ALFRED BINET

THE MIND AND THE BRAIN

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The Mind and the Brain / Being the Authorised Translation of L'Âme et le Corps:

Содержание

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BOOK I

THE DEFINITION OF MATTER

THE MIND AND THE BRAIN[1]

[1] *L'Ame et la Corps.*—Disagreeable as it is to alter an author's title, the words "Soul and Body" had to be abandoned because of their different connotation in English. The title "Mind and Body" was also preoccupied by Bain's work of that name in this series. The title chosen has M. Binet's approval.—Ed.

CHAPTER I
INTRODUCTION

This book is a prolonged effort to establish a distinction between what is called mind and what is called matter. Nothing is more simple than to realise this distinction when you do not go deeply into it; nothing is more difficult when you analyse it a little. At first sight, it seems impossible to confuse things so far apart as a thought and a block of stone; but on reflection this great contrast vanishes, and other differences have to be sought which are less apparent and of which one has not hitherto dreamed.

First let us say how the question presents itself to us. The fact which we must take as a starting point, for it is independent of every kind of theory, is that there exists something which is "knowable." Not only science, but ordinary life and our everyday conversation, imply that there are things that we know. It is with regard to these things that we have to ask ourselves if some belong to what we call the mind and others to what we call matter.

Let us suppose, by way of hypothesis, the knowable to be entirely and absolutely homogeneous. In that case we should be obliged to set aside the question as one already decided. Where everything is homogeneous, there is no distinction to be drawn. But this hypothesis is, as we all know, falsified by observation. The whole body of the knowable is formed from an agglomeration of extremely varied elements, amongst which it is

easy to distinguish a large number of divisions. Things may be classified according to their colour, their shape, their weight, the pleasure they give us, their quality of being alive or dead, and so on; one much given to classification would only be troubled by the number of possible distinctions.

Since so many divisions are possible, at which shall we stop and say: this is the one which corresponds exactly to the opposition of mind and matter? The choice is not easy to make; for we shall see that certain authors put the distinction between the physical and the mental in one thing, others in another. Thus there have been a very large number of distinctions proposed, and their number is much greater than is generally thought. Since we propose to make ourselves judges of these distinctions, since, in fact, we shall reject most of them in order to suggest entirely new ones, it must be supposed that we shall do so by means of a criterion. Otherwise, we should only be acting fantastically. We should be saying peremptorily, "In my opinion this is mental," and there would be no more ground for discussion than, if the assertion were "I prefer the Romanticists to the Classicists," or "I consider prose superior to poetry."

The criterion which I have employed, and which I did not analyse until the unconscious use I had made of it revealed its existence to me, is based on the two following rules:—

1. *A Rule of Method.*—The distinction between mind and matter must not only apply to the whole of the knowable, but must be the deepest which can divide the knowable, and must

further be one of a permanent character. *A priori*, there is nothing to prove the existence of such a distinction; it must be sought for and, when found, closely examined.

2. *An Indication of the Direction in which the Search must be Made.*—Taking into account the position already taken up by the majority of philosophers, the manifestation of mind, if it exists, must be looked for in the domain of facts dealt with by psychology, and the manifestation of matter in the domain explored by physicists.

I do not conceal from myself that there may be much that is arbitrary in my own criterion; but this does not seem to me possible to avoid. We must therefore appeal to psychology, and ask whether it is cognisant of any phenomenon offering a violent, lasting, and ineffaceable contrast with all the rest of the knowable.

The Method of Concepts and the Method of Enumeration.—Many authors are already engaged in this research, and employ a method which I consider very bad and very dangerous—the method of concepts. This consists in looking at real and concrete phenomena in their most abstract form. For example, in studying the mind, they use this word "mind" as a general idea which is supposed to contain all the characteristics of psychical phenomena; but they do not wait to enumerate these characteristics or to realise them, and they remain satisfied with the extremely vague idea springing from an unanalysed concept. Consequently they use the word "mind" with the imprudence of

a banker who should discount a trade bill without ascertaining whether the payment of that particular piece of paper had been provided for. This amounts to saying that the discussion of philosophical problems takes especially a verbal aspect; and the more complex the phenomena a concept thus handled, contains, the more dangerous it is. A concept of the colour red has but a very simple content, and by using it, this content can be very clearly represented. But how can the immense meaning of the word "mind" be realised every time that it is used? For example, to define mind and to separate it from the rest of the knowable which is called matter, the general mode of reasoning is as follows: all the knowable which is apparent to our senses is essentially reduced to motion; "mind," that something which lives, feels, and judges, is reduced to "thought." To understand the difference between matter and mind, it is necessary to ask one's self whether there exists any analogy in nature between motion and thought. Now this analogy does not exist, and what we comprehend, on the contrary, is their absolute opposition. Thought is not a movement, and has nothing in common with a movement. A movement is never anything else but a displacement, a transfer, a change of place undergone by a particle of matter. What relation of similarity exists between this geometrical fact and a desire, an emotion, a sensation of bitterness? Far from being identical, these two facts are as distinct as any facts can be, and their distinction is so deep that it should be raised to the height of a principle, the principle of

heterogeneity.

This is almost exactly the reasoning that numbers of philosophers have repeated for several years without giving proof of much originality. This is what I term the metaphysics of concept, for it is a speculation which consists in juggling with abstract ideas. The moment that a philosopher opposes thought to movement, I ask myself under what form he can think of a "thought," I suppose he must very poetically and very vaguely represent to himself something light and subtle which contrasts with the weight and grossness of material bodies. And thus our philosopher is punished in the sinning part; his contempt of the earthly has led him into an abuse of abstract reasoning, and this abuse has made him the dupe of a very naïve physical metaphor.

At bottom I have not much faith in the nobility of many of our abstract ideas. In a former psychological study[2] I have shown that many of our abstractions are nothing else than embryonic, and, above all, loosely defined concrete ideas, which can satisfy only an indolent mind, and are, consequently, full of snares.

The opposition between mind and matter appears to me to assume a very different meaning if, instead of repeating ready-made formulas and wasting time on the game of setting concept against concept, we take the trouble to return to the study of nature, and begin by drawing up an inventory of the respective phenomena of mind and matter, examining with each of these phenomena the characteristics in which the first-named differ

[2] *Étude expérimentale de l'Intelligence.* Paris: Schleicher.

from the second. It is this last method, more slow but more sure than the other, that we shall follow; and we will commence by the study of matter.

