sounds, tastes, and other sensational qualities.

§ 33. Duration is often named along with quality, intensity, and extensity as a sensational element (or, in the older terminology, 'attribute of sensation'). But the consciousness of duration seems to be a complex rather than an elemental experience; and seems not even to form a necessary part of all sensational experience. It should be noted that this conclusion is not incompatible with the conviction that we have some sort of elemental consciousness of time. (Cf. pp. 85, 140 f., 231.)

§ 34. This book recognizes three sorts of elemental experience: sensational, attributive, relational. These classes are distinguished as follows. Sensational elements seem to be present in every conscious experience. However abstract a thought or however impassioned an emotion, always it seems to include sensational elements, the consciousness, for example, of warmth or of cold, of quickened or of retarded breathing.* Corresponding with every sensational element, there is some assignable change, both in an area of the brain-cortex and in a peripheral nerve end-organ. For almost every sensational element there is a distinct physical condition. Thus, the rate of ether-wave vibration conditions the consciousness of color-quality, and the amplitude of the wave the consciousness of color-intensity.

Contrasted with the ever-present, sensational elements, correlated with definite physical and peripheral physiological phenomena, are two classes of elements of consciousness, the attributive and the relational. Within the former group this book includes the affective consciousness of pleasantness and unpleasantness, the consciousness of realness, and (possibly) another element, 'clearness,' or 'attended-to-ness.' Among simple relational experiences it has named the consciousness of 'one' of 'many' of 'like' of 'different' of 'more' of 'less' and the like. The following statements may be made about elements of both these classes. (1) It is at least probable that there are experiences which contain neither attrib-

* Cf. for consideration of a different view, p. 364, below.

utive nor relational elements, which are, in a word, purely sensational. Certainly we may have inattentive, indifferent consciousness untinged with the feeling of reality; and it is likely that the very primitive or very sleepy consciousness contains no consciousness of unification, of distinction, or of connection. (2) There are obviously no definite physical modes of stimulation and thus no end-organs of the attributive and the relational consciousness. (3) From the first of these characters it follows that an attributive or relational element is reflectively known as, so to speak, belonging to, attached to, another element or constituent of the complex experience of the given moment. And the relational is distinguished from the attributive element as belonging to at least two such other elements or factors. Thus, I am always conscious of a pleasant something — taste or familiarity; I attend to a color, I hold a sound as real. In other words, the attributive experiences are somehow 'attached to' sensational consciousness. Similarly, we are conscious of the likeness or unlikeness of one color or pleasure or relation to another — that is, the relational consciousness is, as it were, subordinated to two other elemental experiences.

These criteria of the elements of consciousness are, one and all, reflectively observed characters, facts later 'known about' the elements of consciousness. This statement is of importance as guarding against the charge of treating the characters of independence, attachedness, and the like, as if they were *constituents* of the elements of consciousness.

TABLE OF ELEMENTS OF CONSCIOUSNESS

CLASSES OF SENSATIONAL ELEMENTS

A. From External Stimulus

(*Psychic nature*)			(*Organ stimulated*)		(*Physical stimulus*)
I. Visual, or	(*Quality*)	(*Intensity*) (*Extensity*)	(*Peripheral*)	(*Central*) *Occip. Lobe*	
a. 1. Color		— —	*Retinal cones*	"	Ether-waves Leogth of waves
2. Colorless light		— —	*Retinal rods*	"	"
b. Brightness			" (degree of excitation)	" (degree of excitation)	Amplitude of waves
c. Bigness			" (extent of excitation)	" (number of cells excited)	Number of simultaneous waves

II. Auditory, of	*Basilar membrane of cochlea*	*Temporal lobe* (external surface)	Air-waves
a. 1. Pitch	"	"	Length of waves
2. Noise-quality	"	"	"
b. Loudness	" (degree of excitation)	" (degree of excitation)	Amplitude of waves
c. Volume	" (number of fibres excited)	" (number of cells excited)	Complexity of waves
III. Gustatory, of	*Taste-buds (?) on tongue and palate*	*Temporal lobe* (median surface)	Liquid Chemical Stimulus
a. Taste-quality	"	"	Mode of stimulus
b. Taste-intensity	" (degree of excitation)	" (degree of excitation)	Degree of stimulus
c. Taste-extensity (?)	" (extent of excitation)	" (number of cells excited)	Amount of stimulus
IV. Olfactory, of	*End-organs in peak of nose*	*Temporal lobe* (median)	Gaseous Chemical Stimulus
a. Smell-quality	"	"	Mode of stimulus
b. Smell-intensity	" (degree of excitation)	" (degree of excitation)	Degree of stimulus
c. Smell-extensity (?)	" (extent of excitation)	" (number of cells excited)	Amount of stimulus

B. Either from External or from Internal Stimulus

V. Pressure[1]	*Hair-bulbs, Tactile corpuscles, Pacinian corpuscles*	*Rolandic area*[2]	Mechanical Stimulus
VI. Pain[1]	*Free nerve endings, in cutis, etc.*	*Rolandic area*[2]	Mechanical Thermal Chemical Electrical
VII. Temperature, of		*Rolandic area*[2]	Thermal Stimulus
a. Cold[1]	*End-bulbs of Krause*	"	"
b. Warmth[1]	*End-organs of Ruffini*	"	"
c. Hotness[1] (?)		"	"

C. From Internal Stimulus Only

VIII. Of Strain (?)[1]	*End-organs in tendons*	*Rolandic area*[2]	Mechanical Stimulus by external weight or internal pull

CLASSES OF ATTRIBUTIVE ELEMENTS

I. Affective Elements: —

a. Pleasure

b. Displeasure (Consciousness of unpleasantness)

II. Attention

III. Consciousness of Realness

[1] The specific mention of quality, intensity, and (probable) extensity is here omitted.
[2] Or else the median *gyrus fornicatus*. Cf. p. 296, above.

PARTIAL ENUMERATION OF RELATIONAL ELEMENTS

CONSCIOUSNESS OF
One, more-than-one (many);
More, less;
Like, different;
Connected, opposed; *etc.*

A reference to the 'personal attitudes,' as related to the 'structural elements' is not out of place at this point. The following enumeration does not, however, claim to be either definitive or complete: —

PARTIAL ENUMERATION OF PERSONAL ATTITUDES

I. (Unsympathetic; either social or non-social)
Receptiveness and Activity
Attention (Egoistic and Altruistic)
Individualization

II. Sympathy (always social).
a. Non-emotional.
b. Emotional.

The receptive attitude characterizes perception, memory, and emotion, whereas will and faith are active; attention is everywhere manifest, and the contrast between egoism and altruism (attention to myself and to my object, in particular to my personal object,) is well illustrated by the opposition of egoistic to altruistic emotion and by the distinction between will and faith; the particularly individualizing experiences are recognition, emotion, will, and faith. As has been shown, also, any volition, recognition, or emotion is social when it has a personal object, but the sympathetic experience is always social and has a two-fold object; thus, in perception and in sympathetic emotion my objects are another self, or selves, and the object common to us both.

The distinction, as stated in the body of this book, between these basal personal attitudes and the structural elements is the following: the structural elements may be (though they need

not be) impersonally regarded—one may arbitrarily leave the self out of account and consider sensations of blue and red, feelings of pleasantness and unpleasantness, experiences of likeness and connectedness without reference to any self or experiencer. A second difference, frequent if not invariable, seems to consist herein that the structural elements are more readily 'externalized,' in the sense of being regarded as parallel with the qualities of objects supposed to exist independent of me. So we speak of green leaves as well as of the visual quality, green, of pleasant food as well as of the pleasantness of eating, of similarity between objects as well as of feelings of similarity. It is possible, also, to distinguish between the sensational (or substantive) structural elements, on the one hand, and, on the other, the attributive and relational elements, on the ground that the sensational elements are more apt to be externalized.

A final comment is the following: the personal attitudes are in no sense a mere reduplication of the structural elements. Thus, it is all but universally admitted that there is no volition-element which corresponds with the individualizing activity of will; and it is at least an open question whether we can distinguish any structural element of attended-to-ness, or clearness — in other words, whether attention can be considered impersonal.

C. The Psychophysical Law

§ 35. The psychophysical law formulates a well-known relation between physical stimulation and sensational consciousness: the more intense a stimulus to sensation the more it must be altered in order that the accompanying consciousness may vary. If, for example, I am carrying a quarter pound of tea I shall feel the weight of an added ounce, whereas the same ounce, if it were added to a pound or two-pound package, would be followed by no consciousness of additional weight. Similarly, in a quiet room I hear a fly's buzzing which I should not hear in a whirring factory. Psychological experimenting, especially in the early days, was largely concerned with the verification and the application of this law. The general outcome of it is the follow-

ing: to obtain a series of sensational intensities, just perceptibly different from each other, the series of physical stimuli must differ, one from the other, by a certain definite proportion. The proportion varies with the form of stimulus: the degree or sound stimulus must increase by one-third, of gaseous olfactory stimulus by about one-fourth, of mechanical surface stimulus by one-twentieth, of mechanical pull by one-fortieth, and of light stimulus by one one-hundredth. For example, if one can just tell the difference between weights of one hundred and one hundred and five grams applied to the ends of the fingers, one will not be able to distinguish weights of two hundred and two hundred and five grams, but will barely discriminate weights of two hundred and two hundred and ten.

SECTION IV

§ 1. On the negative character of fusion, cf. C. S. Myers, *op. cit.*, pp. 6–7. On the difficulty of analysis in fusion, cf. Titchener, "Experimental Psychology, Qualitative, Instructor's Manual," § 45; Külpe, *op. cit.*, § 42 ff.

THE CONSCIOUSNESS OF SPACE

a. The Extensity Consciousness

§ 2. The teaching of this book, that there is an elemental consciousness of extensity, accords with the prevailing doctrine of contemporary psychology. It has been disputed, none the less, by acute psychologists who urge that the consciousness of extensity is no distinctive and elemental experience but rather a fusion in which the consciousness of eye or hand movements predominates. This account (the empiricist theory, as it is called) of the extensity consciousness is based mainly on two facts, abundantly proved: (1) that the newly born and those recently recovered from congenital blindness are unable rightly to estimate distances and to compare shapes; and (2) that our consciousness of form and of position includes the consciousness of eye and of hand movements. But these admitted facts do not disprove the occurrence of an elementary extensity consciousness. They prove that the space consciousness is a complex, including consciousness of movement; and that the capacity to measure and to compare forms and distances grows with experience. In other words, the empiricists prove that the consciousness of space is *more than* an elemental extensity experience, not that the consciousness of space is devoid of an elemental extensity consciousness.

The truth is that the empiricist theory is intended to oppose the so-called nativistic doctrine — the assertion that we are born with a ready-made consciousness of space. Against such a view

the arguments of the empiricists do hold. But it is not proper to confound the 'nativistic' teaching about the time of the earliest space consciousness with the 'sensationalist' doctrine of an extensity element. For bibliography, cf. M. W. Calkins, "An Introduction to Psychology," pp. 495, 496; and add on the sensationalist side, Ebbinghaus, Grundzüge, pp. 422 ff.; Titchener, "Text-book," I., 1909, § 12; S. Witasek, " Grundlinien der Psychologie," 1908, p. 187.

b. The Consciousness of Apartness

§ 3. On the consciousness of apartness, cf. especially, Ebbinghaus, *op. cit.*, 436–437, and Lipps, cited by Ebbinghaus, p. 431. The doctrine of Chapter IV. differs from that of Lipps and Ebbinghaus in regarding the consciousness of apartness not as elemental but as fusion of the sensational consciousness of extension with the relational experience of plurality ('more-than-one-ness'). Ebbinghaus tends to confuse this elemental but relational consciousness with the more complex and partly sensational experience of apartness.

Von Frey has shown by experiment that successive excitation of end-organs of pressure lying side by side, however close to each other, gives rise to distinguishable pressure sensations; but that the pressures thus distinguished are not always localized, either correctly or incorrectly. Thus, a subject may recognize two stimuli on his wrist, but may be unable to tell whether one is above or beside the other. Von Frey inclines to the belief that the basis of distinction between these sensations must be a difference in pressure quality (*ein qualitatives Merkzeichen*); but it is not improbable that the two sensations differ in intensity or in extensity, rather than in quality.*

c. Local Signs

§ 4. Besides being able to localize excitations from two stimuli everybody can localize fairly well the excitation from a single

* Von Frey und Metzner, "Die Raumschwelle der Haut bei Successivreizung," *Zeitschr. für Psychol. u. Physiol.*, Bd. 29, 161 ff., esp. 178 ff.

stimulus applied to the skin. If I sit blindfolded and some one touch me with pencil point on forehead, hand, or chest, and if I am then required myself to touch the point of stimulation, I shall succeed approximately, although not without errors. And I shall be able to describe in words the place of contact. Evidently, this consciousness of the point of contact presupposes the consciousness of the body as a whole. The problem is to explain why the stimulation of a single point of the skin should excite the far more complex consciousness of the body as a whole, or that of a region of the body. Since the time of Lotze, that character or accompaniment of a tactual sensation through which it is referred to one part or another of the body has been called the tactual local sign. Similarly, the character of a visual sensation through which it is 'referred' to one part or another of the field of vision is called the visual local sign.

There are two theories of the local sign. (1) According to the first, or kinæsthetic, theory, suggested by Lotze, the local sign of either a visual or a pressure sensation is the consciousness (perception or imagination) of an habitual reflex movement of eye or of hand. (Such consciousness of movement may be supplemented by a concrete visual image of the part of the body stimulated, or by a verbal image, as of the word 'forehead,' 'arm.') The local sign of a visual sensation is the eye movement necessary to secure excitation of the fovea by the stimulating object. The local sign of a pressure sensation differs with the portion of the body excited — it may be, for example, the imagination of the movement by which a pencil, touching the wrist, slides toward the fingers.

According to (2) the other view, which may be called the element-theory, there is in every sensation an immediately realized, unspatial character due to the specific position of the bodily structures which are excited — due, for example, to the excitation of more or less closely crowded skin end-organs or retinal structures. This unnamed character * is to be confused neither with the consciousness of color or of pressure, nor with the experience of visual

* Cf. Von Frey and Metzner, quoted, p. 335, above.

or of pressure intensity and extensity. For all these may remain unchanged while yet the position is known to vary.*

The two accounts of the local sign differ therefore in the following way. The kinæsthetic theory conceives the local sign as associated perception or imagination of movement; the 'nativistic' or elemental theory conceives it as an indescribable element of the sensation. But both agree in the important negative teaching that the local sign, because it is the character of a single sensation, is not itself a consciousness of place. For the consciousness of place, or position, is a consciousness of apartness — that is, of more-than-one-ness. It cannot then be a constituent either of the consciousness of stimulation of one skin-point, or of the consciousness of any one point in the field of vision. In the words of James: "although a feeling of . . . bigness may, a feeling of place cannot possibly, form an immanent element in any single sensation." †

d. Visual Geometrical Illusions

§ 5. The classification and explanation of the geometrical illusions is a topic at once too technical and too unsettled for detailed discussion in this book. Visual space illusions may roughly be grouped as (1) illusions of size, best illustrated by the Müller-Lyer figure in which the line *ab*, though objectively equal to *cb*, appears longer; and (2) illusions of direction. To the latter class belong (*a*) the two-dimensional illusions illustrated by the Zöllner figure, in which the lines *ab* and *cd*, though parallel each with *ef*, yet seem to diverge from it in opposite directions, ‡ and by the Poggendorf illusion,

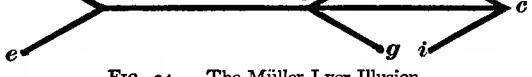

FIG. 24. — The Müller-Lyer Illusion.

* Cf. E. Hering, and C. S. Myers, *op. cit.*, 238 ff., with bibliography, p. 242. In favor of this view are urged (1) the alleged testimony of introspection; (2) the fact that localization occurs so soon after congenital blindness that there has been no time for setting up habitual eye movements.

† "The Principles of Psychology," Vol. II., p. 154, end.

‡ Cf. p. 72, above, for a variant of this figure.

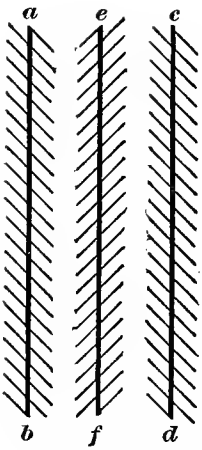

FIG. 25. — The Zöllner Illusion.

in which the short line *cd*, though really a continuation of *ab*, seems displaced downward; and (*b*) the three-dimensional illusions of perspective, of which the example best known is Schröder's figure. This seems to represent, especially if *c* be fixated, the upper side of a staircase, at other times — more readily if *b* be fixated — the under side of the same stairs.