CHAPTER II
OUR KNOWLEDGE OF EXTERNAL OBJECTS IS ONLY SENSATIONS

Of late years numerous studies have been published on the conception of matter, especially by physicists, chemists, and mathematicians. Among these recent contributions to science I will quote the articles of Duhem on the Evolution of Mechanics published in 1903 in the *Revue générale des Sciences*, and other articles by the same author, in 1904, in the *Revue de Philosophie*. Duhem's views have attracted much attention, and have dealt a serious blow at the whole theory of the mechanics of matter. Let me also quote that excellent work of Dastre, *La Vie et la Mort*, wherein the author makes so interesting an application to biology of the new theories on energetics; the discussion between Ostwald and Brillouin on matter, in which two rival conceptions find themselves engaged in a veritable hand-to-hand struggle (*Revue générale des Sciences*, Nov. and Dec. 1895); the curious work of Dantec on *les Lois Naturelles*, in which the author ingeniously points out the different sensorial districts into which science is divided, although, through a defect in logic, he accepts mechanics as the final explanation of things. And last, it is impossible to pass over, in silence, the rare works of Lord Kelvin, so full, for French readers, of unexpected suggestions,

for they show us the entirely practical and empirical value which the English attach to mechanical models.

My object is not to go through these great studies in detail. It is the part of mathematical and physical philosophers to develop their ideas on the inmost nature of matter, while seeking to establish theories capable of giving a satisfactory explanation of physical phenomena. This is the point of view they take up by preference, and no doubt they are right in so doing. The proper rôle of the natural sciences is to look at phenomena taken by themselves and apart from the observer.

My own intention, in setting forth these same theories on matter, is to give prominence to a totally different point of view. Instead of considering physical phenomena in themselves, we shall seek to know what idea one ought to form of their nature when one takes into account that they are observed phenomena. While the physicist withdraws from consideration the part of the observer in the verification of physical phenomena, our rôle is to renounce this abstraction, to re-establish things in their original complexity, and to ascertain in what the conception of matter consists when it is borne in mind that all material phenomena are known only in their relation to ourselves, to our bodies, our nerves, and our intelligence.

This at once leads us to follow, in the exposition of the facts, an order which the physicist abandons. Since we seek to know what is the physical phenomenon we perceive, we must first enunciate this proposition, which will govern the whole of our discussion:

to wit—

Of the outer world we know nothing except our sensations.

Before demonstrating this proposition, let us develop it by an example which will at least give us some idea of its import. Let us take as example one of those investigations in which, with the least possible recourse to reasoning, the most perfected processes of observation are employed, and in which one imagines that one is penetrating almost into the very heart of nature. We are, let us suppose, dissecting an animal. After killing it, we lay bare its viscera, examine their colour, form, dimensions, and connections; then we dissect the organs in order to ascertain their internal nature, their texture, structure, and function; then, not content with ocular anatomy, we have recourse to the perfected processes of histology: we take a fragment of the tissues weighing a few milligrammes, we fix it, we mount it, we make it into strips of no more than a thousandth of a millimetre thick, we colour it and place it under the microscope, we examine it with the most powerful lenses, we sketch it, and we explain it. All this work of complicated and refined observation, sometimes lasting months and years, results in a monograph containing minute descriptions of organs, of cells, and of intra-cellular structures, the whole represented and defined in words and pictures. Now, these descriptions and drawings are the display of the various sensations which the zoologist has experienced in the course of his labours; to those sensations are added the very numerous interpretations derived from the memory, reasoning, and often,

also, from the imagination on the part of the scholar, the last a source at once of errors and of discoveries. But everything properly experimental in the work of the zoologist proceeds from the sensations he has felt or might have felt, and in the particular case treated of, these sensations are almost solely visual.

This observation might be repeated with regard to all objects of the outer world which enter into relation with us. Whether the knowledge of them be of the common-place or of a scientific order matters little. Sensation is its limit, and all objects are known to us by the sensations they produce in us, and are known to us solely in this manner. A landscape is nothing but a cluster of sensations. The outward form of a body is simply sensation; and the innermost and most delicate material structure, the last visible elements of a cell, for example, are all, in so far as we observe them with the microscope, nothing but sensation.

This being understood, the question is, why we have just admitted—with the majority of authors—that we cannot really know a single object as it is in itself, and in its own nature, otherwise than by the intermediary of the sensations it provokes in us? This comes back to saying that we here require explanations on the two following points: why do we admit that we do not really perceive the objects, but only something intermediate between them and us; and why do we call this something intermediate a sensation? On this second point I will offer, for the time being, one simple remark: we use the term sensation for lack of any other to express the intermediate

character of our perception of objects; and this use does not, on our part, imply any hypothesis. Especially do we leave completely in suspense the question whether sensation is a material phenomenon or a state of being of the mind. These are questions we will deal with later. For the present it must be understood that the word sensation is simply a term for the something intermediate between the object and our faculty of cognition.[3] We have, therefore, simply to state why we have admitted that the external perception of objects is produced mediately or by procuration.

There are a few philosophers, and those not of the lowest rank, who have thought that this intermediate character of all perception was so evident that there was no need to insist further upon it. John Stuart Mill, who was certainly and perhaps more than anything a careful logician, commences an exposition of the idealist thesis to which he was so much attached, by carelessly saying: "It goes without saying that objects are known to us through the intermediary of our senses.... The senses are equivalent to our sensations;"[4] and on those propositions he rears his whole system, "It goes without saying …" is a trifle thoughtless. I certainly think he was wrong in not testing more carefully the solidity of his starting point.

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[3] *Connaissance.*—The word cognition is used throughout as the English equivalent of this, except in places where the context shows that it means acquaintance merely. —Ed.

[4] J. S. Mill, *An Examination of Sir Wm. Hamilton's Philosophy*, pp. 5 and 6. London. 1865.

In the first place, this limit set to our knowledge of the objects which stimulate our sensations is only accepted without difficulty by well-informed persons; it much astonishes the uninstructed when first explained to them. And this astonishment, although it may seem so, is not a point that can be neglected, for it proves that, in the first and simple state of our knowledge, we believe we directly perceive objects as they are. Now, if we, the cultured class, have, for the most part,[5] abandoned this primitive belief, we have only done so on certain implicit conditions, of which we must take cognisance. This is what I shall now demonstrate as clearly as I can.

Take the case of an unlearned person. To prove to him that he knows sensations alone and not the bodies which excite them, a very striking argument may be employed which requires no subtle reasoning and which appeals to his observation. This is to inform him, supposing he is not aware of the fact, that, every time he has the perception of an exterior object, there is something interposed between the object and himself, and that that something is his nervous system.

If we were not acquainted with the existence of our nervous system, we should unhesitatingly admit that our perception of objects consisted in some sort of motion towards the places in which they were fixed. Now, a number of experiments prove to us that objects are known to us as excitants of our nervous system which only act on this system by entering into communication,

[5] A few subtle philosophers have returned to it, as I shall show later in chapter iv.

or coming into contact with, its terminal extremities. They then produce, in the interior of this system, a peculiar modification which we are not yet able to define. It is this modification which follows the course of the nerves and is carried to the central parts of the system. The speed of the propagation of this nerve modification has been measured by certain precise experiments in psychometry; the journey is made slowly, at the rate of 20 to 30 metres per second, and it is of interest that this rate of speed lets us know at what moment and, consequently, by what organic excitement, the phenomenon of consciousness is produced. This happens when the cerebral centres are affected; the phenomenon of consciousness is therefore posterior to the fact of the physical excitement.

I believe it has required a long series of accepted observations for us to have arrived at this idea, now so natural in appearance, that the modifications produced within our nervous system are the only states of which we can have a direct consciousness; and as experimental demonstration is always limited, there can be no absolute certainty that things never happen otherwise, that we never go outside ourselves, and that neither our consciousness nor our nervous influx can exteriorise itself, shoot beyond our material organs, and travel afar in pursuit of objects in order to know or to modify them.

Before going further, we must make our terminology more precise. We have just seen the necessity of drawing a distinction between the sensations of which we are conscious and the

unknown cause which produces these sensations by acting on our nervous systems. This exciting cause I have several times termed, in order to be understood, the external object. But under the name of external object are currently designated groups of sensations, such as those which make up for us a chair, a tree, an animal, or any kind of body. I see a dog pass in the street. I call this dog an external object; but, as this dog is formed, for me who am looking at it, of my sensations, and as these sensations are states of my nervous centres, it happens that the term external object has two meanings. Sometimes it designates our sensations; at another, the exciting cause of our sensations. To avoid all confusion we will call this exciting cause, which is unknown to us, the *X* of matter.

It is, however, not entirely unknown, for we at least know two facts with regard to it. We know, first, that this *X* exists, and in the second place, that its image must not be sought in the sensations it excites in us. How can we doubt, we say, that it exists? The same external observation proves to us at once that there exists an object distinct from our nerves, and that our nerves separate us from it. I insist on this point, for the reason that some authors, after having unreservedly admitted that our knowledge is confined to sensations, have subsequently been hard put to it to demonstrate the reality of the excitant distinct from the sensations.[6] Of this we need no demonstration, and the testimony

[6] Thus, the perplexity in which John Stuart Mill finds himself is very curious. Having admitted unreservedly that our knowledge is confined to sensations, he is powerless

of our senses suffices. We have seen the excitant, and it is like a friend who should pass before us in disguise so well costumed and made up that we can attribute to his real self nothing of what we see of him, but yet we know that it is he.

And, in fact, let us remember what it is that we have argued upon—viz. on an observation. I look at my hand, and I see an object approaching it which gives me a sensation of feeling. I at first say that this object is an excitant. It is pointed out to me that I am in error. This object, which appears to me outside my nervous system, is composed, I am told, of sensations. Be it so, I have the right to answer; but if all that I perceive is sensation, my nervous system itself is a sensation; if it is only that, it is no longer an intermediary between the excitant and myself, and it is the fact that we perceive things as they are. For it to be possible to prove that I perceive, not the object, but that *tertium quid* which is sensation, it has to be admitted that the nervous system is a reality external to sensation and that objects which assume, in relation to it, the rôle of excitants and of which we perceive the existence, are likewise realities external to sensation.

This is what is demonstrated by abstract reasoning, and this reasoning is further supported by a common-sense argument. The outer world cannot be summarised in a few nervous systems suspended like spiders in empty space. The existence of a

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to set up a reality outside this, and acknowledges that the principle of causality cannot legitimately be used to prove that our sensations have a cause which is not a sensation, because this principle cannot be applied outside the world of phenomena.

nervous system implies that of a body in which it is lodged. This body must have complicated organs; its limbs presuppose the soil on which the animal rests, its lungs the existence of oxygen vivifying its blood, its digestive tube, aliments which it digests and assimilates to its substance, and so on. We may indeed admit that this outer world is not, in itself, exactly as we perceive it; but we are compelled to recognise that it exists by the same right as the nervous system, in order to put it in its proper place.

The second fact of observation is that the sensations we feel do not give us the true image of the material *X* which produces them. The modification made in our substance by this force *X* does not necessarily resemble in its nature the nature of that force. This is an assertion opposed to our natural opinions, and must consequently be demonstrated. It is generally proved by the experiments which reveal what is called "the law of the specific energy of the nerves." This is an important law in physiology discovered by Müller two centuries ago, and consequences of a philosophical order are attached to it. The facts on which this law is based are these. It is observed that, if the sensory nerves are agitated by an excitant which remains constant, the sensations received by the patient differ according to the nerve affected. Thus, the terminals of an electric current applied to the ball of the eye give the sensation of a small luminous spark; to the auditory apparatus, the current causes a crackling sound; to the hand, the sensation of a shock; to the tongue, a metallic flavour. Conversely, excitants wholly different, but affecting the same

nerve, give similar sensations; whether a ray of light is projected into the eye, or the eyeball be excited by the pressure of a finger; whether an electric current is directed into the eye, or, by a surgical operation, the optic nerve is severed by a bistoury, the effect is always the same, in the sense that the patient always receives a sensation of light. To sum up, in addition to the natural excitant of our sensory nerves, there are two which can produce the same sensory effects, that is to say, the mechanical and the electrical excitants. Whence it has been concluded that the peculiar nature of the sensation felt depends much less on the nature of the excitant producing it than on that of the sensory organ which collects it, the nerve which propagates it, or the centre which receives it. It would perhaps be going a little too far to affirm that the external object has no kind of resemblance to the sensations it gives us. It is safer to say that we are ignorant of the degree in which the two resemble or differ from each other.