The types of explanation most frequently applied to these illusions are either in terms of perception or in terms of attention. To the first group belong the following theories: * —

(1) The figures are explained as illusions of reversible perspective. It is pointed out that the Schröder illusion changes according as the line *ab* seems nearer or farther from the observer. Such an explanation, while it obviously holds in some cases, seems artificial as applied to other illusions. In case of the Müller-Lyer illusion, for example (Figure 24), it would suppose that the longer line appears nearer the observer; but, as a matter of fact, the line *ab* seldom if ever seems nearer than *cd*. Carefully scrutinized, also, this explanation through reversible perspective virtually reduces to one or other of the remaining explanations, for the consciousness of perspective, or distance, is either identical with the con-

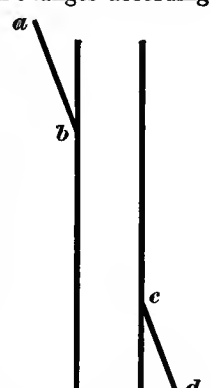

FIG. 26. — The Poggendorf Illusion.

* For summary of facts, and brief discussion of theories: Sanford, *op. cit.*, 1898, Chapter VII., pp. 212 ff.; Titchener, Experimental Psychology, Qualitative, Teachers' Manual, 1901, pp. 303 ff. (Cf. especially bibliography, pp. 305 ff.) Cf. also Ebbinghaus, Grundzüdge, 2ter Band, 1te Lieferung, 1908, pp. 51 ff.

sciousness of movement or else is characterized by some special depth element.*

(2) The second perceptual theory of these illusions offers different accounts of different illusions, but these all agree in explaining the illusions not through eye movements but through certain innate retinal factors.†

(3) The third theory explains the illusions as due to eye movements.‡ In its earlier form this theory supposed that corresponding, point by point, with the peripheral changes due to our

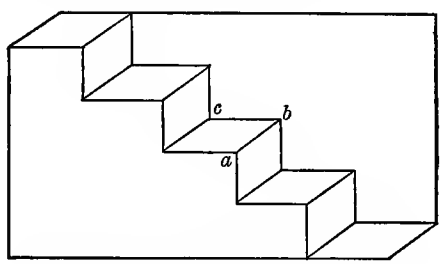

FIG. 27. — Schröder's Stair Figure.

eye movements perceptions of these movements occur, and that accordingly these spatial illusions are the consciousness of actual movements: that the line *cb*, for example, in Figure 24, seems shorter than *ab* because the eye actually executes a shorter movement. In this extreme form the eye-movement theory is, however,

* Cf. p. 341, below. Ebbinghaus groups this with the Lipps theory (cf. footnote, next but one) as association theory.

† For details, cf. E. Hering, Beiträge zur Physiologie, Heft 1, 1861; also Myers, *op. cit.*, pp. 304, 298, 296.

‡ The enumeration of these three types of explanation leaves out of account not only many detail-explanations and all forms of the explanation of the illusions as mainly phenomena of attention, but the systematic doctrine of Lipps ("Raumaesthetik u. geometrisch. optische Täuschungen," 1897), based on the view that we regard every figure as a sort of personified combination of opposing mechanical forces.

experimentally disproved by the experiments of Stratton,* Dodge,† Judd, ‡ and others. These experimenters have photographed the actual eye movements made during observation of different forms, and have shown that we do not have an exact consciousness of the movements actually performed by our eyes. For, in the first place, as any ordinary observation of a moving eye confirms, the eye invariably makes a jerky movement in passing slowly over the field of vision, and yet we are totally unconscious of these pauses in the apparently continuous movements of the eye. And, in particular, the movements of our eyes in regarding such figures as that of Müller-Lyer are not of the sort which, on this theory, are demanded. It simply is not true that, in looking at Figure 24, I am conscious of my eyes as following the outward sweep of the lines *ad*, *ae*, *bf*, *bg*, and that thus I overestimate *ab*, whereas I underestimate *cb* because my eye movements are arrested by the inward turn of *ch*, *ci*, *bf*, and *bg*. For experiments have shown cases of the Müller-Lyer illusion in which there were no 'frequent or marked modifications of the eye movements' in overestimating *ab*, and in which a short movement in looking at *cb* was supplemented by 'a secondary movement which . . . carries the eye to the true extremity of the underestimated figure.'§ Experiments on the Zöllner illusion show that for three out of four subjects the eyes were deflected in a direction opposite to that of the illusion.‖

Evidently the theory that the eye movements vary precisely with the illusion and that the illusion is itself a consciousness of definite eye movements must be abandoned. Yet, none the less, the Yale experiments show a parallelism, though irregular and

* Wundt's *Philosophische Studien*, XX., p. 336, and *Psychol. Review*, 1906, pp. 82 ff.

† "Five Types of Eye Movement," *Journal of Physiology*, 1903, VIII., pp. 307–329.

‡ Cf. below.

§ C. H. Judd, "The Müller-Lyer Illusion," *Yale Psychological Studies*, 1905, N.S., Vol. I., p. 79[4].

‖ "The Zöllner Illusion," Judd and Courten, *ibid.*, p. 136.

incomplete, of eye movements and illusion.* The writer of this book accordingly holds it probable that (1) some more or less vague consciousness of eye movements is a constituent not only of our ordinary space consciousness but of this consciousness of illusions; that (2) it is impossible that specific illusions can be explained by precisely corresponding eye movements; that (3) we must therefore suppose a characteristic, but so far undescribed, cortical change produced by the eye movements and in part, at least, conditioning the illusion.† It must, however, be admitted that so general a conclusion leaves almost unanswered the special problems raised by these geometrical illusions. And it well may be that the illusions are explicable rather in terms of attending and of relating than in terms of sensation, whether retinal or motor. ‡

e. 1. *The Nature of the Consciousness of Depth*

§ 6. Hering, James, and Stumpf are the main upholders of the doctrine that we are immediately and elementally conscious of depth as distinguished from surface. Cf. Hering, *Beiträge zur Physiologie*, V., and Hermann's *Handbuch d. Physiol.*, III., pp. 572 ff.; Stumpf, "Die Ursprung der Raumvorstellung," 1873, Chapter II.; James, *op. cit.*, II., pp. 212 ff. Most contemporary psychologists, however, though they admit an elemental factor in

* *Yale Psychological Studies*, 1905, N.S., I., pp. 81^2, 111^2, $135.^3$

† Professor Judd's conclusion is stated in these words: "Whatever sensory impulses can be brought into coördination and equilibrium by a single act will be grouped together. Whatever sensory impulses must be responded to by a succession of acts will be grouped apart." (*Yale Psychol. Studies*, *op. cit.*, p. 225^2.)

‡ For explanation in terms of attention, cf. R. Schumann, *Beiträge, Zeitschr. für Psychol.*, Bd. 23, 1 ff., Bd. 24, 1 ff., Bd. 30, 241 ff., 321 ff., and Ebbinghaus, cited on p. 338, pp. 69, 79, 83, *et al.* For explanation in terms of 'analytic' and 'synthetic' apprehension, cf. Benussi, "Zur Psychologie des Gestalterfassens," in Meinong's "Untersuchungen zur Gegenstandstheorie," 1904, pp. 303 ff. For summary of these theories and for a somewhat similar explanation of the tactual illusions of filled and unfilled space, cf. Helen Dodd Cook, "Die taktile Schätzung von ausgefüllten und leeren Strecken," *Archiv für die gesamte Psychol.*, 1910, XVI., esp. pp. 539 ff.

all space consciousness, yet teach in agreement with the doctrine of this book that the consciousness of distance, or depth, is complex, including, along with the elemental consciousness of mere bigness or extensity, other elements and, in particular, either a consciousness of movements or, at any rate, a consciousness due to movements. Cf. Ebbinghaus, *op. cit.*, § 38, pp. 423 ff., and Lipps there cited.

2. *The Conditions of the Depth Consciousness*

(*a*) Disparate Images

§ 7. It is certain that the occurrence of disparate retinal images — that is, of right and left eye images which differ slightly — is an occasion of our consciousness of depth; for otherwise the stereoscopic illusion could not exist. Hering holds, indeed, that the occurrence of these disparate images is the sole and sufficient explanation of the visual depth consciousness. An apparently decisive objection to this view is the fact that depth is perceived in monocular vision when the occurrence of more than one retinal image is entirely excluded.*

(*b*) Accommodation

§ 8. The monocular visual perception of depth is probably conditioned by accommodation, since it occurs when one eye is closed so that only a single retinal image can be formed. Yet (1) as Baird has shown, some individuals seem to lack, or nearly to lack, the monocular consciousness of depth.† And (2) as Judd has proved, by photographing eye movements, parallel movements of the closed eye are present in monocular vision: in other words, accommodation does not occur alone, but is ac-

* Cf. Baird, cited below, p. 192.

† For the statement and criticism of a theory, that of F. Hillebrand, which denies the influence on the depth consciousness of sensations due to accommodation, cf. J. W. Baird, "The Influence of Accommodation and Convergence upon the Perception of Depth." *Amer. Jour. of Psychol.*, 1903, XIV., pp. 150–200, esp., pp. 163, 165, 192, 200.

companied by binocular eye movements.* Finally (3) all experimenters agree that, in monocular vision, the distance of far objects is less accurately measured than that of near objects or, in technical terms, that "the limens of approach are uniformly less than those of recession." Baird explains this phenomenon by the supposition that the relaxation of the ciliary muscle, when one regards far objects, occasions fainter tactual-motor sensations than the tension of the muscle when one accommodates for near objects.†

(*c*) Convergence

§ 9. Changes in the convergence of the eyeballs, like disparate images, are invariable correlates of the binocular consciousness of depth and distance. There is, however, a marked difference in the two situations. In perceiving depth one obviously cannot at the same time perceive the retinal images, whereas one always perceives, however inattentively, the changes in convergence of the eyes. If I hold my two forefingers before my eyes, approximately in the line of clearest vision, the one about a foot and the other about two feet away from me, and if then I look from one to the other I am distinctly conscious of the movements which are made as the eyeballs converge less or diverge more. Not merely, then, are convergence and divergence conditions of depth perception, but the consciousness of the greater or less convergence is a constituent of the depth or distance consciousness.

f. Auditory Localization

§ 10. A discussion of auditory localization must take account of its physical and physiological conditions and of its psychic nature. Such a discussion may profitably be based on an enumeration of the more important facts of auditory localization, as established by experiment. These are the following: —

1. Monaural localization, that is, localization with one ear

* Cf. *Yale Psychological Studies*, 1907, pp. 396–397.

† *Op. cit.*, pp. 196–197. Hillebrand had urged the phenomenon as proof that accommodation is not a condition of monocular depth consciousness.

when the other is deaf or else artificially closed, is far less accurate than binaural localization.*

2. A sound from the right is never confused with a sound from the left. This is the outcome of many thousand tests.*

3. (*a*) Sounds given in the median plane, that is, from front to back, are constantly confused. All investigators agree on this point. Yet median plane localization is capable of great improvement.† (*b*) Many other pairs of 'confusion points' occur, symmetrically situated with reference to the point at which the monaural stimulus is most intense.‡

4. Discrimination of the direction of *two* sounds is keener when the sounds are given near the front and near the back (not, however, in the exact front or back) than when given at the sides.§

5. Equidistant sounds seem to vary both in intensity and in distance with different positions. In particular, a sound at the side (near the 'aural axis') seems louder and nearer than a sound in another position.||

6. (*a*) Sounds seem to vary in timbre and even in pitch with different positions. (*b*) Complex tones — the tones of the voice, for example — are better localized than simple tones, such as those of a tuning-fork.¶

On these results of experimentation a consideration of the *physical* conditions of localization has now to be based. Several inferences from the facts may be made with some assurance. First, *binaural localization depends either* (*a*) *on the intensity, or* (*b*) *on the pitch and timbre, of sound stimuli.* (*a*) A sound stimulus affects the right and left ear differently according as it is situated more to the right or more to the left. Localization is due in large part to this 'binaural ratio of intensities.' This is argued from the facts (1 and 4, in the enumeration just given) that binaural localiza-

* All investigators. On paragraph 2, cf. especially, Matsumoto, and Preyer, p. 568. The authors named in the footnotes of this section are cited in full on p. 349, below.

† Pierce, pp. 85 ff.

‡ Cf. Starch, 1905, p. 26.

§ Cf. especially Bloch, pp. 29 ff.; Starch, 1905.

|| Starch, 1907, pp. 2 ff.; Gamble and Starch, pp. 427 ff.

¶ Starch, 1907, pp. 29 ff. Cf. Pierce, 149 *et al.*

tion is superior to monaural; and that sounds at the front or back are better discriminated than sounds at the side. For a sound near the front or the back affects the two ears with nearly equal intensities, and consequently a change in the ratio of these intensities is readily noticed. The occurrence of confusion points is another argument to this conclusion, for the binaural ratio of sounds at confusion points is the same. Yet (*b*) variations in timbre and in pitch, as well as variations in intensity, are conditions of binaural localization. This is argued from the introspection of observers, (cf. 6 above), and from the improvement, through practice, in median plane localization when sound intensities are equal for the two ears. (Cf. 3 (*a*).)

Second, *monaural localization, also, is due both to variations in the intensity and to variations in the pitch and the timbre of sound stimuli.* (1) The dependence of monaural localization on the intensity of sound is shown by the relatively accurate and mainly monaural localization of sounds given in the aural axis. (Cf. 5, on p. 344). (2) The significance of pitch and timbre is shown by the cases of monaural localization (inaccurate, to be sure) of sounds which are not near the aural axis.

The *physiological* conditions of auditory localization are next to be discussed. They are not so readily assigned, and four different theories have, in fact, been held. Auditory localization has been attributed: *first*, to the excitation of specific organs in the semi-circular canals;* and *second*, to the cutaneous excitation of the shell and drum of the ear.† With greater probability, auditory localization is explained as due, *third*, to specific brain processes, in particular, to processes corresponding respectively with the consciousness of right and of left.‡ *Fourth* and finally, as the preachers used to say, auditory localization has been attributed to the occurrence of reflex movements, especially of head movements.§

* Preyer, criticised by Breuer.

† Wundt, Grundzüge der physiol. Psychologie, II.^{5}, pp. 486 ff.

‡ Stumpf, Tonpsychologie, II., pp. 51 ff.

§ Münsterberg. But cf. pp. 346^3 ff. below, for modification of the theory as first stated.

Of these four physiological theories, the first has been decisively disproved * and for the second there is no important evidence.† In default of any further explanation one has, thus, to choose between the last two; and such a choice at once involves the problem: What is the nature of the *consciousness* of the position of sounds? Two types of description are in the field — the nativistic and the empiricist. The first or nativistic theory, corresponding with the theory of specific brain processes, either holds, with Stumpf, that special sensations of right and left occur or, with Pierce, it asserts simply that "auditory impressions originally possess positional characters." The second, or empiricist, account of auditory localization teaches that the primary constituents of the distance consciousness are certain movements or tendencies to movement excited by the varying intensities and qualities of sounds.

The writer of this book inclines to adopt the 'motor' theory just stated. According to this view, auditory as well as visual localization is primarily describable in terms of perception or imagination of bodily motion supplemented, for all seeing people, by visual imagination of the body and its environment. The movements, perceived or imagined, which condition this consciousness may be movements of the body as a whole, or even eye movements, toward the source of sound. The physical conditions of these movements are the varying intensities and qualities of sound stimuli.

Two amplifications of this statement are necessary. It must be noticed, in the first place, that such a motor theory need not imply that every consciousness of position is conditioned by a definite reaction, reflexly excited, and that it consists in the consciousness of this precise reflex movement. The notorious errors

* Cf. Breuer, Bloch, p. 18; Pierce, 139 ff., esp. p. 142[1]. The point of Bloch's criticism is that all sound waves must affect the semicircular canals alike, since all reach it through the external meatus.

† Cf. Angell and Fite, pp. 236, 246. It should be stated that this criticism does not deny the fact that the pinna, or shell of the ear, may deflect the direction of sound-waves and thus, indirectly, affect localization. Cf. Bloch, pp. 36[6], 48[3]; Starch, 1905, p. 24.

of localization, and the failures of attempts to demonstrate an exact parallel between bodily movements and accurate localizations, make this view untenable.* It will be observed, in the second place, that a motor theory is entirely compatible with an admission of the significance of visual imagination (either the imagination of feet, face, or hair, or the imagination of certain parts of the ordinary environment) in the consciousness of 'up' and 'down,' 'front' and 'back.' It is even possible that, in the developed localizing consciousness of some subjects, these visual images may have crowded out the motor consciousness. Originally, however, and probably in most adult experiences, these visual images are supplementary to the percepts or images of instinctive motor reactions to the source of sound.