On thinking it over, it will be found that this contains a very great mystery, for this power of distinction (*specificité*) of our nerves is not connected with any detail observable in their structure. It is very probably the receiving centres which are specific. It is owing to them and to their mechanism that we ought to feel, from the same excitant, a sensation of sound or one of colour, that is to say, impressions which appear, when compared, as the most different in the world. Now, so far as we can make out, the histological structure of our auditory centre is the same as that of our visual centre. Both are a collection of

cells diverse in form, multipolar, and maintained by a conjunctive pellicule (*stroma*). The structure of the fibres and cells varies slightly in the motor and sensory regions, but no means have yet been discovered of perceiving a settled difference between the nerve-cells of the optic centre and those of the auditory centre. There should be a difference, as our mind demands it; but our eye fails to note it.

Let us suppose, however, that to-morrow, or several centuries hence, an improved *technique* should show us a material difference between the visual and the auditory neurone. There is no absurdity in this supposition; it is a possible discovery, since it is of the order of material facts. Such a discovery, however, would lead us very far, for what terribly complicates this problem is that we cannot directly know the structure of our nervous system. Though close to us, though, so to speak, inside us, it is not known to us otherwise than is the object we hold in our hands, the ground we tread, or the landscape which forms our horizon.

For us it is but a sensation, a real sensation when we observe it in the dissection of an animal, or the autopsy of one of our own kind; an imaginary and transposed sensation, when we are studying anatomy by means of an anatomical chart; but still a sensation. It is by the intermediary of our nervous system that we have to perceive and imagine what a nervous system is like; consequently we are ignorant as to the modification impressed on our perceptions and imaginations by this intermediary, the nature of which we are unable to grasp.

Therefore, when we attempt to understand the inmost nature of the outer world, we stand before it as before absolute darkness. There probably exists in nature, outside of ourselves, neither colour, odour, force, resistance, space, nor anything that we know as sensation. Light is produced by the excitement of the optic nerve, and it shines only in our brain; as to the excitement itself, there is nothing to prove that it is luminous; outside of us is profound darkness, or even worse, since darkness is the correlation of light. In the same way, all the sonorous excitements which assail us, the creakings of machines, the sounds of nature, the words and cries of our fellows are produced by excitements of our acoustic nerve; it is in our brain that noise is produced, outside there reigns a dead silence. The same may be said of all our other senses.

Not one of our senses, absolutely none, is the revealer of external reality. From this point of view there is no higher and no lower sense. The sensations of sight, apparently so objective and so searching, no more take us out of ourselves than do the sensations of taste which are localised in the tongue.

In short, our nervous system, which enables us to communicate with objects, prevents us, on the other hand, from knowing their nature. It is an organ of relation with the outer world; it is also, for us, a cause of isolation. We never go outside ourselves. We are walled in. And all we can say of matter and of the outer world is, that it is revealed to us solely by the sensations it affords us, that it is the unknown cause of our sensations, the

inaccessible excitant of our organs of the senses, and that the ideas we are able to form as to the nature and the properties of that excitant, are necessarily derived from our sensations, and are subjective to the same degree as those sensations themselves.

But we must make haste to add that this point of view is the one which is reached when we regard the relations of sensation with its unknown cause the great *X* of matter.[7] Positive science and practical life do not take for an objective this relation of sensation with the Unknowable; they leave this to metaphysics. They distribute themselves over the study of sensation and examine the reciprocal relations of sensations with sensations. Those last, condemned as misleading appearances when we seek in them the expression of the Unknowable, lose this illusory character when we consider them in their reciprocal relations. Then they constitute for us reality, the whole of reality and the only object of human knowledge. The world is but an assembly of present, past, and possible sensations; the affair of science is to analyse and co-ordinate them by separating their accidental from their constant relations.

[7] See p. 18, *sup.*—Ed.

CHAPTER III
THE MECHANICAL THEORIES OF MATTER ARE ONLY SYMBOLS

If we keep firmly in mind the preceding conclusion—a conclusion which is neither exclusively my own, nor very new—we shall find a certain satisfaction in watching the discussions of physicists on the essence of matter, on the nature of force and of energy, and on the relations of ponderable and imponderable matter. We all know how hot is the fight raging on this question. At the present time it is increasing in intensity, in consequence of the disturbance imported into existing theories by the new discoveries of radio-activity.[8] We psychologists can look on very calmly at these discussions, with that selfish pleasure we unavowedly feel when we see people fighting while ourselves safe from knocks. We have, in fact, the feeling that, come what may from the discussions on the essence of matter, there can be no going beyond the truth that matter is an excitant of our nervous system, and is only known in connection with, the perception we have of this last.

If we open a work on physics or physiology we shall note with astonishment how the above considerations are misunderstood.

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[8] I would draw attention to a recent volume by Gustave Le Bon, on *Evolution de la Matière*, a work full of original and bold ideas.

Observers of nature who seek, and rightly, to give the maximum of exactness to their observations, show that they are obsessed by one constant prejudice: they mistrust sensation.

A great part of their efforts consists, by what they say, in reducing the rôle of sensation to its fitting part in science; and the invention of mechanical aids to observation is constantly held up as a means of remedying the imperfection of our senses. In physics the thermometer replaces the sensation of heat that our skin—our hand, for example—experiences by the measurable elevation of a column of mercury, and the scale-pan of a precise balance takes the place of the vague sensation of trifling weights; in physiology a registering apparatus replaces the sensation of the pulse which the doctor feels with the end of his forefinger by a line on paper traced with indelible ink, of which the duration and the intensity, as well as the varied combinations of these two elements, can be measured line by line.

Learned men who pride themselves on their philosophical attainments vaunt in very eloquent words the superiority of the physical instrument over mere sensation. Evidently, however, the earnestness of this eulogy leads them astray. The most perfect registering apparatus must, in the long-run, after its most scientific operations, address itself to our senses and produce in us some small sensation. The reading of the height reached by the column of mercury in a thermometer when heated is accomplished by a visual sensation, and it is by the sight that the movements of the balance are controlled; and that the traces

of the sphygmograph are analysed. We may readily admit to physicists and physiologists all the advantages of these apparatus. This is not the question. It simply proves that there are sensations and sensations, and that certain of these are better and more precise than others. The visual sensation of relation in space seems to be *par excellence* the scientific sensation which it is sought to substitute for all the rest. But, after all, it is but a sensation.

Let us recognise that there is, in all this contempt on the part of physicists for sensation, only differences in language, and that a paraphrase would suffice to correct them without leaving any trace. Be it so. But something graver remains. When one is convinced that our knowledge of the outer world is limited to sensations, we can no longer understand how it is possible to give oneself up, as physicists do, to speculations upon the constitution of matter.

Up to the present there have been three principal ways of explaining the physical phenomena of the universe. The first, the most abstract, and the furthest from reality, is above all verbal. It consists in the use of formulas in which the quality of the phenomena is replaced by their magnitude, in which this magnitude, ascertained by the most precise processes of measurement, becomes the object of abstract reasoning which allows its modifications to be foreseen under given experimental conditions. This is pure mathematics, a formal science depending upon logic. Another conception, less restricted than the above,

and of fairly recent date, consists in treating all manifestations of nature as forms of energy. This term "energy" has a very vague content. At the most it expresses but two things: first, it is based on a faint recollection of muscular force, and it reminds one dimly of the sensation experienced when clenching the fists; and, secondly, it betrays a kind of very natural respect for the forces of nature which, in all the images man has made of them, constantly appear superior to his own. We may say "the energy of nature;" but we should never say, what would be experimentally correct; "the weakness of nature." The word "weakness" we reserve for ourselves. Apart from these undecided suggestions, the term energy is quite the proper term to designate phenomena, the intimate nature of which we do not seek to penetrate, but of which we only wish to ascertain the laws and measure the degrees.

A third conception, more imaginative and bolder than the others, is the mechanical or kinetic theory. This last absolutely desires that we should represent to ourselves, that we should imagine, how phenomena really take place; and in seeking for the property of nature the most clearly perceived, the easiest to define and analyse, and the most apt to lend itself to measurement and calculation, it has chosen motion. Consequently all the properties of matter have been reduced to this one, and in spite of the apparent contradiction of our senses, it has been supposed that the most varied phenomena are produced, in the last resort, by the displacement of material

particles. Thus, sound, light, heat, electricity, and even the nervous influx would be due to vibratory movements, varying only by their direction and their periods, and all nature is thus explained as a problem of animated geometry. This last theory, which has proved very fertile in explanations of the most delicate phenomena of sound and light, has so strongly impressed many minds that it has led them to declare that the explanation of phenomena by the laws of mechanics alone has the character of a scientific explanation. Even recently, it seemed heresy to combat these ideas.

Still more recently, however, a revulsion of opinion has taken place. Against the physicists, the mathematicians in particular have risen up, and taking their stand on science, have demonstrated that all the mechanisms invented have crowds of defects. First, in each particular case, there is such a complication that that which is defined is much more simple than the definition; then there is such a want of unity that quite special mechanisms adapted to each phenomenal detail have to be imagined; and, lastly—most serious argument of all—so much comprehensiveness and suppleness is employed, that no experimental law is found which cannot be understood mechanically, and no fact of observation which shows an error in the mechanical explanation—a sure proof that this mode of explanation has no meaning.

My way of combating the mechanical theory starts from a totally different point of view. Psychology has every right to say

a few words here, as upon the value of every kind of scientific theory; for it is acquainted with the nature of the mental needs of which these theories are the expression and which these theories seek to satisfy. It has not yet been sufficiently noticed that psychology does not allow itself to be confined, like physics or sociology, within the logical table of human knowledge, for it has, by a unique privilege, a right of supervision over the other sciences. We shall see that the psychological discussion of mechanics has a wider range than that of the mathematicians.

Since our cognition cannot go beyond sensation, shall we first recall what meaning can be given to an explanation of the inmost nature of matter? It can only be an artifice, a symbol, or a process convenient for classification in order to combine the very different qualities of things in one unifying synthesis—a process having nearly the same theoretical value as a *memoria technica*, which, by substituting letters for figures, helps us to retain the latter in our minds. This does not mean that figures are, in fact, letters, but it is a conventional substitution which has a practical advantage. What *memoria technica* is to the ordinary memory, the theory of mechanics should be for our needed unification.

Unfortunately, this is not so. The excuse we are trying to make for the mechanicians is illusory. There is no mistaking their ambition, Notwithstanding the prudence of some and the equivocations in which others have rejoiced, they have drawn their definition in the absolute and not in the relative. To take their conceptions literally, they have thought the movement of

matter to be something existing outside our eye, our hands, and our sense; in a word, something *noumenal*, as Kant would have said. The proof that this is their real idea, is that movement is presented to us as the true outer and explanatory cause of our sensations, the external excitement to our nerves. The most elementary works on physics are impregnated with this disconcerting conception. If we open a description of acoustics, we read that sound and noise are subjective states which have no reality outside our auditory apparatus; that they are sensations produced by an external cause, which is the vibratory movement of sonorous bodies—whence the conclusion that this vibratory movement is not itself a sensation. Or, shall we take another proof, still more convincing. This is the vibratory and silent movement which is invoked by physicists to explain the peculiarities of subjective sensation; so that the interferences, the pulsations of sound, and, in fine, the whole physiology of the ear, is treated as a problem in kinematics, and is explained by the composition of movements.

What kind of reality do physicists then allow to the displacements of matter? Where do they place them, since they recognise otherwise that the essence of matter is unknown to us? Are we to suppose that, outside the world of *noumena*, outside the world of phenomena and sensations, there exists a third world, an intermediary between the two former, the world of atoms and that of mechanics?

A short examination will, moreover, suffice to show of what

this mechanical model is formed which is presented to us as constituting the essence of matter. This can be nothing else than the sensations, since we are incapable of perceiving or imagining anything else. It is the sensations of sight, of touch, and even of the muscular sense. Motion is a fact seen by the eye, felt by the hand; it enters into us by the perception we have of the solid masses visible to the naked eye which exist in our field of observation, of their movements and their equilibrium and the displacement we ourselves effect with our bodies. Here is the sensory origin, very humble and very gross, of all the mechanics of the atoms. Here is the stuff of which our lofty conception is formed. Our mind can, it is true, by a work of purification, strip movement of most of its concrete qualities, separate it even from the perception of the object in motion, and make of it a something or other ideal and diagrammatic; but there will still remain a residuum of visual, tactile, and muscular sensations, and consequently it is still nothing else than a subjective state, bound to the structure of our organs. We are, for the rest, so wrapped up in sensations that none of our boldest conceptions can break through the circle.