It is at once evident that this theory is readily harmonized with the facts established by observation. In particular, it accounts for the lack of confusion between right and left. And it explains the errors in localizing sounds in the median plane, for such sounds are equidistant from right and left ears, and there is consequently no tendency to move rather in the one direction than in the other. It has furthermore a decisive advantage over every visual theory in that it offers an explanation of the consciousness of right and of left. For how conceivably can right be distinguished from left in purely visual terms? Right and left, as Kant long ago pointed out, are perfectly symmetrical, and accordingly there seems to be nothing by which to distinguish either the visual (or the merely tactual) consciousness of the right of my body from that of the left. The psychologist has, therefore, to adopt either the motor theory, which conceives the right as 'that which is realized to be more mobile,' or he has to espouse the Stumpf-Preyer theory of specific right and left sensations. This Stumpf theory, it will be admitted, is readily harmonized with many facts of localization, yet it is open to important objections: (1) The

* This admission, coupled with the recognition of body and eye movements, as well as head movements, as conditions of localization, seems to meet the objections raised by Bloch (p. 19) and by Pierce (pp. 150 ff.) to the Münsterberg theory.

theory requires the hypothesis of precisely similar end-organs whose excitation results in different sensations merely because the organs are situated respectively to right and to left. This supposition clearly is contrary to physiological analogy. (2) Many children learn but slowly to distinguish right from left, and some people never learn to make the distinction save through artificial associations, that, for example, of the left with the ring finger. This would scarcely be possible if there were immediate and original sensations of right and of left. (3) Simultaneous sounds of the same quality, given one to the right ear and one to the left, fuse into one sound attributed to an intermediate position. This fact is readily explicable by the supposition of a single movement as resultant of stimuli to two opposed movements, but is not easily harmonized with the hypothesis of distinct right and left sensations. For these reasons, the Stumpf theory can scarcely win assent, and Pierce's form of the nativistic theory is too indefinite to serve the purpose of a localization theory.*

The strongest objection to this modified form of the motor theory is based on the results of experiments showing that two sounds of different quality simultaneously given, one from the right and one from the left, are often simultaneously attributed to approximately their actual positions. Such localization seems to involve an opposition and consequent cancelling of rightward by leftward movement.† The objection, however, loses most of its force when it is remembered first that the memory of movements

* Pierce seems virtually to admit that undifferentiated 'positional characters' play no part in localization, for he says (p. 193[2]) "When I say that a sound is 'here' or 'there' . . . I mean . . . the sort of *reaction* that must be made in order that the sounding body may be seen or touched or brought to the position of most distinct hearing." His main argument for positional characters is based on the fact that, under experimental conditions, a sound may be localized in the head, and on the conclusion that such localization must be elemental because (p. 181) "neither vision nor touch has any actual experience with the endocephalic masses." This observation, however, directly contradicts that of the writer and of others, who certainly sometimes have a visual image, very schematic, of the interior of the skull.

† Cf. von Kries, p. 249; Bloch, pp. 17–18.

may perhaps persist when actual movement is checked, and second, that so-called simultaneous localization may well consist in a consciousness of rightward swiftly succeeded by that of leftward movement.

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§ 11. BIBLIOGRAPHY. — On the *consciousness of harmony and of melody*: cf. above, pp. 315 ff. on beats; also EBBINGHAUS, Grundzüge, pp. 298; H. VON HELMHOLTZ, Sensations of Tone, 1895, chapter XII.; K. STUMPF, Tonpsychologie, II., esp. §§ 23–26, 28; and Differenztöne und Konsonanz, *Zeitschr. für Psychol.*, 1905, XXXIX., 269 ff.; R. KÖNIG, Über den Zusammenklang zweier Töne, *Poggendorff's Annalen*, CLVII., p. 177, cited by Ebbinghaus, *op. cit.*, pp. 305, 308; F. KRÜGER, Das Bewusstsein der Konsonanz, 1903; M. MEYER, Über Kombinationstöne u. s. w., *Zeitschr. für Psychol.*, 1896, XI., 177; F. WEINMANN, Zur Struktur der Melodie, *Zeitschr. für Psychol.*, 1904, XXXV., 340 ff.

§ 12. BIBLIOGRAPHY. — On *the consciousness of rhythm:* T. L. BOLTON, Rhythm, *American Journal of Psychology*, 1893, I., 145 ff., 310 ff.; E. MEUMANN, Untersuchungen zur Psychologie und Aesthetik des Rhythmus, *Philos. Studien*, 1894, X., 249 ff., 393 ff.· M. K. SMITH, *ibid.*, 1900, 71 ff., 197 ff.

SECTION V.

I. Instinct

§ 1. The study of instinct is common ground to biologist and to psychologist proper. From the biological point of view the instinct is an unlearned, or innate, reaction of organism to environment, normally characteristic of a family or species, and presumably of use to the race and often, also, to the individual. (A distinction sometimes made between the instinctive as co-ordinated and complex reaction and the reflex as simple seems to the writer to add an unnecessary character. A baby's first vague movements, though uncoördinated, are properly called 'instinctive.')

The psychologist is concerned both with the instinctive bodily reaction as sequent or accompaniment of the conscious relation of self to environment and with the instinctive consciousness — whether perceptual or emotional. (For modes of consciousness as well as movements may be distinguished as instinctive or acquired.) In both cases the fundamental distinction, never to be obscured, is between the unlearned and the acquired. In other words, a mode of consciousness or a reaction which has not been acquired is to be called instinctive, even if one cannot as yet prove it to be a race-activity, and even if one cannot prove it to be useful in the perpetuation or development of the race. In truth, the utility of an activity or experience is a trait too difficult of observation and demonstration to be named as primary mark of instinct. Accordingly, the definition of 'instinctive action' as 'something purposive but involuntary'* subordinates the fundamental to the secondary character.

* Wundt, "Lectures on Human and Animal Psychology," XXVII., § 1, Eng. tr., p. 395. Cf. Schneider, "Der thierische Wille," p. 61, and James, "Psychology, Briefer Course," p. 391.

Yet, though the instinct be not defined as useful, it remains true that the constant result of biological study is to discover the usefulness of instinctive reactions. For the individual, indeed, an instinctive act may be useless or perilous — for example, the water hen flicks her tail before the undertail has grown white so as to serve as signal; and the insect dies in the act of laying her eggs; but for the race the instinctive activity is reasonably inferred, if indeed it is not observed, to be of use. And the utility of instinctive reactions is the presupposition of all theories about their origin.

It should be added that many instincts are neither exclusively psychical nor exclusively physical, but what McDougall calls psychophysical — a combination of consciousness with reaction. McDougall indeed teaches that "there is every reason to believe that even the most purely instinctive action is the outcome of a distinctly mental process, one which is incapable of being described in purely mechanical terms, because it is a psychophysical process, involving psychical as well as physical changes";[1] but certainly McDougall does not disprove the occurrence of perfectly unconscious, unlearned reactions. He overstates his position, once more, when he declares that this "mental process . . . can only be fully described in terms of the three aspects of all mental process — the cognitive, the affective, and the conative."[1] For, though many instincts are of this complete type, surely not all are. McDougall, however, is clearly right in his opposition to the prevalent identification of instinct with mechanical reflex reaction.

II. Learning

Experimental testing of the ability of animals to acquire new forms of reaction has an important bearing on the question: how low in the scale of animal life does consciousness occur? For the ability to modify instinctive reaction (where the stimulus to movement remains unchanged) is the severest criterion of the presence of consciousness. The experiments of Professor

[1] "Social Psychology," pp. 26, 27.

Jennings (cited below) indicate that even certain unicellular animals meet this test.

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On *habit:* cf. works cited, p. 87; also S. H. ROWE, Habit Formation (with bibliography).

On *animal psychology:* M. F. WASHBURN, The Animal Mind (with bibliography), 1908; C. L. MORGAN, cited, p. 87.

On *instinct:* works cited, pp. 87, 351, and 376; H. R. MARSHALL, Instinct and Reason; K. GROOS, The Play of Man, The Play of Animals; G. SCHNEIDER, Der menschliche Wille.

On *learning in animals:* cf. M. W. CALKINS, The Limits of Genetic and of Comparative Psychology, *British Journal of Psychology*, I., pp. 267 ff., and ALLEN, BETHE, JENNINGS, LOEB, PECKHAM, SMALL, WATSON, and others, there cited; also R. M. YERKES, *Journal of Philosophy*, 1905, II., 141.

On *imitation in animals:* cf. E. L. Thorndike, Animal Intelligence, *Psychol. Review Monograph Supplement*, No. 4, The Mental Life of the Monkeys, *ibid.*, No. 15, 1901; C. S. BERRY, An Experimental Study of Imitation in Cats, *Journal of Compar. Neurol. and Psychol.*, 1908, XVIII., pp. 1 ff.; HAGGARTY, Imitation in Monkeys, *ibid.*, 1909, XIX., pp. 337 ff; also BOHN, L. W. COLE, KINNAMAN, PORTER.

On *habit, instinct, imitation, and learning in children:* cf. the biographical studies of child psychology, by PREYER, PEREZ, SHINN, MOORE, E. A. KIRKPATRICK, Genetic Psychology, Chapters IV., V., X., with bibliographies; and the journals, in German and in English, devoted to child psychology.

SECTION VI.

Attention

§ 1. For advocacy of the view that attention is elemental, the student is referred to Titchener, as cited below. Attention, or 'clearness,' is, according to Titchener, 'an independent attribute of sensation' — that is, attention is coördinate with sensational intensity and extensity, and thus (in the terminology not of Titchener, but of the writer) itself elemental.

§ 2. A second difference between the teaching of Titchener and that of this book has been indicated in the last sentence. Titchener holds that attention, 'sensible clearness,' as he calls it, is purely sensational, — in other words, that we can attend to 'sensible objects only,' to sights and sounds, never to our affective experience, our emotions.* The introspection of the writer does not confirm that of Titchener on this point. Unquestionably, prolonged attention to emotion as such, to one's happiness or unhappiness, diminishes, perhaps even destroys, the affective quality. In the words of Maeterlinck, "il n'y a aucun bonheur dans le bonheur lui même tant qu'il ne nous aide pas a songer à autre chose." But similarly, attention to perception — as distinguished from attention to the perceived — is likely to destroy perception as such, that is, to turn perceiving into thinking. The truth is, that introspection is attention.† We must therefore be able, if only for a brief time, to attend to pleasantness and unpleasantness, else we should not introspectively distinguish the affections from their sensational accompaniments.‡

* The question whether we attend to relations does not, for Titchener, exist, because he believes that the relational consciousness reduces to sensational elements. (Cf. p. 364.)

† Cf. Titchener, *op. cit.*, p. 175. "Psychological observation," or introspection, means, he says, "attention to the phenomena."

‡ For Titchener's consideration of this point, cf. his *Outline*, § 33.

There is great vagueness and indecision in most discussions of attention, and many writers have recourse to unexplained metaphors in place of scientific description, distinguishing the object of attention as 'focus' from the unattended-to as 'margin,' or 'periphery,' or referring to attention as 'crest' of the 'wave' of consciousness. The reader is referred especially (1) to the discussions of Wundt, in the "Lectures on Human and Animal Psychology," XVII., the "Grundriss" (§ 15), and the "Grundzüge der physiolog. Psychologie," III.[5], 1903, pp. 331 ff.; (2) to C. Stumpf, "Tonpsychologie," I., 67 ff.; II., 276 ff.; (3) to E. B. Titchener, "The Psychology of Feeling and Attention," 1908 (with bibliographies).

The doctrine of Titchener has been briefly summarized. Wundt teaches the elemental character of attention,* or clearness, though not always from a purely structural standpoint. Stumpf's opinion is that "attention is identical with interest and interest is a feeling." Accordingly, he defines attention as "Lust am Bemerken selbst." † He emphasizes the prolongation, through association, of the object of attention. The writer of this book has amended her former account of attention as mere structural element, being convinced that attention is a fundamental personal attitude. This is perhaps the real meaning of Külpe's conception of attention as 'condition,' not element, of consciousness.

In the forefront of discussion, at present, is the problem of the number of degrees, or levels, of attention. Cf. L. R. Geissler, "The Measurement of Attention," *Amer. Journ. of Psychol.*, 1909, XX., 473–529, especially 524 ff.; E. B. Titchener, *op. cit.*, pp. 220 ff.; "Text-book of Psychology," § 77, and p. 302.

For discussion of the *neural conditions of attention*, cf. Titchener, *op. cit.*, pp. 206 and 359 (Note 42); W. McDougall, *Mind*, 1903; M. Meyer, *Psychol. Review*, 1908, XV., pp. 358 ff.; 1909, XVI.,

* Cf. "Lectures" (cited above), Eng. Tr., p. 247: "It is as impossible to define the clearness of an idea as to define the intensity or quality of a sensation."

† *Op. cit.*, II., p. 279.

pp. 36 ff.; and (for *summary to date*), A. J. Hamlin, *Amer. Jour. of Psychol.*, 1896, VIII., 3 ff., Chapters I.–III.

Cf. also M. W. Calkins, "An Introduction to Psychology," Appendix VII. (for brief classification of types of attention doctrine), and W. B. Pillsbury, "L'Attention," 1906, and "Attention," 1908.

SECTION VII.

Association and Memory

§ 1. The following table states the relations between fusion and association on the one hand, successive and simultaneous association on the other. The term 'assimilation' may, however, be used, as on page 65 of this book, to cover both the elemental and the complex form of simultaneous association. A simultaneous association consists essentially in the persistence of the first term of a successive association.

FUSION AND ASSOCIATION

I. Fusion (of peripherally excited elements).
II. Association (of terms, one or both of which are centrally excited):—
  a. Simultaneous.
    1. Assimilation (of elements).
    2. Complex simultaneous association.
  b. Successive.

For slightly varying uses of these terms, and for further distinction between forms of fusion, cf. Külpe, "Grundriss der Psychologie," §§ 42 ff.; and Wundt, "Grundzüge," II.[5], pp. 526 ff.

§ 2. On the *classification of association as total or partial*, cf. James, "The Principles of Psychology," Vol. I., pp. 569 ff., 578 ff., and "Psychology, Briefer Course," pp. 259 ff. For *criticism of the older division* between 'association by contiguity' and 'association by similarity,' cf. F. H. Bradley, "The Principles of Logic," p. 294; James, "Principles," I., pp. 590 ff.; M. W. Calkins, "Association," pp. 12 ff. For examples of association suitable for analysis, cf. this Appendix, Section XVII., pp. 403–404.

§ 3. The study of the nature of associations, as these vary from time to time, and from individual to individual, has been carried on by experiments of two main types, 'spontaneous' and 'con-

trolled.' Spontaneous associations are very readily studied through a simple experiment (which may indeed be performed with a whole class of students as subjects). The instructor pronounces a word, directing the students to write, as quickly as possible, a word or phrase descriptive of the first suggested image; next, to write a word (or phrase) descriptive of the second image suggested; and so on, for a given period — one minute, for example. The resulting series of associations is worked over by each writer, in order to discover the type of connection. Thus, the association of 'swallow' with 'nest' may be due to the writer's interest in birds, the association of 'nest' with 'boy' may be due to his recent reading of a story of robbing nests; the association of 'boy' with 'blue' may be due to the frequency of his repetition of "Little Boy Blue." Experiments of this sort are well suited for comparing the associations and imagery of different individuals and groups. A child's list of associations differs materially from an adult's, a farmer's from a sailor's. Such a comparison is facilitated if the suggestive word is ambiguous — some such word, for example, as 'swallow' or 'ball'; for the first word on a given list is likely to indicate an interest or occupation of the writer: Thus, a boy might write 'nest' after 'swallow,' while a physician would write 'throat.'

In experiments of the 'controlled' variety, the subject is not left free to imagine what he will, once he has been started. Rather, a list of words is read him and he records his first association to each. The list is carefully selected, usually with a view to furthering one sort of associations rather than another. The more serious experiments are carried on with one subject only, and the time of the association-reaction is measured, that is to say, the time which intervenes between the moment when the subject hears a word and the moment when he responds with the word thus suggested to him. Controlled association experiments of this type are nowadays used as a method of mental diagnosis. It is found that the association-reaction is lengthened, even against the will of the subject, when the suggesting word has to do with an emotionally interesting experience.

Professor Münsterberg has proposed to test the connection of suspected persons with a given crime, by requiring them to indicate the 'idea associated' by each one of a list of words, and by including in the list words suggestive of the crime or its surroundings. Similar experiments have been used in the effort to discover both from the nature and from the time of the associations the source and objects of the mental disturbance of the cerebrally diseased.