But it is not the notion of movement alone which proceeds from sensation. There is also that of exteriority, of space, of position, and, by opposition, that of external or psychological events. Without declaring it to be certain, I will remind you that it is infinitely probable that these notions are derived from our muscular experience. Free motion, arrested motion, the effort,

the speed, and the direction of motion, such are the sensorial elements, which, in all probability, constitute the foundation of our ideas on space and its properties. And those are so many subjective notions which we have no right to treat as objects belonging to the outer world.

What is more remarkable, also, is that even the ideas of object, of body, and of matter, are derived from visual and tactile sensations which have been illegitimately set up as entities. We have come, in fact, to consider matter as a being separate from sensations, superior to our sensations, distinct from the properties which enable us to know it, and binding together these properties, as it were, in a sheaf. Here again is a conception at the base of visualisation and muscularisation; it consists in referring to the visual and other sensations, raised for the occasion to the dignity of external and permanent causes, the other sensations which are considered as the effects of the first named upon our organs of sense.

It demands a great effort to clear our minds of these familiar conceptions which, it is plain are nothing but naïve realism. Yes! the mechanical conception of the universe is nothing but naïve realism.

To recapitulate our idea, and, to make it more plain by an illustration, here is a tuning-fork on the table before me. With a vigorous stroke of the bow I set it vibrating. The two prongs separate, oscillate rapidly, and a sound of a certain tone is heard. I connect this tuning-fork, by means of electric wires, with a

Déprez recording apparatus which records the vibrations on the blackened surface of a revolving cylinder; and we can thus, by an examination of the trace made under our eyes, ascertain all the details of the movement which animates it. We see, parallel to each other, two different orders of phenomena; the visual phenomena which show us that the tuning-fork is vibrating, and the auditory phenomena which convey to us the fact that it is making a sound.

The physicist, asked for an explanation of all this, will answer: "It is the vibration of the tuning-fork which, transmitted by the air, is carried to our auditory apparatus, causes a vibration in the tympanum, the movements of which are communicated to the small bones of the middle ear, thence (abridging details) to the terminations of the auditory nerve, and so produces in us the subjective sensation of sound." Well, in so saying, the physicist commits an error of interpretation; outside our ears there exists something we do not know which excites them; this something cannot be the vibratory movement of the tuning-fork, for this vibratory movement which we can see is likewise a subjective sensation; it no more exists outside our sight than sound exists outside our ears. In any case, it is as absurd to explain a sensation of sound by one of sight, as a sensation of sight by one of sound.

One would be neither further from nor nearer to the truth if we answered that physicist as follows: "You give the preponderance to your eye; I myself give it to my ear. This tuning-fork appears to you to vibrate. Wrong! This is how the thing occurs. This

tuning-fork produces a sound which, by exciting our retina, gives us a sense of movement. This visual sensation of vibration is a purely subjective one, the external cause of the phenomenon is the sound. The outer world is a concert of sounds which rises in the immensity of space. Matter is noise and nothingness is silence."

This theory of the above experiment is not absurd; but, as a matter of fact, it is probable that no one would or could accept it, except verbally for amusement, as a challenge, or for the pleasure of talking metaphysics. The reason is that all our evolution, for causes which would take too long to detail, has established the hegemony of certain of our senses over the others. We have, above all, become visual and manual beings. It is the eye and the hand which give us the perceptions of the outer world of which we almost exclusively make use in our sciences; and we are now almost incapable of representing to ourselves the foundation of phenomena otherwise than by means of these organs. Thus all the preceding experiment from the stroke of the bow to the final noise presents itself to us in visual terms, and further, these terms are not confined to a series of detached sensations.

Visual sensation combines with the tactile and muscular sensations, and forms sensorial constructions which succeed each, other, continue, and arrange themselves logically: in lieu of sensations, there are objects and relations of space between these objects, and the actions which connect them, and the phenomena which pass from one to the other. All that is only sensation, if

you will; but merely as the agglutinated molecules of cement and of stone are a palace.

Thus the whole series of visual events which compose our experiment with the tuning-fork can be coherently explained. One understands that It is the movement of my hand equipped with the bow which is communicated to the tuning-fork. One understands that this movement passing into the fork has changed its form and rhythm, that the waves produced by the fork transmit themselves, by the oscillations of the air-molecules, to our tympanum, and so on. There is in all this series of experiments an admirable continuity which fully satisfies our minds. However much we might be convinced by the theoretical reasons given above, that we have quite as much right to represent the same series of events in an auditory form, we should be incapable of realising that form to ourselves.

What would be the structure of the ear to any one who only knew it through the sense of hearing? What would become of the tympanum, the small bones, the cochlea, and the terminations of the acoustic nerve, if it were only permitted to represent them in the language of sound? It is very difficult to imagine.

Since, however, we are theorising, let us not be stopped by a few difficulties of comprehension. Perhaps a little training might enable us to overcome them. Perhaps musicians, who discern as much reality in what one hears as in what one sees, would be more apt than other folk to understand the necessary transposition. Some of them, in their autobiographies, have

made, by the way, very suggestive remarks on the importance they attribute to sound: and, moreover, the musical world, with its notes, its intervals, and its orchestration, lives and develops in a manner totally independent of vibration.

Perhaps we can here quote one or two examples which may give us a lead. To measure the length of a body instead of applying to it a yard-wand, one might listen to its sound; for the pitch of the sound given by two cords allows us to deduce their difference of length, and even the absolute length of each. The chemical composition of a body might be noted by its electric resistance and the latter verified by the telephone; that is to say, by the ear. Or, to take a more subtle example. We might make calculations with sounds of which we have studied the harmonic relations as we do nowadays with figures. A sum in rule of three might even be solved sonorously; for, given three sounds, the ear can find a fourth which should have the same relation to the third as the second to the first. Every musical ear performs this operation easily; now, this fourth sound, what else is it but the fourth term in a rule of three? And by taking into consideration the number of its vibrations a numerical solution would be found to the problem. This novel form of calculating machine might serve to fix the price of woollen stuffs, to calculate brokerages and percentages, and the solution would be obtained without the aid of figures, without calculation, without visualisation, and by the ear alone.

By following up this idea, also, we might go a little further.

We might arrive at the conviction that our present science is human, petty, and contingent; that it is closely linked with the structure of our sensory organs; that this structure results from the evolution which fashioned these organs; that this evolution has been an accident of history; that in the future it may be different; and that, consequently, by the side or in the stead of our modern science, the work of our eyes and hands—and also of our words—there might have been constituted, there may still be constituted, sciences entirely and extraordinarily new—auditory, olfactory, and gustatory sciences, and even others derived from other kinds of sensations which we can neither foresee nor conceive because they are not, for the moment, differentiated in us. Outside the matter we know, a very special matter fashioned of vision and touch, there may exist other matter with totally different properties.