BIBLIOGRAPHY. — On *this form of mental diagnosis:* C. G. JUNG, Diagnostische Associationsstudien, *Beiträge zur exp. Psychopathologie*, I., 1906, and Zur Tatbestandsdiagnostik, *Zeitschr. für angewandte Psychologie*, 1908, Bd. I., 163 ff.; F. KRAMER and W. STERN, Selbstverrat durch Association, *Beiträge zur Psychol. der Aussage*, 1906, IV.; H. MÜNSTERBERG, On the Witness-stand, 1908, esp. pp. 73 ff.; M. WERTHEIMER, Experimentelle Untersuchungen zur Tatbestandsdiagnostik, *Archiv für die ges. Psychol.*, 1905, VI., 59 ff.; R. M. YERKES and C. S. BERRY, The Association Reaction Method of Mental Diagnosis, *American Journal of Psychology*, 1909, XX., 22–37 (with bibliography).

On '*psychoanalysis*' (the form of mental 'diagnostic' in which the experimenter is in complete ignorance of his subject's mental history): BREUER u. FREUD, Über den psychischen Mechanismus hysterischer Phänomene, *Neurolog. Zentralblatt*, 1893; FREUD, Zur Psychopathologie des Alltagslebens, 1904; J. H. SCHULTZ, Psychoanalyse, *Zeitschr. für angewandte Psychol.*, 1909, II., 440 ff. (with bibliography).

§ 4. On *memorizing*, cf. E. A. Gamble, The Reconstruction Method in Memorizing, Chapter III.; Ebbinghaus, Grundzüge, § 61; H. J. Watt, The Economy and Training of Memory, 1909; St. Augustine, Confessions, Book X., Chapter 8 ff.

SECTION VIII.

I. Experimental Study of Recognition

§ 1. Experiments on the nature of the familiarity consciousness were planned and carried through by A. Lehmann (Wundt's *Philosophische Studien*, Bd. VII., pp. 169 ff.). He tested several observers with a series of 66 odors, and found (in opposition to his own prepossession) that in 7 per cent of the cases the subjects recognized the odors without being able to name them or to connect them with other experiences. Similar experiments were carried out, in the Wellesley College laboratory in greater number and under stricter conditions, with the results summarized above (p. 126). Cf. Gamble and Calkins, *Zeitschrift für Psychol. und Physiol. der Sinnesorgane*, 1903, Bd. 32, pp. 177 ff.

II. Relational Elements of Consciousness

§ 2. The doctrine of elements of consciousness which are neither sensational nor in any sense coördinate with the affections or feelings is upheld by psychologists of the most diverse schools. Herbert Spencer was the first to name and to discuss them,[1]* but his teaching attracted little notice, and thirty years passed before Ehrenfels rediscovered the *Gestaltqualitäten*,[2] and James wrote of the 'transitive feelings' of 'and,' 'but,' and 'if.'[3] To-day two groups, or schools, and several individuals among Continental psychologists and a considerable number of English-speaking psychologists more or less unequivocally teach the occurrence of elements of consciousness neither sensational nor affective. There is, first, the school of Meinong,[4] Höfler,[5] and Witasek,[6]

* The Arabic numerals of this section (Appendix VIII., § 2) refer to the numerals of the Bibliography which follows (p. 365). The section is condensed and revised from a paper in *The American Journal of Psychology*, 1909, XX., pp. 269 ff.

which discusses relational elements under the names '*fundirte Inhalte*' and '*Gegenstände höherer Ordnung*.' The second of the Continental schools is that of Külpe and the students and workers in the Würzburg Institut, Watt,[7] Ach,[8] Messer,[9] Bühler,[10] and others. Individual upholders of the theory are Binet,[11] Stumpf [12] with his doctrine of *Gebilde* and *Verhältnisse*, Cornelius,[13] and, finally, in spite of great divergence in terminology, Ebbinghaus [14] and Münsterberg.[15]

Of writers in English, Stout,[16] R. S. Woodworth,[17] and the writer of this book,[18] have most explicitly taught the occurrence of these elements of consciousness, neither sensational nor affective, which are especially characteristic of what is called thought. Judd, also, describes concept and judgment in terms of relation;[19] and Angell, in spite of his denial of literally imageless thought, seems to indicate by his term 'meaning' a relational experience.[20]

It thus appears that the introspection of a score of psychologists, of different periods, prepossessions, and training, speaks unequivocally in favor of the occurrence of elements neither sensational nor affective.

It must be added that this testimony has been fortified, in recent years, by the attempt to control introspection through experimental conditions. One of the latest of such investigations is made by Bühler, whose method — a modification of that of Marbe and Messer — is, in brief, the following: He puts to his subjects, trained introspecters, questions answerable by 'yes' or 'no,' which are intended to excite their thought. After a question has been answered, the subject at once analyzes the consciousness preceding and leading to his answer. The questions are suited to the interests of the subjects. Illustrations are: "Can you reach Berlin in seven hours?" "Does monism mean the annihilation of personality?" The results of the investigation have been (1) the assertion in most cases by the observers that they are distinctly conscious of unsensational and non-affective experiences; (2) the apparent occurrence of some cases where no image, verbal or concrete, can be detected; (3) the

confirmation of this introspection by the discovery that a subject often remembers *not* the images, but only the relation — say, of likeness or of opposition — in an earlier experience. Wundt[24] has very sharply criticised the method of these experiments on the ground, mainly, that it involves disturbance of the subject, and that it does not admit of repetition and variation of the experience to be studied. In the opinion of the writer, Bühler successfully meets this attack, appealing to the records of his subjects for evidence of their being undisturbed; and holding that repetition and variation are, in fact, obtainable in the essential sense that questions of the same or of regularly varying types may be repeated.

Woodworth's method and results resemble those of the Würzburg school, except that he confines himself to the study of comparison (the discovery of equivalent relation), and that in one group of his experiments he offers concrete material — colors and forms — for comparison. Earlier experimenters have found traces of relational experiences in the course of investigations concerned primarily with association. The experiments, for example, by which Professor Gamble and the writer tested Lehmann's assertion that recognition consists in associated images, disclosed a large number of cases in which the consciousness of familiarity, occurring markedly earlier than any associated images, is, in the view of the writer, most readily described as relational experience.

The criticism of the relational-element doctrine has, however, achieved one important result: it has effectively challenged the assertion that imageless thought occurs. For it is always possible to question the completeness and the accuracy of the introspection on which this conclusion is based. And, as Professor Titchener[23] and others have shown, it is probable that introspecters have often overlooked the occurrence in thought, and in recognition, of characteristic kinæsthetic and organic sensational elements. But the admission that thought and recognition contain sensational factors does not disprove the result of such multiplied introspection: that along with imagery, and often

in the focus of attention when one compares and reasons and recognizes, are elements neither sensational nor affective.

BIBLIOGRAPHY. — *The founders of the doctrine:* 1. H. SPENCER, The Principles of Psychology, first edition (1855), § 81, p. 285. 2. CHR. EHRENFELS, *Vierteljahrschr. für wissenschaftliche Philos.*, XIV., p. 249, 1890. 3. W. JAMES, Principles of Psychology, I., pp. 247 ff., with Note.

Writers of the Meinong School: 4. A. MEINONG: *Zeitschrift*, II., p. 247, 1891; and XXI., pp. 182 ff.; and Ueber Annahmen, 1902. 5. A. HÖFLER (Psychologie), and 6. S. WITASEK (Grundlinien der Psychologie, 1908), have incorporated Meinong's doctrine in systematic treatises.

Writers of the Würzburg School: 7. H. WATT, *Archiv f. die gesammte Psychologie*, IV., 288 ff., 1905. 8. N. ACH, Ueber die Willenstätigkeit und das Denken (based on experiments carried on in Würzburg and in Göttingen), Göttingen, 1905. 9. MESSER, *Archiv*, VIII., 1 ff., 1906. 10. K. BÜHLER, *Archiv*, IX., 297 ff., 1907; XII., 9 ff., 1908. (Account and defence of experimental investigation. For account of experiments by similar method, cf. K. MARBE, Experimentell-Psychologische Untersuchungen über das Urteil, Leipzig, 1901.)

Other continental psychologists: 11. A. BINET, L'étude experimentelle de l'intelligence, Paris, 1903. 12. C. STUMPF, Erscheinungen und Psychische Funktionen, *Königl. Akad. d. Wissenschaften*, Berlin, 1907, pp. 7 ff., 29 ff. 13. H. CORNELIUS, Psychologie als Erfahrungswissenschaft, pp. 70, 164 *et al;* cf. also *Zeitschrift*, XXII., pp. 101 ff. (1899), where Cornelius develops a teaching of G. E. MÜLLER. 14. Ebbinghaus recognizes as elements only sensations and affections, while 15. MÜNSTERBERG admits sensations only. Yet the first includes under the head of 'general attributes of sensation' (Grundzüge, I., pp. 410 ff.) and the second groups in the class of value-qualities (Grundzüge, I., pp. 290 ff.) what are here considered as relational elements.

Contemporary English-speaking psychologists: 16. G. STOUT, Analytic Psychology, I., pp. 66, 78–96; II., p. 42. 17. R. S. WOODWORTH, Imageless Thought, *Journal of Philosophy, Psychology, and Scientific Method*, III., pp. 701 ff., 1906; The Cause of a Voluntary Movement in *Studies in Philosophy and Psychology by Students of C. E. Garman*, pp. 351 ff.; Non-Sensorial Components of Sense-Perception, *Journal of Philosophy*, etc., IV., pp. 164 ff., 1907. 18. M. W. CALKINS, An Introduction to Psychology, 1901, Chapter X. (especially in the second edition, 1905); Der doppelte Standpunkt in der Psychologie, 1905, pp. 25 ff.

19. C. S. JUDD, Psychology, General Introduction, 1907, pp. 286 ff.; and 20. J. R. ANGELL, Psychology, 1904, p. 213, *et al.*, implicitly advocate this view.

Critics: 21. I. M. BENTLEY, *American Journal of Psychology*, 1902, pp. 269 ff. 22. R. SCHUMANN, *Zeitschr.* 1898, XVII., pp. 128 ff. 23. E. B. TITCHENER, Experimental Psychology of the Thought Processes, 1909. 24. W. WUNDT, Ueber Ausfrageexperimente, *Psychologische Studien*, 1907, III., pp. 300–360. (A criticism of Bühler. Cf. Bühler's reply, *Archiv*, XII., esp. pp. 94, 103, 107; and WUNDT's rejoinder to the reply, *Archiv*, 1908, XI.); 25. VON ASTER, *Zeitschr. für Psychol.*, Bd. 49, 56 ff.; 26 DÜRR, *ibid.*, 313 ff. (Cf. BÜHLER'S reply, *ibid.*, Bd. 51, 108 ff.) 27. S. S. COLVIN, *Psychol. Bulletin*, VI., p. 236 and VII., p. 59.

On *classification of relational elements:* cf. BÜHLER and WITASEK, cited above. On the *physiological basis*, cf. M. F. WASHBURN, *Psychol. Bull.*, VI., 369 ff.

On the *consciousness of time:* cf. MÜNSTERBERG, *op. cit.*, pp. 244 ff.; EBBINGHAUS, *op. cit.*, 457 ff. (in which a doctrine of elemental time-consciousness is set forth); and B. BOURDON, La perception de temps, *Revue Philosophique*, 1907, LXIII., pp. 449 ff.

III. THE APPLICATION OF THE TERM 'FEELING'

§ 3. The term 'feeling' is nowadays usually employed to cover the consciousness of pleasantness and unpleasantness and any strictly coördinate elemental experiences. Both Spencer* and James,† on the other hand, and more recently W. Mitchell,‡ refer by the term to any experience whatever, elemental or complex. This usage seems to the writer of this book highly convenient, because there is no other single word which can well be put to this service, whereas 'feelings' of pleasantness and unpleasantness may be termed 'affections' and grouped with any coördinate experiences under the term 'attributive elements.' This general application of the term 'feeling' has, however, met with little approval, and accordingly the word is seldom used in this book except in the narrower sense.

* "Principles of Psychology."

† "The Principles of Psychology," I., pp. 185–186.

‡ "Structure and Growth of the Mind," Chapter I., § 3, p. 10.

SECTION IX.

NOTES ON THE NATURE OF THOUGHT AND GENERALIZATION

§ 1. On thought as sharing or shareable consciousness, cf. J. M. Baldwin, "Thought and Things," Vol. II., Chapter III., on "Common Acceptance and Acknowledgment."

§ 2. On the historically developed doctrine of the 'general notion,' cf. Locke, "Essay Concerning Human Understanding," Book III., Chapter III., §§ 6 ff., Berkeley, "Principles of Human Knowledge," Introduction, §§ 6–20; also, T. Huxley, "Hume," p. 112, and M. W. Calkins, "An Introduction to Psychology," pp. 221 ff.

§ 3. On conception as 'motor' consciousness, cf. Baldwin, "Mental Development in the Child and Race," pp. 325 ff.; Royce there cited on p. 330; C. H. Judd, *Journal of Philosophy*, VI., p. 90.

§ 4. According to a recent theory, conception is identical except in function with imagination. That is to say, imagination becomes conception merely by virtue of associating similar images. On this view, no characteristic attitude or element is involved in conception; and a given experience is conception, or generalization, not for what it is but for what it does.

A very clear statement of this view is that of Professor Dickinson Miller (*Psychological Review*, Vol. II., pp. 537 ff.). In the opinion of the writer, Dr. Miller is altogether right in this view that the function of conception is the association of similar images, but wrong in the denial of the structurally simple consciousness of generality which distinguishes conception. The suggested images are sometimes called 'the meaning.' Cf. I. E. Miller, "The Psychology of Thinking," Chapter XII., pp. 153 ff.; and E. B. Titchener, "Text-book," § 103, pp. 367–368, "Experimental Psychology of the Thought-Processes," pp. 175 ff.

SECTION X.

JUDGMENT, REASONING AND LANGUAGE

BIBLIOGRAPHICAL NOTES

§ 1. On the classification of judgment and reasoning, cf. the text-books of logic. On the distinction between analytic and synthetic judgments, cf. Kant, Kritik of Pure Reason, Introduction, IV.

On the conception of judgment as affirmation, cf. F. Brentano, Psychologie, Kap. VII., and Stout, Analytic Psychology, Vol. I., pp. 97, 99.

§ 2. On animal reasoning, cf. C. L. Morgan, Animal Life and Intelligence, Chapter IX. (with citations); James, The Principles of Psychology, II., pp. 349 ff.; Thorndike, cited p. 356.

§ 3. On the nature of abstraction, cf. M. W. Calkins, An Introduction to Psychology, pp. 224 ff.; James, Psychology, Brief Course, pp. 248 ff.; The Principles of Psychology, I., 487 ff., 502 ff.; II., 332 ff.

§§ 4–5. On the nature and origin of language, and on the language of animals, cf. James, *op. cit.*, II. 356 ff.; G. J. Romanes, Mental Evolution in Man, pp. 138 ff.; W. Whitney, Language and the Study of Language, pp. 426 ff.; article on Philology in *Encycl. Britannica*, 9th ed., Vol. XVIII., pp. 766 ff.; Müller and the Science of Language, pp. 9 ff.; Max Müller, Science of Thought, I., 192 ff.; Science of Language, I., 404 ff.; C. L. Morgan, Animal Life and Intelligence, pp. 343 ff.

§ 6. On the relation of language to thought, cf. Müller, Science of Thought, I., pp. 50 ff.; W. Whitney, Language and the Study of Language, pp. 405 ff.; Müller and the Science of Language, pp. 26 ff.; H. B. Alexander, Visual Imagery, in *Psychol. Review*, 1904, XI., p. 335.

SECTION XI.

I. The Use of the Terms 'Subject' and 'Object'

§ 1. The term 'object' in the first paragraph of Chapter XI. is used not in the widest possible sense to include myself-as-object (the private, personal object), but to refer to the 'other-than-myself,' whether personal or impersonal, external or internal. Cf. pp. 3 ff. and 281, above.

II. The Nature and Classification of the Affective Elements

a. the sensationalist theory of stumpf

§ 2. Stumpf distinguishes sharply between pleasantness and unpleasantness (*Lust* and *Unlust*) on the one hand and higher feeling (*Affekt* or *Gemütsbewegung*) on the other. He then describes unpleasantness as pain-sensation and pleasantness as faint form of the sensations of 'itch,' of 'tickle,' etc. This account is based mainly on the following considerations: (*a*) the alleged invariable unpleasantness of pain; (*b*) the alleged difficulty of assigning physiological conditions of pleasantness regarded as unsensational; (*c*) the belief that this account is less complex than other theories. No one of these arguments is undisputed.