But let us bring our dream to an end. The interest of our discussion does not lie in the hypothetical substitution of hearing or any other sense for sight. It lies in the complete suppression of all explanation of the noumenal object in terms borrowed from the language of sensation. And that is our last word. We must, by setting aside the mechanical theory, free ourselves from a too narrow conception of the constitution of matter. And this liberation will be to us a great advantage which we shall soon reap. We shall avoid the error of believing that mechanics is the only real thing and that all that cannot be explained by mechanics must be incomprehensible. We shall then gain more liberty of

mind for understanding what the union of the soul with the body[9] may be.

[9] See [Note 1] on p. 3 .—Ed.

CHAPTER IV
ANSWERS TO SOME OBJECTIONS, AND SUMMARY

I have set forth the foregoing ideas by taking the road which to me seemed the best. On reflection it has occurred to me that my manner of exposition and demonstration may be criticised much more than my conclusion. Now, as it is the conclusion alone which here is of importance, it is expedient not to make it responsible for the arguments by which I have supported it.

These arguments resolve themselves into the attestation that between objects and our consciousness there exists an intermediary, our nervous system. We have even established that the existence of this intermediary is directly proved by observation, and from this I have concluded that we do not directly perceive the object itself but a *tertium quid*, which is our sensations.

Several objections to this might be made. Let us enumerate them.

1. It is not inconceivable that objects may act directly on our consciousness without taking the intermediary of our nervous system. Some authors, the spiritualists notably, believe in the possibility of disembodied souls, and they admit by implication that these souls remain in communication with the terrestrial

world, witness our actions, and hear our speech. Since they no longer have organs of sense, we must suppose that these wandering souls, if they exist, can directly perceive material objects. It is evident that such hypotheses have, up till now, nothing scientific in them, and that the demonstrations of them which are given raise a feeling of scepticism more than anything else. Nevertheless, we have not the right to exclude, by *a priori* argument, the possibility of this category of phenomena.

2. Several German authors have maintained in recent years, that if the nervous system intervenes in the perception of external objects, it is a faithful intermediary which should not work any change on those physical actions which it gathers from outside to transmit to our consciousness. From this, point of view colour would exist as colour, outside our eyes, sound would exist as sound, and in a general way there would not be, in matter, any mysterious property left, since we should perceive matter as it is. This is a very unexpected interpretation, by which men of science have come to acknowledge the correctness of the common belief: they rehabilitate an opinion which philosophers have till now turned to ridicule, under the name of naïve realism. All which proves that the naïveté of some may be the excessive refinement of others.

To establish scientifically this opinion they batter down the theory of the specific energy of the nerves. I have recalled in a previous page[10] of what this theory consists. I have shown

[10] See p. 22, *sup.*—Ed.

that if, by mechanical or electrical means, our different sensory nerves are excited, notwithstanding the identity of the excitant, a different sensation is provoked in each case—light when the optic nerve is stimulated, sound when the acoustic, and so on. It is now answered to this argument based on fact that the nature of these excitants must be complex. It is not impossible, it is thought, that the electric force contains within itself both luminous and sonorous actions; it is not impossible that a mechanical excitement should change the electric state of the nerve affected, and that, consequently, these subsidiary effects explain how one and the same agent may, according to the nerves employed, produce different effects.

3. After the spiritualists and the experimentalists, let us take the metaphysicians. Among them one has always met with the most varying specimens of opinions and with arguments for and against all possible theories.

Thus it is, for example, with the external perception. Some have supposed it indirect, others, on the contrary, that it acts directly on the object. Those who uphold the direct theory are inspired by Berkeley, who asserts that the sensitive qualities of the body have no existence but in our own minds, and consist really in representative ideas. This doctrine is expressly based on this argument—that thought differs too much in nature from matter for one to be able to suppose any link between these two substances. In this particular, some authors often make an assertion without endeavouring to prove it. They are

satisfied with attesting, or even with supposing, that mind can have no consciousness of anything but its own states. Other philosophers, as I have said, maintain that "things which have a real existence are the very things we perceive." It is Thomas Reid who has upheld, in some passages of his writings at all events, the theory of instantaneous perception, or intuition. It has also been defended by Hamilton in a more explicit manner.[11] It has been taken up again in recent years, by a profound and subtle philosopher, M. Bergson, who, unable to admit that the nervous system is a *substratum of knowledge* and serves us as a percipient, takes it to be solely a motor organ, and urges that the sensory parts of the system—that is to say, the centripetal, optic, acoustic, &c., nerves—do not call forth, when excited, any kind of sensation, their sole purpose being to convey disturbances from periphery to periphery, or, say, from external objects to the muscles of the body. This hypothesis, surely a little difficult to comprehend, places, if I mistake not, the mind, as a power of perception and representation, within the interval comprised between the external object and the body, so that the mind is in direct contact with external objects and knows them as they are.

It will be noticed that these three interpretations, the spiritualistic, the experimental, and the metaphysical, are in formal opposition with that which I have set forth earlier in these pages. They deny the supposition that the nervous system serves

[11] See J. S. Mill's *Examination of Sir Wm. Hamilton's Philosophy*, chap. x. p. 176, *et. seq.*

us as an intermediary with nature, and that it transforms nature before bringing it to our consciousness. And it might seem that by contradicting my fundamental proposition, those three new hypotheses must lead to a totally different conclusion.

Now, this is not so at all. The conclusion I have enunciated remains entirely sound, notwithstanding this change in the starting point, and for the following reason. It is easy to see that we cannot represent to ourselves the inner structure of matter by using all our sensations without distinction, because it is impossible to bring all these sensations within one single and identical synthetic construction: for this they are too dissimilar. Thus, we should try in vain to unite in any kind of scheme a movement of molecules and an odour; these elements are so heterogeneous that there is no way of joining them together and combining them.

The physicists have more or less consciously perceived this, and, not being able to overcome by a frontal attack the difficulty created by the heterogeneity of our sensations, they have turned its flank. The ingenious artifice they have devised consists in retaining only some of these sensations, and in rejecting the remainder; the first being considered as really representing the essence of matter, and the latter as the effects of the former on our organs of sense; the first being reputed to be true, we may say, and the second being reputed false—that is subjective, that is not representing the *X* of matter.[12] I have refuted this

[12] See p. 18, *sup.*—Ed.

argument by showing that all our sensations without exception are subjective and equally false in regard to the *X* of matter, and that no one of them, consequently, has any claim to explain the others.