Bibliography. — C. Stumpf, Über Gefühlsempfindungen, *Zeitschr. für Psychol. und Physiol.* XLIV., 1 ff.; Von Frey, Die Gefühle, 1894; Bourdon, La sensation de plaisir, *Revue philosophique*, 1893; Sollier, Le mécanisme des émotions, 1905.

In *criticism of the theory*, cf. E. B. Titchener, The Psychology of Feeling and Attention, 1908, Lect. I., *passim*, and Lect. III.; Max Meyer, The Nervous Correlate of Pleasantness and Unpleasantness, I., *Psychological Review*, 1908, XV., pp. 205 ff.; C. H. Johnston in the *Psychological Bulletin*, 1908, V., pp. 65 ff.

b. THE TRIDIMENSIONAL THEORY OF WUNDT*

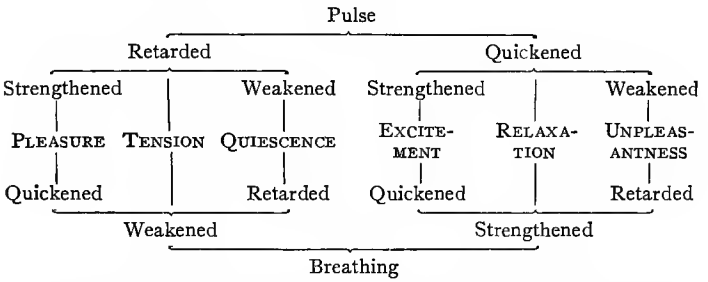
Wundt includes in the group of the affections, or feelings, four elements or (rather classes of elements) coördinate with pleasantness and unpleasantness. These four are: tension and relaxation (*Spannung-Lösung*), excitement and quiescence (*Erregung-Beruhigung*). Relaxation is opposed to tension and quiescence to excitement, as pleasantness is opposed to unpleasantness, so that we have three pairs of opposites, or, as Wundt calls them, 'dimensions' of feeling.

The arguments for this view may be summarized as follows: The Wundtians point out in the first place that emotional states differ, according to common consent, not merely as pleasant and unpleasant, but also as exciting or quieting, straining or relaxing. Both melancholy and terror, for example, are unpleasant emotions, yet the first is quieting, or depressing, while the second is as clearly exciting. This purely introspective argument is verified and supplemented by experiment. Alechsieff, whose experimental study is one of the best and most recent of those put forth by members of the Wundtian school,† stimulated his subjects in such wise as presumably to bring about emotional experiences, and recorded both pulse and breathing, and introspection. The introspective records first (1) clearly indicated the occurrence of straining and relaxing, exciting and depressing emotions; next (2) sometimes asserted the occurrence, in emotional experiences, of elemental consciousness other than sensations, pleasantness and unpleasantness; finally (3) seemed to show that pleasantness or unpleasantness may occur in combination with any one of the four other 'feelings.' In other words, the records indicated that in pleasurable emotion subjects were sometimes in a state of tension, but sometimes relaxed, sometimes excited, and sometimes depressed; and that in unpleasant emotion subjects were now relaxed, now strained, and now excited, again depressed. The objective results

* This section is condensed from a paper by the writer, cited in the footnote of p. 362.

† "Die Grundformen der Gefühle," 1907; cited, p. 373[2].

of these experiments are summarized by Alechsieff in the following scheme adapted from Wundt: —



The Wundtian conclusion from both sorts of evidence is the following: Experiences which are thus shown to be, on the one hand, introspectively elemental, distinct, and independently variable and, on the other hand, accompanied by clearly differentiated yet coördinated circulatory and respiratory phenomena, are elements of consciousness belonging in a class together. Therefore tension-relaxation and excitement-quiescence form, with pleasantness-unpleasantness, the enlarged class of the 'feelings (*Gefühle*).'

This doctrine has, however, found little favor outside the narrow circle of Wundt's fellow-workers and students. Against the Wundtian arguments from experiment it is rightly urged that the outcome of experiment is far from conclusive in Wundt's favor, and that even experiments undertaken from the same theoretical standpoint as Alechsieff's issue in results of a very conflicting nature.* In default of experiment we are thrown back on introspection and, on this basis, the writer of this book agrees with the opponents of Wundt that elemental affective elements — or feeling-elements strictly coördinate with pleasant-

* Cf. Alechsieff, *op. cit.*, p. 175[2] *et al*, for admission of the opposing results of experimental investigations of the breathing. For Alechsieff's attempts at explanation, cf. *op. cit.*, p. 207; also pp. 180–200. For the report of experiments carried on in the Cornell laboratory indicating, in opposition to Alechsieff, that the alleged elements do not vary independently, cf. Hayes and Titchener, cited below.

ness and unpleasantness — are not discovered in our emotional experience. Most of these critics attempt to reduce all four of the new 'feelings' to kinæsthetic and organic sensations, but, in this reduction, they ignore the introspective testimony of Alechsieff's subjects, which has at least the face-value of their own. In the opinion of the writer, the following conclusions are truer to introspection: —

(1) Tension is reducible to attention, or clearness, plus the organic sensations which accompany attention. (The significance of this assertion varies, of course, with one's doctrine of attention.)

(2) Relaxation probably is merely the absence of strain. Alechsieff himself seems virtually to imply this.* So far as relaxation is a positive experience, it seems to reduce, as Titchener teaches, to organic sensations.

(3) and (4) The case is different with excitement and quiescence (*Erregung-Beruhigung*). These are complex, not elemental, experiences; and the distinguishing feature of them is neither the organic sensations — though these are present and significant — nor any new kind of feeling, but rather the vivid consciousness of doubtful future or of irrevocable past. In the words of Royce: "we tend to regard with restlessness whatever tendency involves our interest in immediately future changes. The emotions of . . . fear, of hope, of suspense are accordingly especially colored by restless feelings. On the other hand, the feelings of quiescence predominate when . . . we regard the past."

This analysis of the Wundtian theory has led, accordingly, to the conclusion that Wundt is unjustified in his teaching of the two new pairs of feelings coördinate with each other and with pleasantness-unpleasantness. Only one of the four, namely, tension, is either elemental or — in any sense — parallel with pleasantness-unpleasantness. Relaxation, a second of these alleged elements, seems to reduce to bare sensation, where the name does not indicate mere absence of strain. The other two, excitement and quiescence, are, indeed, as the Wundtians insist, un-

* Cf. *op. cit.*, p. 222[1]. Titchener has a similar criticism, *op. cit.*, p. 145.

sensational; but the unsensational elements which distinguish them are not affective elements (or feelings), but rather relational elements.

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In *criticism of the theory:* E. B. TITCHENER, Lectures on Feeling and Attention, 1908, Lecture IV.; S. P. HAYES, A Study of the Affective Qualities, I. The Tridimensional Theory of Feeling, *American Journal of Psychology*, XVII., pp. 358 ff., 1906; J. ORTH, Gefühl und Bewusstseinsanlage, 1903; M. KELCHNER, *Archiv*, V., pp. 107 ff.

III. NOTES ON EMOTION

§ 3. On the *classification of the emotions:* cf. A. Bain, Feeling and Will, pp. 71–77, and headings of Chapters V.–X.; H. Höffding, Outlines of Psychology, VI., B, C, Eng. tr., pp. 233 ff.; D. Mercier, *Mind*, N. S., IX. and X.; Spinoza, Ethics, Part III.; J. Ward, Encyclopædia Britannica, 9th edition, pp. 67–70. The classification adopted in this book owes most to Höffding, Mercier, and Spinoza.

§ 4. On the *æsthetic consciousness:* cf. Kant, Critique of Judgment, Part I., Book I., especially §§ 1–12; Schopenhauer, The World as Will and Idea, Vol. I., Book III., especially §§ 30–35, 38, 45; Vol. II., Supplements to Book III., esp. Chapter 39; Schiller, Uber die ästhetische Erziehung des Menschen, Briefe 12–14, 23 ff.; H. Marshall, Pain, Pleasure, and Æsthetics, pp. 110 ff.; T. Lipps, Grundlegung der Aesthetik, H. Münsterberg, The Eternal Values, IX.–X., pp. 165 ff.; E. Puffer, The Psychology of Beauty, especially II., III., VIII.; G. Santayana, The Sense of Beauty; P. Stern, Einfühlung und Association, in der neueren Aesthetik, *Beiträge zur Aesthetik*, Hamburg, 1898.

(*Experimental*): O. Külpe, Der gegenwärtige Stand der exper-

imentellen Aesthetik, *Archiv für die gesammte Psychol.*, II., 1906, and papers there cited; L. J. Martin, An Experimental Study of Fechner's Principles of Aesthetics, *Psychol. Review*, May, 1906; R. MacDougall, E. D. Puffer, and R. P. Angier in *Harvard Psychol. Studies*, I. (1903), pp. 309 ff.

On the *sense of humor:* C. C. Everett, Poetry, Comedy, and Duty. Th. Lipps, Psychologie d. Komik (includes criticisms of Kraepelin, Vischer, Lotze, Hecker), *Philosophische Monatshefte*, XXIV. and XXV.; E. Kraepelin, Zur Psychologie d. Komischen, *Phil. Stud.*, II.; J. Ziegler, Das Komische, Leipzig, 1900.

(*Experimental Study*): L. J. Martin, Experimental Prospecting in the Field of the Comic, *Amer. Jour. of Psychol.*, XVI., pp. 35 ff.

§ 5. On the *relation between physical stimulus and affective consciousness:* cf. Külpe, *op. cit.*, § 37, Wundt, Grundzüge der Physiologischen Psychologie, II.[5], pp. 311 ff.

§ 6. Accounts of the *bodily conditions of the affective consciousness* are, one and all, avowedly hypothetical. The theory put forward in this book is a sort of composite of certain features of the doctrines of Wundt, Flechsig, and Marshall. Two other doctrines, very recently set forth, may be stated, briefly, in the words of their authors: —

(1) Professor Titchener hazards the guess that the peripheral organs of affection are the free afferent nerve-endings . . . distributed through the various tissues of the body . . . The nervous excitations," he holds, "will vary with the tone of the bodily systems in which they are set up, and that tone can itself vary only in two opposite ways."

(2) Professor Max Meyer argues that "if pleasantness and unpleasantness are different in kind from sensation . . . then the kind of . . . relation between nervous activity and pleasantness and unpleasantness is likely to be . . . different." Accordingly he attributes pleasantness and unpleasantness to intensity of nerve current. He supposes that "while the correlate of sensation is the nervous current itself, the correlate of pleasantness and unpleasantness is the increase or decrease of

the intensity of a previously constant current if the increase or decrease is caused by a force acting at a point other than the point of sensory stimulation."

BIBLIOGRAPHY. — WUNDT, Grundzüge, II.[5], 358 ff. Grundriss, § 7, 10 a; 15, 2 a; H. R. MARSHALL, Pain, Pleasure, and Æsthetics, esp. Chapter V., § 3; P. FLECHSIG, Gehirn und Seele, pp. 89 ff.; H. MÜNSTERBERG, Beiträge zur Psychologie, IV., p. 216; M. MEYER, *Psychol. Review*, 1908, XV., pp. 306 ff.; E. B. TITCHENER, A Text-book of Psychology, 1909, § 74, pp. 260–263.

§ 7. The emphasis upon *the occurrence in emotion of sensational constituents* — sensations due to heart-beat, dilation of arteries, breathing, and the like — is a contribution to psychology of Professors William James and K. Lange. Both lay such stress on this factor of emotion that they tend to underestimate or even to ignore the other structural constituents of emotion — the pleasantness or unpleasantness. It should be noted that this James-Lange doctrine stands in close relation to the conception of emotion as doubly personal. For precisely organic sensation is an important sensational factor in my consciousness of myself; and kinæsthetic sensations of movement — of approach and withdrawal, coöperation, and antagonism — are at least constituents of my consciousness of other selves.

BIBLIOGRAPHY. — Cf. JAMES, Principles of Psychology, Chapter XXV. (Briefer Psychology, Chapter XXIV.); The Physical Basis of Emotion, *Psychol. Review*, I., pp. 516 ff.; LANGE, Über Gemütsbewegungen, translated by H. Kurella, Leipzig, 1887; C. STUMPF, Über den Begriff der Gemütsbewegung, *Zeitschr. für Psychol. und Physiol.*, XXI., pp. 47 ff.; D'ALLONNES, *Rev. Philos.*, 1905, LX., 592 ff.

§ 8. Besides the reports (cited above, in § 3, p. 371) of experiments on affective reactions, the following reports of earlier experiments may be consulted: —

In *favor of the doctrine that affective reactions may be clearly distinguished as pleasant or unpleasant*: Féré, Sensation et Mouvement, Paris, 1887; A. Lehmann, Hauptgesetze des menschlichen Gefühlslebens, Ger. tr., Leipzig, 1892, and Die kör-

perlichen Äüsserungen psychischer Zustände, Leipzig, 1899 und 1905.

In *opposition to the doctrine*: Binet et Courtier, *L'Année Psychologique*, 1897, Binet et Henri, *ibid.;* J. R. Angell and H. B. Thompson, Organic Processes and Consciousness, *Psychol. Review*, 1899, Vol. VI., pp. 32 ff. (with full references); E. A. Gamble, Attention and Thoracic Breathing, *Amer. Journ. of Psychol.*, 1905. The criticism based on these experiments is strengthened by many observations; for example, by observation of the warm flush of shame, one of the unpleasant emotions.

§ 9. On the *biological significance of emotion:* cf. Darwin, The Expression of the Emotions; Spencer, The Principles of Psychology, Vol. I., Part II., §§ 122 ff.; Vol. II., Part IX., §§ 497 ff.; James, The Principles of Psychology, Vol. II., pp. 477 ff.; J. Dewey, *Psychol. Review*, 1894, I., pp. 553 ff.; II., pp. 13 ff.; G. Dumas, *Revue Philosophique*, LVIII., LIX. (reviewed, *Psychol. Bulletin*, 1907, IV., pp. 222 ff.); D. C. Nadejde, Die biologische Theorie der Lust und Unlust, 1908; Yerkes, "Introduction to Psychology," pp. 362 ff.

§ 10. On the *relation between instinct and emotion*, cf. W. McDougall, "An Introduction to Social Psychology," Chapter III., especially p. 46: "In the case of the principal powerful instincts, the affective quality of each instinctive process and the sum of visceral and bodily changes in which it expresses itself are peculiar . . . ; for such modes of affective experience . . . the generic name . . . is emotion."

§ 11. On *emotion as individualizing*, cf. W. James, "The Varieties of Religious Experience," p. 171: "The first thing the intellect does with an object is to class it along with something else. But any object that is infinitely important to us . . . feels to us also as if it must be *sui generis* and unique. Probably a crab would be filled with a sense of personal outrage if it could hear us class it without ado or apology as a crustacean. 'I am no such thing,' it would say, 'I am MYSELF, MYSELF.'"

SECTION XII.

WILL

§ 1. In support of the teaching, contrary to that of this book, that there is a structural conation element, cf. G. T. Ladd, Psychology, Descriptive and Explanatory, 1895, pp. 211 ff.

It should be pointed out that I have abandoned the use of the term 'volition' to designate exclusively the anticipatory image regarded from the standpoint of the idea-psychologist. In this book 'volition' is used as a synonym for 'will.' A more important modification of my earlier teaching is the omission, from the enumeration of the unsensational factors of volition, of an experience of dependence, or linkedness of future with present. A volitional experience of dependence is still insisted on, but is conceived as realized personal attitude to the future.

§ 2. Professor Thorndike opposes the conception of volition which this book upholds on the ground that actions may be, and often are, performed without any antecedent image of them. "Any mental state whatever," he says, "may be an impulse, — may take on the aspect of impeller to an act";* and he adds that "percepts, sensations, and emotions" more than "images and memories" impel action.* All this, doubtless, is true. Professor Thorndike rightly suggests that even an exhortation to choice, such as "Make up your mind," may in actual fact result in an impulsive act and not in an act preceded by anticipatory image. Yet it does not follow that because an act may be impulsively performed, therefore volition is identical with impulse. The truth is that there are two sorts of ideo-motor act: the more common impulsive movement which Thorndike describes, and the strictly voluntary act. A given action may be performed

* Elements of Psychology, pp. 86 ff. Cf. R. S. Woodworth, "The Consciousness of a Voluntary Movement," Garman Commemorative Volume, pp. 351 ff.

either impulsively or voluntarily — either without, or with, anticipatory consciousness. Cf. G. Stout, *Mind*, N.S. V., p. 356′: "Volition is a desire qualified and defined by the judgment that so far as in us lies we shall bring about the attainment of the desired end."

§ 3. On will as self-activity, cf. J. A. Symonds, quoted by Cooley, "Human Nature and the Social Order," pp. 169 ff.: "The main thing which sustained me was a sense of self, imperious, antagonistic, unmalleable. My external self was being perpetually snubbed, mortified. Yet the inner self hardened after a dumb, blind fashion. I kept repeating, 'Wait, wait, I will, I shall, I must.' . . . This primal need of self-effectuation is the essence of ambition."

SECTION XIII.

Faith and Belief

On the *feelings of realness:* cf. A. Bain, Emotions and Will, pp. 510 ff.; W. James (cited, p. 235); J. M. Baldwin, Handbook of Psychology, Vol. II., Feeling and Will, Chapter VII., pp. 148 ff. (with authors there cited); Th. Lipps, Leitfaden der Psychologie, 1903, pp. 156 ff.

On *faith:* cf. Baldwin, *op. cit.*, p. 158, 3; J. Royce, The Philosophy of Loyalty, 1908; H. S. Holland, "Faith," in Lux Mundi, ed. by C. L. Gore, pp. 1–54.

On *imitation and opposition:* cf. G. Tarde, Les lois de l'imitation; G. Le Bon, The Psychology of the Crowd; J. Royce, Preliminary Report on Imitation, *Psychol. Review*, 1895, II., pp. 217 ff.; The Psychology of Invention, *ibid.*, 1898, pp. 113 ff.

On the *group-consciousness:* For distinction between the 'mob,' or 'crowd,' conceived as mainly imitative, emotional, impulsive group, from the 'society' regarded as a group of reflectively social persons, both imitative and originating and both emotional and deliberative, cf. J. M. Baldwin, Social and Ethical Interpretations, 1897, 1906. As exponent of the view that the crowd is the typical social group, cf. G. Le Bon, The Psychology of the Crowd. Cf., also, G. Tarde, Social Laws, translated by H. C. Warren, 1899; E. A. Ross, Social Psychology, 1908; H. C. Cooley, Social Organization, A Study in the Larger Mind, 1909; W. McDougall, An Introduction to Social Psychology, 1909, Chapters X.–XV.; G. H. Mead, Social Psychology as Counterpart to Physiological Psychology, *Psychol. Bulletin*, 1909, VI., pp. 401 ff.

SECTION XIV.

The Religious Consciousness

§ 1. The scientific study of personal relations forms the most important problem of what Professor Stern calls 'psychography,' the study of individual selves. In the effort to coördinate such studies, the *Institut für angewandte Psychologie* has appointed a special commission (cf. *Zeitschrift für angewandte Psychologie*, III., Heft. 3).

§ 2. Most of the current conceptions of religion are defective for one of two reasons: (1) Some of them are so wide that they do not serve to distinguish religion from other forms of immaterialism. So, when Wundt says, "All ideas and feelings are religious which refer to an ideal existence," an existence which fully corresponds to the wishes and requirements of the human mind,* he does not sufficiently distinguish religion from personal desire or from moral striving. (2) Over against these inclusive conceptions are those which unduly narrow the conception of religion. Thus, Schleiermacher makes of religion an exclusively emotional experience when he defines it as "a feeling of absolute dependence upon God." † And, on the other hand, Herbert Spencer confuses theology with religion, that is, philosophy with experience, when he conceives religion as "the recognition of a mystery pressing for interpretation." ‡ In opposition to these one-sided views: Professor Leuba's words deserve quotation; § Religion, he says, is "compounded of will, thought, and feeling, bearing to each other the relation which belongs to them in every department of life."

* "Ethics," Eng. tr., Vol. I., p. 59. For Wundt's illuminating treatment of the sources and beginnings of religion, cf. Völkerpsychologie.

† "Reden über Religion," 4te Aufl., p. 42.

‡ "First Principles," Part I., Section 13, p. 44 (4th edition).

§ "The Psychological Nature of Religion," *American Journal of Theology*, January, 1907, p. 80, and "The Psychological Nature and Origin of Religion," 1909, p. 8. (Note the citations of the footnotes.)

The writer of this book has modified her former definition of religion, as conscious relation of human to divine self, and now describes religion as conscious relation to being, or beings, regarded as greater than the human self. This change has been made in order to recognize what Professor Leuba calls the 'godless' as opposed to the 'personal' religions. It should never, however, be overlooked that even if the object of the religious experience is not conceived as personal it is always treated as personal — in other words, it is always the object of prayer, or of sacrifice, or of mystic adoration.

SECTION XV.

Abnormal Psychology

Barely incidental reference has been made, in this book, to an important branch of psychology — the study of abnormal forms of consciousness. The neglect has been, it must be admitted, intentional. The 'abnormal' is simply that which diverges from the normal, and must therefore be studied from the standpoint of the normal consciousness. Obviously such a study can be undertaken only after one has concerned oneself with the facts and principles of normal psychology.

This closing section will speak briefly of certain of the more important phenomena and forms of the abnormal consciousness — discussing, however, only non-pathological experiences and leaving out of account all forms of insanity, the abnormal consciousness due to cerebral disease. The abnormal phenomena to be considered are, in the main, the following: (1) perceptual hallucinations and illusions; (2) abnormal motor phenomena, usually known as automatisms; (3) abnormal suggestibility; and (4) abnormal dissociation. All these experiences occur in dreams, in hypnosis also, and in the waking life as well. We shall, therefore, first briefly study our dreams, shall next consider the state of hypnosis, and shall then discuss the abnormal experiences of our waking life. A final section will be devoted to a consideration of the veridical phenomena alleged to occur in all these states.

I. The phenomena (exclusive of veridical phenomena)

a. Dreams

Dreaming is consciousness during sleep. It is hardly correct to speak of it as 'abnormal,' for it is likely that every one dreams

at one time or another. People who declare that they do not dream have probably merely forgotten their dreams.*

The essential likeness of the dream consciousness and the waking consciousness should first be noted, for it is often overlooked. All sorts and kinds of consciousness occur in dreams. A structural analysis will disclose not only visual and auditory, cutaneous, olfactory, and gustatory sensational consciousness, but affective and relational consciousness as well. It is indeed admitted on all hands that people remember and feel in their dreams. It is equally true, though more often disputed, that they think and reason and choose, though choice and reasoning are based on absurd premises leading to impossible outcomes.†

Yet, spite of the likeness of dreams to the waking consciousness, dreaming is characterized by three, at least, of the four abnormal phenomena which have been named. (1) The distinguishing mark of every dream is the fact that it is essentially hallucination or illusion.‡ In my dreams I externalize unreal people and far-away scenes and impossible situations. The hallucination (or illusion) is doubtless due to the dissociation to which reference will presently be made. It remains uncorrected because of the lack of perceptual and habitual images with which to compare dream images. In the daytime the tendency to externalize vivid images is corrected by the incongruity of the image with the perceptual experience: the imagined apple tree in bloom cannot well form a part of the perceived winter scene. When, on the other hand, I am asleep with eyes closed, nothing contradicts the externality of the vivid image.

(2) Dreams may be, in the second place, accompanied by motor reactions which, after waking, one is unaware of having made. Many people speak during their sleep — in all probability while they are dreaming; and sleep-walking is no uncommon occurrence. Such bodily 'automatisms,' of which the waking self is

* Cf. the writer's "An Introduction to Psychology," p. 398[1].

† For discussion, cf. "An Introduction to Psychology," pp. 400 ff. (with citations).

‡ Cf. p. 60, above.

unaware or forgetful, is called somnambulism when it occurs in sleep.

(3) Closely connected with the hallucination is the dissociation involved in our dreaming. By dissociation is meant the interruption of ordinary habitual associations, the abnormal narrowing of our experience through the dropping out of images and memories which are normally present in the waking life. Such a narrowing of the ordinary consciousness has one (sometimes both) of two results. Either the remaining consciousness is more intense, or else other, more remote, imaginings take the place of those which have dropped out. The greater vividness of fewer objects is an explanation of the dream hallucination; the occurrence of unusual imagery characterizes most dreams. On its neural side, dissociation implies what may be described, somewhat figuratively, as a blocking of ordinary 'association paths' and a consequent damming up of cortical energy. This results on the one hand in the more intense functioning of the sense centres still excited, and on the other hand in the spread of the cortical energy through less frequently used 'brain paths.'

It must, however, be noted that dreaming is not purely dissociative. On the contrary, dreams are connected in two ways with the waking life: they are due to past waking experience and they are remembered after waking. As regards the first point, most dreams can be traced associatively to a starting-point in the waking life; and some dreams even include specific memories of waking experience. Out of 194 of my own dreams, carefully studied, I found only 22 (11.3 per cent) in which I could trace no suggestion from the waking experience. Professor Sigismund Freud believes that the relation of dream to previous life is always emotional — that every dream is, in fact, a wish fulfilled.* In my

*"Die Traumdeutung," 1900, 1909. Dr. Freud offers as proof the carefully analyzed and valuable records of many dreams, mainly his own. Unquestionably he shows that many dreams may reasonably be explained as fulfilments of wish. He does not, however, — in the nature of the case, be cannot, — show that all dreams correspond to actual wishes; indeed, he does not, in the opinion of many critics, successfully exclude the possibility that some of his own dreams might be otherwise explained.

opinion this account of the dream unduly limits the forms of its connection with the previous life. But the fact of such connection is undeniable.

Besides this connection with the previous life, dreams, as already stated, play a rôle in later experience. We often remember our dreams; and are sometimes puzzled to know whether we have really experienced or dreamed some event. And yet, notwithstanding the connection of dream with waking life, dreams are also markedly dissociative, cut off from the ordinary waking consciousness. Thus, the dream self commonly adjusts himself without surprise to changed surroundings; he fails to imagine names and scenes which in waking life would certainly be suggested to him; and he may even forget his name and circumstances and take to himself a new set of characters.

b. Hypnosis

By hypnosis is meant a state in which one is abnormally influenced by one person's suggestions and abnormally unaffected by any suggestions of an opposite sort. Hypnosis is induced in various ways, as by 'rhythmic passes,' or by fixing the attention of the subject on a bright surface; but all these methods agree in directing the attention of the subject upon the hypnotizer and in diverting his attention from other objects. The hypnotic subject is deaf and blind to all that goes on about him, but keenly alive to every look, word, and movement of the hypnotizer.* In a word, hypnosis consists in abnormal suggestibility in a single direction, coupled with extreme dissociation — the dropping out of memories, images, and even perceptions which would normally be present.

The suggestion of the hypnotizer may affect both the bodily reactions and the consciousness of his subject; that is, he may bring about both automatisms and hallucinations. There are two main forms of bodily control. In the lighter stages the

* Auto-hypnosis, or self-hypnotization, is not specifically discussed in this section.

hypnotizer affects, positively or negatively, the voluntary muscles of his subject, preventing him, by a command, from opening his eyes or inducing him to hold his arm outward and rigid for minutes at a time. More complicated acts may also be brought about: for instance, the subject may lift books from a table or may whirl several times round. In deeper hypnosis the involuntary muscle contractions, and thus the pulse and the secretions, may be affected. Structural bodily changes sometimes occur. There are, for example, well authenticated though infrequent cases, in which blisters have been produced by a hypnotizer who assured his subject that a burning object would be applied to his skin. We may quote, in illustration, from Krafft Ebing's account of his well-known patient, Ilma S ——: "The experimenter draws with the percussion hammer a cross on the skin over the biceps of the left arm, and suggests to the patient that on the following day at twelve o'clock, in the same place, a red cross shall appear. . . . On the next day at eleven o'clock . . . the patient wonders that she has an itching, excoriated spot on her right upper arm. . . . The examination shows that a red cross is to be seen on the right arm exactly at the place corresponding with that marked on the left side yesterday." Later a 'sharply defined scab' is formed.*

Hypnosis is marked, finally, by perceptual illusions and hallucinations. These may be positive or negative. A positive illusion may, for example, be induced if the hypnotizer, pointing to cracks in the wall, tells the subject that these are interlacing tree tops, thus suggesting the vision of a summer landscape. Or the hypnotizer may hand to his subject a cup of water, or even of ink, telling him that it is coffee. The subject drinks it eagerly, complains, perhaps, that it is warm, and shows by the expression of his face that he is quite unconscious of its real nature. Indeed, the alleged coffee may produce actual bodily effects, a flushed face, for example. These, of course, are instances of illusion brought about by means of an external object. Genuine hallu-

* "An Experimental Study in the Domain of Hypnotism," by R. von Krafft Ebing, translated by C. G. Chaddock (Putnam, 1889), pp. 57–60. Cf. pp. 78, 96.

cinations can also be induced: a subject, for example, will hear the sounds of a piano if they are merely suggested by the hypnotist. The negative illusions and hallucinations of the hypnotized subfect are far more difficult of explanation. The hypnotizer, for example, indicates some person who is present, and says decidedly, "This man has left the room; he is no longer present." Forthwith the hypnotized subject utterly disregards the banished individual, failing to reply to his questions, and even running against him. In like manner, the hypnotizer may suggest to his subject that he is unable to see or to hear or to feel pain. Pain-sensations are not, however, very suspectible to suggestion, and the value of hypnotism as an anæsthetic has been very much exaggerated.

It has thus been shown that hypnosis is characterized by suggestibility, automatism, hallucination, and dissociation. In its extreme forms the dissociation and the new set of imaginings which replace the old seem to involve a loss of the normal personality and a transformation into a new self. Thus, the deeply hypnotized subject, if told that he is Paderewski, talks about music and devotes himself to the piano. Krafft Ebing's subject, Ilma S——, when it was suggested to her that she was eight years old, played contentedly for hours at a time with a doll, wrote an unformed hand, and made childish errors in spelling words which she normally spelled correctly. The new personality may persist for a long period and recur regularly. One of the best-known cases is that of Janet's patient, Leonie,* who "has been hypnotized by all sorts of persons from the age of sixteen upwards. Whilst her normal life developed in one way in the midst of her poor country surroundings, her second life was passed in drawing-rooms and doctors' offices, and naturally took an entirely different direction. In her normal state, this poor peasant woman is a serious and rather sad person, calm and slow, very mild with every one, and extremely timid; to look at her one would never suspect the personage which she contains. But hardly is she put to sleep

* Pierre Janet, "L'automatisme psychologique," 1889, pp. 132 ff.

hypnotically, when a metamorphosis occurs. She is gay, noisy, restless, sometimes insupportably so. She remains good-natured, but has acquired a singular tendency to irony and sharp jesting. To this character must be added the possession of an enormous number of recollections, whose existence she does not even suspect when awake, for her amnesia is then complete. . . . She refuses the name of Leonie, and takes that of Leontine (Leonie 2) to which her first magnetizers had accustomed her. 'That good woman is not myself,' she says, 'she is too stupid!' To herself, Leontine or Leonie 2, she attributes all the sensations and all the actions; in a word, all the conscious experiences which she has undergone in somnambulism, and knits them together to make the history of her already long life. To Leonie 1 [as M. Janet calls the waking woman], on the other hand, she exclusively ascribes the events lived through in waking hours. But it is the same with her second or deepest state of trance. When after the renewed passes, syncope, etc., she reaches the condition called Leonie 3, she is another person still. Serious and grave, instead of being a restless child, she speaks slowly and moves but little. Again she separates herself from the waking Leonie 1. 'A good but rather stupid woman,' she says, 'and not me.' And she also separates herself from Leonie 2: 'How can you see anything of me in that crazy creature?' she says. 'Fortunately, I am nothing for her.'"

The dissociation of hypnosis from the waking life is evidently not complete. The hypnotized subject remembers not only the events of former hypnosis but facts of his waking life. On the other hand, unlike the dreamer, he seldom remembers, after waking, the experiences of the trance. Yet hypnosis, in its deeper stages, has a curious influence on the later waking life, known as post-hypnotic suggestion. The hypnotist, for example, before waking his subject, addresses him in some such fashion as the following: "To-morrow, at twelve o'clock, you will stop the clock on the stairs." At twelve o'clock on the following day, the subject, apparently in his normal condition, actually stops the clock, to all appearance on his own initiative, without remembering the suggestion of the hypnotist.

It is obvious that the main value, as well as the chief danger, of hypnotism lies in just this susceptibility of the hypnotic subject to post-hypnotic suggestion. Physicians and 'mental healers' who make use of hypnotism suggest to the patient that he is freed from disturbing symptoms, and that he will remain freed from them after waking. Not merely nervous diseases, so called, but all diseases and symptoms which have no anatomical cause have been successfully treated by hypnotism.

In unscrupulous hands the ability to give post-hypnotic suggestions may, of course, be grossly abused. There are reasonably well-attested instances of crimes committed and of large sums of money given away, in accordance with post-hypnotic suggestion. In such cases the discovery of the guilty hypnotist is made difficult by the fact, already indicated, that the hypnotized subject so seldom remembers the events of the hypnotic state. The best authorities, however, agree in the conclusion that only individuals predisposed to criminal acts can be influenced to actual crime.

It should be stated very emphatically that no person can be hypnotized against his will. Hypnosis is induced only when the attention is concentrated on the hypnotizer. On the other hand, the habit of yielding attention, like all other habits, is readily formed. It follows that a person several times hypnotized becomes very readily susceptible. Evidently there is grave danger in a tendency to yield oneself to the exclusive control of others. For these reasons the hypnotic state should be induced only for serious purposes — to cure disease or to extend knowledge; and only persons possessed at once of medical and of psychological training should give hypnotic suggestions.

c. Abnormal Experiences in the Waking Life

(1) There are countless authentic illustrations of waking *hallucinations* and illusions. The voices which called to Joan of Arc, the devil who used to argue with Luther, and the daimon of Sokrates are illustrations which at once suggest themselves. It is not always easy to decide, from the descriptions which we have of them,

whether these visions are illusions, that is, conditioned in part by peripheral excitation, or whether they are hallucinations, that is, conditioned by cerebral excitation only. Sometimes, however, the distinction is obvious. For example, the phantoms which haunted Charles IX. after the massacre of St. Bartholomew were hallucinations, but the image of Byron which appeared to Sir Walter Scott was a mere illusion, for the clothes of the figure consisted, Sir Walter discovered, of the folds of a curtain.

Far more important as materials for study than these vivid, yet often confused and unverified, stories from which we have quoted, are the massed results of an *International Census on Waking Hallucinations*, made by the Society for Psychical Research.* The question on which this study is based is the following: "Have you ever, when believing yourself to be completely awake, had a vivid impression of seeing or being touched by a living being or inanimate object, or of hearing a voice, which impression, so far as you could discover, was not due to any external physical cause?" To this question, 27,329 answers were given, and of these, 3271, or 11.96 per cent, were affirmative; in other words, one out of every twelve of the persons reached by the investigation asserted that he had experienced hallucinations. This percentage, however, is, in all probability, too high to be representative, for the larger the number of answers received by any one collector of these statistics, the smaller was the number of affirmative replies. It follows that if the investigation were further extended, the percentage would probably fall still lower.† Yet, with all allowances for overestimation, the fact remains that waking hallucinations must be commoner than many of us think. Visual hallucinations far outnumber the others: of 2232 cases completely described, 1441 included visual elements, 850 were partly auditory, and only 244 were tactile. Most of these hallucinations related to people, living or dead, but a few represented angels or supernatural beings, and a slightly larger number were grotesque or horrible figures. About

* *Proceedings of the Society for Psychical Research*, Vol. X., 1894.

† Edmund Parish, "Hallucinations and Illusions" (Scribner, 1897), pp. 85 ff.

one-twentieth of them were indefinite or indescribable. Persons between the ages of fifteen and thirty reported more than one-half the number of these illusions and hallucinations, and men reported only two-thirds as many as women, 9.75 per cent as compared with 14.56 per cent. The general conclusion of the Report is "that this apparent difference should, to a great extent, be attributed to the fact that men, among the pressing interests and occupations of their lives, forget these experiences sooner."*

Besides the involuntary hallucinations and illusions, there is the whole class of illusions which are voluntarily induced. These may be regarded as cases of self-hypnotization. The commonest method of bringing about illusions is known as crystal vision: the experimenter looks fixedly at a glass sphere, at a mirror surface, or even at a glass of water, until there appear pictures in its reflecting surface. The images which appear within these different crystals are usually reproductions of former experiences, and often of long-forgotten objects or scenes. One sees, for instance, a forgotten name or a room familiar in early childhood. The images, on the other hand, may be purely imaginary, as when Mrs. Verrall sees in her crystal† colors so vivid that they leave an after-image in complementary colors. The images seen in crystals may be, finally, veridical images of actual scenes beyond the range of the normal vision of the crystal seer. ‡

The phenomena of synæthesia, of which the most important are so-called 'colored hearing' and 'mental forms,' are sometimes regarded as waking illusions. Colored hearing consists in the regular sequence of a consciousness of some particular color upon the consciousness of a letter, a name, or a musical tone. A mental form is a regularly recurring imaged arrangement of serial terms — numerals, for example, or names of the months of the year — in some special form, perhaps in a circle or in a zigzag line. But these are, in great part at least, cases of vividly associated images, not illusions.

* Cf. Parish, *op. cit.*, p. 84.

† *Proceedings of the Soc. for Psy. Res.*, VIII., pp. 473 ff.

‡ Cf. p. 395, below.

(2) Not only hypnotic and hysteric subjects, but many well and apparently normal people, exhibit the phenomena of *automatism*, that is, relatively complex bodily movement executed without the knowledge, or at least without the after-memory, of the normal waking self. The best-known form of automatism is automatic writing, and is of the following nature:* the subject provided with a pencil, and so placed that the hand which holds the pencil is hidden from his eyes, unconsciously responds to stimulation of the hand. If the hand be pressed three times, it will make three marks when these pressures are over; if the hand is guided and made to draw a single letter, it may go on to complete a word. Normal persons possess the rudiments of automatic writing, passively repeating uniform movements when the experimenter has initiated them, following the rhythm of a metronome, or even outlining imagined figures, and writing imagined names. The significant feature of this experience is the subject's entire unconsciousness of the movements of his own hands.

(3) In the waking life, as in dreaming and in hypnosis, dissociation, that is, the loss of the old memories of the normal life, sometimes seems to involve a so-called *loss of personality;* and the new complexes of imagination which replace the old seem to make up a new personality or self. Often the two personalities alternate; sometimes the new one supplants the old. An early instance is that of Ansel Bourne, a Rhode Island carpenter who disappeared in January, 1887, just after drawing five hundred dollars from a bank. In March of the same year a man who called himself Brown, and who, for six weeks, had been intelligently carrying on a small fruit and candy store in Norristown, Pennsylvania, waked as Ansel Bourne, in frightened ignorance of his surroundings.†

A more recent and more complicated case is that of Dr. Prince's neurasthenic patient, Miss Beauchamp, who comes to herself after longer or shorter periods of forgetfulness to find that she has done

* Cf. A. Binet, "Double Consciousness," pp. 80 ff.

† W. James, "The Principles of Psychology," I., p. 391.

surprising things — broken appointments or walked unheard-of distances, that she is in strange situations, wound round and round and tangled in yards of worsted, for example. Sometimes she finds before her a note written to herself in her own handwriting, and on her own notepaper, purporting to come from another self which has taken the walks, broken the appointments, involved her in difficulties.*

II. THE EXPLANATION

The most common explanation, nowadays advanced, for abnormal phenomena of consciousness, is the hypothesis, already suggested, of secondary selves, or personalities. Such a secondary self is variously known as sub-conscious or co-conscious, as subliminal or supra-liminal. It is conceived as a self other than the ordinary waking self, yet in some way connected with it. There may be several of these alternating secondary selves. Dr. Prince, for example, believes that the facts of Miss Beauchamp's case can be explained only by the hypothesis of six distinct personalities, one of whom — the mischievous Sally who writes the notes and tangles her *alter ego* in the yarn — is entirely antagonistic to the main self. This hypothesis is believed to be necessary to account for the extreme forms of dissociation just illustrated; and the theory is then often extended to apply to other abnormal phenomena. Thus, on such a theory, the dreaming self, or the hypnotized self, or the self who sees figures in the crystal, is the sub-conscious or co-conscious self.

There is no time to discuss in detail the complicated issues involved in such a theory. The following comments are, therefore, dogmatically stated, though they run counter to the view of many psychologists: The majority of so-called abnormal phenomena are perfectly well explained without recourse to a secondary self hypothesis. It has appeared already that dream illusions are the natural result of the dissociation natural in sleep. It is likewise obvious that abnormal automatisms are extreme instances of the natural outcome of consciousness in action, and of the anatomical unity of afferent and efferent processes. Hypnosis, also, strik-

* Cf. "The Dissociation of a Personality," by Morton Prince, 1905.

ingly as it differs from the waking state is, after all, essentially an exaggerated form of the suggestibility which makes everybody, at least on occasions, imitate slavishly some dominating self. Upholders of the subliminal self theory often admit the theoretical possibility of explaining many phenomena of dreams, hypnosis, and automatism, by analogy with the normal waking consciousness. They argue, however, that other facts, in particular, many phenomena of dissociation, require a secondary self hypothesis; and that continuity requires the explanation of all abnormal phenomena by the hypothesis essential to the explanation of this one group of them. This application of the principle of continuity is not beyond cavil; but it is more important to question the premise of the argument. The writer of this book believes, with many psychologists, that the phenomena of dissociation, even the most pronounced of them, have not been shown to differ, ultimately, from the fluctuations of mood and the alternations of memory of so-called normal experience. I am elated to-day, to-morrow depressed; I am living to-day with the memories of my summer in the woods; to-morrow I have forgotten the very name of my forest retreat and am immersed in my workshop and its associations. The complete change of mood, the more absolute loss of memory, are but extreme forms of this normal dissociation.

To state this differently: what I call my normal experience is a complex web woven of many strands of memory, that is, of series of connected images, each series distinct from the others; it is a composite of many distinct groups of interest and preoccupation. I may regard these memory series and these varying circles of interest as aspects of myself, or as partial selves, distinguishing, for instance, my professional from my personal self, my business from my family self or, perhaps, my frivolous from my strenuous self. So-called dissociation of self involves the peculiar prominence of some one of these lesser selves, or aspects of myself, coupled with unusual forgetfulness of all that lies outside this circle of interest and memory. But whether or not the 'secondary selves' of the abnormal consciousness differ in kind or in degree from the partial selves, with their distinct

memories and feelings, of the normal life, three statements must be made about them: —

In the first place, the term 'subconscious' must not be taken as referring to a mysterious something neither conscious nor unconscious. There is no such middle term between the two: what is not conscious is unconscious. By 'subconscious' should be meant, therefore, either the unconscious physiological process or the inattentive consciousness. In both senses of the term, 'the subconscious,' so far from being occult or mysterious, plays an important part in the normal experience.* On the one hand, all sorts of muscular reactions are performed subconsciously, that is, through unconscious reflexes, and one finds to one's surprise that one has already wound one's watch, or one goes to the front door only to find that one has already locked it. And, similarly each one of us is at every instant 'subconsciously,' or inattentively, aware of a multitude of facts in the environment — of the visual objects which do not excite the visual centre, of faint sounds or odors. The outcome of the inattentive perception is, not infrequently, an apparently sudden and unaccounted for image of name or date or event which one does not remember that one has ever witnessed or heard.*

It must be insisted, second, that the dissociations of personality never involve, what they are sometimes said to imply, a loss of personality. This will be admitted by those of us who sometimes experience a doubling of the dream-personality. I dream, for example, of watching at my own sick-bed, and always I am identified with one, if not both, these selves. And no matter what the hypnotic self forgets, the I-which-forgets remains.

It should be noted, in conclusion, that the secondary self — in the extreme cases of changed personality — might be conceived not as an alternating or partial self, but as a self totally distinct from the normal self, though connected with the same body. This is an older view, yet it has modern support.†

* Cf. Joseph Jastrow, "The Subconscious," especially Part I., VII.–IX.

† Cf. W. McDougall, *Proceedings of the Society for Psychical Research*, XIX., pp. 410 ff.

III. VERIDICAL PHENOMENA

Reference must be made, in conclusion, to so-called veridical phenomena — experiences of people, events, or things, which are beyond the limit of the normal observation or communication. Prophetic dreams, clairvoyant visions, mediumistic revelations, are the phenomena most commonly grouped under this head. It should be noticed, first of all, that people are very readily mistaken in attributing a veridical character to their experiences. Nothing is more common than the false impression, after an important event, that one has previously experienced it. Just as places seem familiar to us, when we have never seen them before, so we meet events, especially overwhelming ones, with a curious sense of having always known or expected them. More than this, veridical experiences may be due to information normally acquired, but forgotten. For example, Mrs. Holland's automatic reproduction of Mr. Myers's epitaph may be due not to the fact that the spirit of Mr. Myers is speaking through her, but to the fact that, though she has no memory of the epitaph, she has read parts of his autobiography.* It is, however, believed by careful students that many veridical phenomena are incapable of explanation, either through coincidence or through forgotten normal experiences, and that they presuppose an influence of self by self through other than the usual means of language and bodily expression. Such supranormal communication between living persons is named telepathy, or thought-transference; and it is held by some that it may have a physical basis — ethereal vibrations of extreme minuteness due to changes in one brain and resulting in changes in another.† Alleged instances of telepathy are either spontaneous or experimentally induced. Under the first head may be reckoned, in the first place, the ordinary cases in which people who know each other well

* *Proceedings of the Society for Psychical Research*, Vol. XXI, Part LV., 1908, pp. 268 ff.

† Cf. Podmore, "The Naturalization of the Supernatural," pp. 10 ff., and note his remark: "No such connection between thinking brains has been proved," and his statement (p. 12) of the main objection to the hypothesis: the difficulty of conceiving such vibrations to be effective at a distance.

make the same remark at the same instant, or respond, as we say, to unspoken questions. More impressive are the cases in which figures of absent people appear in dress and surroundings corresponding, as afterward discovered, with their position and surroundings at the time of the 'vision' or 'message.' Thus, Captain Beaumont, in London, rises to greet his wife, who is wearing a 'mauve dress,' which he has never seen, at a moment when she, in Tenby, is speaking to friends of his absence.* Far more important, evidently, than the accounts of these 'spontaneous' cases are the records of experiments in thought-transference. The most important of these were carried out, in 1889–1891, under the direction of Professor and Mrs. Sidgwick and of Miss Johnson. In 90 out of 617 cases one numeral, out of 81 possible, was intently fixated by the experimenter and correctly stated by the subject of the experiment, who was so placed that he could not see the numerals. By chance alone, only 8 correct statements would, presumably, have been made. The number of correct statements is reduced when subject and experimenter are in different rooms, yet is still too large to be attributed merely to chance. There are also a few cases in which one person, at an hour previously set, draws diagrams or fixates an object which (in one instance four times out of ten) is reproduced or distinctly imagined by a person far distant.†

Similar communications, many people hold, are made to living persons by those who have died. The evidences brought forward for this conclusion are mainly (1) the occurrence of clairvoyant visions concerned with death; and (2) alleged communications, through mediums, from the dead. One may quote, in illustration of the first sort of evidence, the authenticated story ‡ of Captain Colt, an officer of the British army, who had a vision on the eighth of September, 1855, of the kneeling image of his brother, a soldier who was then before Sebastopol. The figure had a wound on the

* "Phantasms of the Living," II., p. 91; also quoted by Myers, "Human Personality," I., p. 649.

† *Journal of the Society for Psychical Research*, 1896, pp. 325 ff.; also noted by Podmore, *op. cit.*, pp. 33 ff.

‡ "Phantasms of the Living," Vol. I., p. 556.

right temple. Captain Colt described the vision to the members of his household, and both his accounts of it and his statement of the date are substantially corroborated by his sister. A fortnight later he had news of his brother's death on the eighth of September. His brother's body had been found "in a sort of kneeling posture . . . propped up by other bodies, and the death wound was where it had appeared in the vision." It is clear, however, that such cases do not necessarily involve communication with the dead, since one may suppose a telepathic message from living witnesses.

The evidence from alleged mediumistic revelations presents greater complexity. On the one hand, it is agreed on all hands that the great bulk of the abnormal physical phenomena popularly attributed to spirit influence — the table-tipping, phosphorescent lights, fragrances, and sounds — are due either to automatic movements unconsciously performed by the mediums, or to their fraudulently concealed bodily movements, sleight-of-hand performances and mechanical devices. Records of the exposures of alleged mediums furnish accumulating and incontestable evidence of these statements. On the other hand, several investigators, foremost in the exposure of these spiritualistic frauds, hold that there are instances of revelations through mediums which may be explained only as the direct communion of the dead with the living. Such is the communication said to be made through the medium, Mrs. Piper, to Sir Oliver Lodge by an uncle long dead, who related occurrences known only to one living person who was miles away and unaware of the 'séance' with Mrs. Piper.* More important is the evidence furnished in very recent years by the phenomena of cross-correspondence in which one automatist is impelled to write statements unintelligible to her, which are later understood through statements, by themselves equally unintelligible, written by another automatist. So, certain Latin passages written automatically by Mrs. Verrall on March 2, 4, and 5, 1906, were a riddle to her until the words "Ave Roma immortalis," written at a distance, on March 7, by

* *Proceedings of the Society for Psychical Research*, VI., pp. 458 ff. Cf. also the records of Mrs. Piper's sittings with the friends of G. P., *ibid.*, XIII. See Podmore, *op. cit.*, pp. 319 ff.

Mrs. Holland, clearly referred the descriptions to Rome and to a picture by Raphael. The picture was well known to Mr. Myers, who — in the belief of Mrs. Verrall, Mrs. Holland, and others — is controlling their automatic writings.

Three scientific attitudes toward this evidence are possible. A group of trained investigators, including the late Professor Sidgwick, the late Mr. F. W. H. Myers, Mrs. Sidgwick, and many others, believe that there is at least preponderant evidence of "direct supersensuous communication of mind with mind," * and that this communion is not only between the living, but of dead with living. It should be added that even those who accept, more or less definitely, this conclusion do not assume to understand the nature and, above all, the strange limitation of the communication; that they do not claim to offer a positive estimate of the value of the messages or to interpret their meaning. At most they hold that the fact of the communication is established. (2) Another group of psychologists includes some who admit that the "theory which assigns" the phenomena of cross-correspondence "to a controlling intelligence external to either of the two automatists must rank, *prima facie*, as a good scientific hypothesis." † Yet these students hold that the "evidence . . . strong as it is, is inconclusive." ‡ Among these men who value the evidence on which the spiritistic hypothesis is based, while yet they reject spiritism, are those who accept the hypothesis of telepathy, supranormal communion among the living. Mr. Frank Podmore is prominent in this group. (3) To a third group of psychologists, when "the question is . . . whether departed spirits enter into communication with living men by mediums . . . the scientist does not admit a compromise; . . . he flatly denies the possibility . . . the facts as they are claimed do not exist and never will exist." § Even so-called telepathic communications between the living are, for these critics, explicable through un-

* Myers, "Human Personality."

† H. N. Gardiner, "The Automatic Writing of Mrs. Holland."

‡ *Ibid.*

§ H. Münsterberg, "Psychology and Life," pp. 252-253.

intended suggestions—for example, through 'involuntary whispering,'* or else the alleged communications only accidentally or superficially resemble the originals.

In the face of this divergence of opinion, the duty of the layman is fairly clear. He will be theoretically open-minded, neither accrediting nor rejecting, uncritically, evidence brought forward on either side. But remembering the proved frauds in mediumistic revelations, and the disagreements among experts, and noting the admitted ignorance concerning the nature and value of alleged veridical phenomena, he will never direct his own conduct by consulting mediums, interpreting dreams, gazing into crystals, or playing with planchettes and ouija-boards.

For *Bibliography* on abnormal psychology, cf. the citations of the footnotes, and add: On *dreams*, M. W. CALKINS, Statistics of Dreams, *American Journal of Psychology*, 1893, V., pp. 311 ff.; Sante de Sanctis, I Sogni, 1899. On *telepathy*, FRANK PODMORE, Apparitions and Thought-transference, 1897. Also JOSEPH JASTROW, Fact and Fable in Psychology, 1901; F. W. MYERS, The Subliminal Self, *Proceedings of the Society for Psychical Research*, VII., VIII., IX.; H. MÜNSTERBERG, Pyschotherapy, 1909.

* Cf. Hannsen and Lehmann, *Philos. Studien*, XI., pp. 471 ff., reviewed by W. James, *Psychol. Review*, III., p. 98; answered by H. Sidgwick, *Proceedings of the Society for Psychical Research*, XII., p. 298.

SECTION XVII.

Review Questions *

Chapter II. 1. What character of perception is illustrated by the following statement: "I must have heard the bell ring instead of imagining it merely; for Robert and Isabel heard it at the same time."

2–4. Classify the sense-type of each of the instances of imagination embodied in the following quotations: —

"The quarrel of the sparrows in the eaves,
The full round moon and the star-laden sky."

". . in embalmed darkness guess each sweet."

"Elaphints a-pilin' teak
In the sludgy, squdgy creek."

5. What sort of imagination was lacking in the man who bewailed 'the cup of Ireland's misery, long running over but not yet full'?

6. Give an example from literature (poetry or prose), of imagination which is: (*a*) visual; (*b*) auditory; (*c*) cutaneous; (*d*) tactual-motor; (*e*) olfactory; (*f*) gustatory.

7. What is proved about Tennyson's ability to imagine tastes by the fact that he describes:

". . . a pasty costly made
Where quail and pigeon, lark and leveret lay
Like fossils of the rock with golden yolks
Imbedded and injellied."

III. 8. Read carefully the following passage: —

Next . . . Mowgli . . . was feeling hands on his legs and arms, — strong little hands, which pinched his flesh — and then a swash of

* The Roman numerals refer to the chapters of the book. Questions adapted or quoted from Thorndike's "Elements of Psychology," Titchener's "Primer of Psychology" and Whipple's "Questions in Psychology" are designated by the letters, *Th.*, *T.*, *W.* In replying to questions which call for examples, students should never repeat those of any text-book of psychology.

branches in his face; and then he was staring up through the swaying boughs at the fleecy white clouds against the blue sky, as Baloo woke the jungle with his deep cries and the birds sang in mockery. . . . Two of the monkeys caught him under the arms and swung off with him through the tree tops. . . . The glimpses of the earth far down below frightened him, and the terrible check and jar at the end of the swing over nothing but empty air brought his heart between his teeth.

. . . For a time he was afraid of being dropped; then he grew angry and then he began to think. The first thing was to send back word to Baloo. — *Adapted from Kipling.*

(*a*) In the consciousness of Mowgli, thus described, find and name: (1) At least four sensational qualities, of which no two belong to the same class. (2) At least two sensational elements, not qualities, which belong each to a different class. (3) Unsensational elements of at least two sorts.

(*b*) Describe, according to the Franklin theory, and according to the Hering theory, the retinal conditions accompanying Mowgli's consciousness of: (1) The blueness of the sky. (2) The whiteness of the clouds.

(*c*) In what respect does the excitation of Mowgli's inner ear differ as he hears: (1) The birds' song. (2) Baloo's cries?

9. Imagine yourself lying in the berth of a sleeping-car. If you could neither hear nor see, should you know:

(*a*) Whether the train were in motion or standing still? If so, how?

(*b*) Whether it were moving forward or backward? How?

(*c*) When it went around a curve? How?

10. What sensational elements do you find in your consciousness of an orange as you take the orange out of the refrigerator and eat it?

11. What sensational elements do you find in the consciousness involved: (*a*) in yawning; (*b*) in lifting your arm from a hanging position to the back of your head?

IV. 12. Give two original examples of perception involving the fusion of different sense qualities.

13. Give two original examples of assimilation.

14. Name the structural elements of your consciousness: (*a*) that the clock on the church spire is round; (*b*) that the spire is pointed; (*c*) that the church is in front of you.

15. Why do artists close one eye in sketching?

16. Describe in full your consciousness of the position of a pencil point with which some one touches your arm (your eyes being closed).* (*T.*)

17. If you were touched (with your eyes shut) on the wrist and on the chest, and then required to re-touch the places struck, you would get more nearly right on the wrist than on the chest. Why?* (*T.*)

18. Describe the difference between a right hand glove and a left-hand glove.*

V. 19. Give at least one example of: (*a*) an instinctive action which becomes habitual; (*b*) an acquired habitual action; (*c*) an impulsive movement; (*d*) a volitional action.

20. Give at least one example of: (*a*) a delayed instinct; (*b*) a transitory instinct; (*c*) an instinct common to human beings and animals.† (*W.*)

21. Should a boy be forbidden to fight? (*W.*) Name two other ways of controlling this instinct.†

VI. 22. Classify each of the following cases of attention: (*a*) the baby's fixed glance at the bright light; (*b*) the miser's absorption in contemplating his stock-certificates and bonds; (*c*) the poet's attention to the composition of a poem; (*d*) the school-boy's attention to it in learning it by heart for to-morrow's lesson; (*e*) the child's attention to the piece of candy which he eats; (*f*) the young girl's attention to the memories of last night's party. (*Th.*)

23. Give an original example of absent-mindedness. How is it related to attention?

24. Describe carefully the bodily attitude: (*a*) of the scout; (*b*) of the eavesdropper. (*T.*)

25. Describe the attentive attitude of a dog.

* Cf. Appendix, Section IV. † Cf. Appendix, Section V.

26. (*a*) Let a friend who is unacquainted with the purpose of the experiment, read the passage (*A*) on page 385, lines 12–30, of this book. Direct him to "skim it inattentively." Keep a record of the time. Next let him read attentively the passage (*B*) on page 391, lines 12–31; and keep a record of the time. Compare the time records in the two cases. (*b*) Let the subject write what he remembers of each passage. Compare the results. (*Th.*) (In recording time, use a stop-watch, or a watch with second hand starting at 60. The experiment should be tried with several subjects. With half of them the passages should be read in the order A — B; with the others, in the order B — A.)

27. Pillsbury, the celebrated chess-player, used, while blindfolded, to play twelve games of chess simultaneously. Is this an instance of simultaneous attention? (*Th.*)

28. Do children master the mechanics of reading better by the use of very interesting stories or by the use of relatively uninteresting ones? Why? (*W.*)

29. Explain the statement: "In one sense all productive imagination is really reproductive. (*W.*)

30. (*a*) What type of imagination is developed in the historical novel? in romantic fiction? (*W.*)

(*b*) Give an example of (1) creative scientific imagination; (2) creative artistic imagination; (3) creative practical imagination.

(*c*) Give an example from literature (poetry or prose) of (1) mechanical imagination; (2) fancy; (3) organic universal imagination.

VII. 31. Classify, as total or partial (multiple or focalized), and analyze by the use of diagram (cf. pages 107, 109) the association involved in each of the following passages: —

(*a*) Hilda's perception of the "palaces, churches, and imperial sepulchres of Rome with the muddy Tiber eddying through the midst" is followed by the memory of "her native village with its great, old elm trees, the neat, comfortable houses scattered along

the wide, grassy margin of its street, and the stream of gold-brown water, which her taste for color had kept flowing, all this while, through her remembrance."

(*b*) The sight of a daisy reminds Wordsworth of: (1) "a little Cyclops with one eye;" (2) "a silver shield with boss of gold."

(*c*) "What is the feeling of lovers when they recognize a lyre, or a garment, or anything else which the beloved has been in the habit of using? Do not they, from knowing the lyre, form in the mind's eye an image of the youth to whom the lyre belongs?" — PLATO.

32. Give an example (*a*) of focalized, or nearly focalized, association; (*b*) of total association.

33. Give at least one example each of association: (*a*) through recency; (*b*) through frequency; (*c*) through natural interest.

34. (*a*) Which part of the total consciousness, "Tuesday, election day, being a holiday, the stores will be closed," would probably be the starting-point of association in the mind of a schoolboy? In the mind of a housekeeper? In the mind of a candidate for office? (*b*) Compose a similar illustration. (*Th.*)

35. If you are 'cramming' a ten-stanza German poem before an examination, at which part would you best take your last hasty glance?

36. Suppose stress to be laid on the perfect recitation of a Shakespearian scene, in an elocution class: what would be two differences between the processes of learning it (*a*) with a week before you; (*b*) with an hour before you?

37. Give an original example of memorizing by grouping facts.

VIII. 38. Describe fully, and compare your experiences, when, as you leave your train, you say: (*a*) "There is my father." (*b*) "That man looks very familiar but I can't remember ever seeing him before."

39. Make a list of at least six words, expressing 'feelings of relation.' (Do not repeat the statements of your text-book.) (*Th.*)

40. List the following studies according to prominence in

each of 'feelings of relation.' Place first the most 'relational': geography, arithmetic, spelling, grammar, history. (*Th.*)

41. Rewrite the following passage leaving out all words expressing relations: —

"Because of the annual overflow of the Nile the land in Egypt is fertilized by a deposit of rich soil brought down from the hills to the south. The land thus produces great crops of wheat for the same reason that the river plains of China produce large crops of rice. Hence Egypt used to be called the granary of Rome. The inferior methods of cultivation, largely by hand labor, are due to the lack of inventiveness and of education among the population, who sow by hand." (*Th.*)

IX. 42. What kind of experience — perception, imagination, or conception — is normally suggested by each of the following words and phrases: (*a*) "furniture"; (*b*) "the desk in the library at home"; (*c*) "the desk on the platform in front of me"; (*d*) "benevolence." (If a conception is suggested, classify it.)

43. Give an original example of at least three visually dissimilar objects which you conceive as belonging to the same class.

44. What is the difference between the trains of associated images normally associated by the following terms: "my dog;" "dogs."

45. Of the following expressions, which (if any) are correct? which (if any) are incorrect? (*a*) "I am thinking of Weissmann's doctrine of heredity." (*b*) "I can't think what the name is." (*c*) "I can't think how you could have done it."

46. What is the common fault of the verses which follow: —

"Deathless principle arise!"

"O worthy Beauty! peerless A Per Se."

X. 47. State three propositions standing respectively for: (*a*) a particular, negative, analytic judgment; (*b*) a particular, affirmative, synthetic judgment; (*c*) a general, negative, analytic judgment.

48. Give an example of inductive reasoning, followed by analytic-

synthetic deductive reasoning, in which the conclusion of the induction forms one judgment of the deduction.

49. Suppose that you have forgotten whether independence or independance is the correct spelling. How would you 'reason out' the correct spelling from your knowledge of Latin? How would this 'reasoning' differ from 'remembering' how to spell the word?

50. An office clerk sometimes forgot to turn off the electric light when he left at six o'clock and, in this case, he usually returned at eight to extinguish it. The office cat paid no attention to the light till after eight. Then, if the clerk had not returned, she put out the light by pulling down a cord. Describe the consciousness of the cat *on the supposition that animals do not reason.*

51. Is Max Müller justified in the statement: "reasoning is impossible without language or without signs"? Justify your answer.

XI. 52. Name and group the ten most important emotions.*

53. Name at least one emotion which seems not to be 'receptive,' or 'passive.' Is this a real or apparent exception to the teaching of pages 171–172, above?

54. Give at least two examples each of: (*a*) exciting, and (*b*) depressing emotion; and of (*c*) emotion with future object, (*d*) emotion with past object.

55. Place these emotions in the table on pages 175–176.

56. Name an emotion roughly parallel with each of the following: (*a*) reverence, (*b*) terror, (*c*) scorn, (*d*) vanity, (*e*) shame.

57. How do you define and classify jealousy?

58. Name, classify, enumerate the structural elements and the personal attitudes involved in the following emotions: (*a*) the emotion of Shylock toward Antonio; (*b*) of Macbeth toward Banquo's ghost; (*c*) of a little boy who is showing a new jackknife to his schoolmates; (*d*) the emotions of Mowgli as described in Question 8.

59. Name the bodily conditions and accompaniments (including cerebral conditions) of one of the emotions just described.

* This question should be answered before reading Chapter XI., II.

60. What is the emotion indicated by the following quotation; and how do you know?—

> "She felt the slackening frost distil
> Through her blood the last ooze dull and chill,
> Her lids were dry and her lips were still."

61. What are the main differences between my enjoyment of a slice of fruit cake and my enjoyment of a mountain view?

62. What are the main constituents of your amusement at the following answer to an examination question: "A vacuum is a chamber of empty air where the Pope lives."

63. What would be a foolish thing to say to a child if you were trying to cure his fear of the dark? What would be a wise thing to say?

64. What can you say *for* and *against* each of the following counsels: (*a*) "Choose a course in philosophy. It will be good discipline because you don't enjoy the study." (*b*) "Don't take philosophy. There are plenty of subjects which you like better." (*c*) "All ready to take the picture. Look bright and animated."

65. Why is, or is not, the following a good method of 'studying' Millet's "Gleaners": "How many women do you see in the picture? How many horses? What else do you see?" (*W.*, taken from Bagley.)

XII–XIII. 66. Name the differences and the likenesses between: (*a*) willing and wishing; (*b*) willing and believing that something will happen; (*c*) will and emotion.

67. Enumerate the structural elements, and the personal attitudes involved in (*a*) willing to get up in the morning; (*b*) willing to solve a problem in geometry.

68. Is your present consciousness of yourself as going to the bookstore to buy a book which is "advised" (not "required") in one of your courses (*a*) an impulse? (*b*) a simple volition? (*c*) a choice?. Justify vour rejection of each of two of these possible answers.

69. Why are people taught to run a typewriter without looking at the keys?

70. Characterize each of the following as illustration of the attitude of will or of faith: (*a*) Xerxes scourging the Hellespont. (*b*) The man who exclaimed, "My country, right or wrong!" (*c*) The Queen of Hearts, in "Alice in Wonderland," who met every crisis with the order "Off with his head."

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