Now, by a new interpretation; we are taught that all sensations are equally true, and that all faithfully represent the great *X*. If they be all equally true, it is absolutely the same as if they were all false; no one sensation can have any privilege over the others, none can be truer than the others, none can be capable of explaining the others, none can usurp to itself the sole right of representing the essence of matter; and we thus find ourselves, in this case, as in the preceding, in presence of the insurmountable difficulty of creating a synthesis with heterogeneous elements.

All that has been said above is summed up in the following points:—

1. Of the external world, we only know our sensations. All the physical properties of matter resolve themselves for us into sensations, present, past, or possible. We may not say that it is by the intermediary, by the means of sensation, that we know these properties, for that would mean that the properties are distinct from the sensations. Objects are to us in reality only aggregates of sensations.

2. The sensations belong to the different organs of the senses —sight, hearing, touch, the muscular sense, &c. Whatever be the sense affected, one sensation has the same rights as the others, from the point of view of the cognition of external

objects. It is impossible to distinguish them into subjective and objective, by giving to this distinction the meaning that certain sensations represent objects as they are, while certain others simply represent our manner of feeling. This is an illegitimate distinction, since all sensations have the same physiological condition, the excitement of a sensory nerve, and result from the properties of this nerve when stimulated.

3. Consequently, it is impossible for us to form a conception of matter in terms of movement, and to explain by the modalities of movement the properties of bodies; for this theory amounts to giving to certain sensations, especially those of the muscular sense, the hegemony over the others. We cannot explain, we have not the right to explain, one sensation by another, and the mechanical theory of matter has simply the value of a symbol.

BOOK II

THE DEFINITION OF MIND

CHAPTER I
THE DISTINCTION BETWEEN COGNITION [13] AND ITS OBJECT

After having thus studied matter and reduced it to sensations, we shall apply the same method of analysis to mind, and inquire whether mind possesses any characteristic which allows it to be distinguished from matter.

Before going any further, let me clear up an ambiguity. All the first part of this work has been devoted to the study of what is known to us in and by sensation; and I have taken upon myself, without advancing any kind of justifying reason, to call that which is known to us, by this method, by the name of matter, thus losing sight of the fact that matter only exists by contra-distinction and opposition to mind, and that if mind did not exist, neither would matter. I have thus appeared to prejudge the question to be resolved.

The whole of this terminology must now be considered as having simply a conventional value, and must be set aside for the present. These are the precise terms in which this question presents itself to my mind. A part of the knowable consists in sensations. We must, therefore, without troubling to style this aggregate of sensations *matter* rather than *mind*, make an

[13] See [Note 3], *sup.* on p. 15.—Ed.

analysis of the phenomena known by the name of mind, and see whether they differ from the preceding ones. Let us, therefore, make an inventory of mind. By the process of enumeration, we find quoted as psychological phenomena, the sensations, the perceptions, the ideas, the recollections, the reasonings, the emotions, the desires, the imaginations, and the acts of attention and of will. These appear to be, at the first glance, the elements of mind; but, on reflection, one perceives that these elements belong to two distinct categories, of which it is easy to recognise the duality, although, in fact and in reality, these two elements are constantly combined. The first of these elements may receive the generic name of objects of cognition, or objects known, and the second that of acts of cognition.

Here are a few examples of concrete facts, which only require a rapid analysis to make their double nature plain. In a sensation which we feel are two things: a particular state, or an object which one knows, and the act of knowing it, of feeling it, of taking cognisance of it; in other words, every sensation comprises an impression and a cognition. In a recollection there is, in like manner, a certain image of the past and the fact consisting in the taking cognisance of this image. It is, in other terms, the distinction between the intelligence and the object. Similarly, all reasoning has an object; there must be matter on which to reason, whether this matter be supplied by the facts or the ideas. Again, a desire, a volition, an act of reflection, has need of a point of application. One does not will in the air, one wills something;

one does not reflect in the void, one reflects over a fact or over some difficulty.

We may then provisionally distinguish in an inventory of the mind a something which is perceived, understood, desired, or willed, and, beyond that, the fact of perceiving, of understanding, or desiring, or of willing.

To illustrate this distinction by an example, I shall say that an analogous separation can be effected in an act of vision, by showing that the act of vision, which is a concrete operation, comprises two distinct elements: the object seen and the eye which sees. But this is, of course, only a rough comparison, of which we shall soon see the imperfections when we are further advanced in the study of the question.

To this activity which exists and manifests itself in the facts of feeling, perceiving, &c., we can give a name in order to identify and recognise it: we will call it the consciousness[14] (*la conscience*), and we will call object everything which is not the act of consciousness.

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[14] The word "*conscience*" is one of those which has been used in the greatest number of different meanings. Let it be, at least, understood that *I* use it here in an intellectual and not a moral sense. I do not attach to the conscience the idea of a moral approbation or disapprobation, of a duty, of a remorse. The best example to illustrate conscience has, perhaps, been formed by Ladd. It is the contrast between a person awake and sleeping a dreamless sleep. The first has consciousness of a number of things; the latter has consciousness of nothing. Let me now add that we distinguish from consciousness that multitude of things of which one has consciousness of. Of these we make the object of consciousness. [*Conscience* has throughout been rendered "consciousness."—Ed.]

After this preliminary distinction, to which we shall often refer, we will go over the principal manifestations of the mind, and we will first study the objects of cognition, reserving for another chapter the study of the acts of cognition—that is to say, of consciousness. We will thus examine successively sensation, idea, emotion, and will.

It has been often maintained that the peculiar property of mind is to perceive sensations. It has also been said that thought—that is, the property of representing to one's self that which does not exist—distinguishes mind from matter. Lastly, it has not failed to be affirmed that one thing which the mind brings into the material world is its power of emotion; and moralists, choosing somewhat arbitrarily among certain emotions, have said that the mind is the creator of goodness. We will endeavour to analyse these different affirmations.

CHAPTER II
DEFINITION OF SENSATION

When making the analysis of matter we impliedly admitted two propositions: first, that sensation is the *tertium quid* which is interposed between the excitant of our sensory nerves and ourselves; secondly, that the aggregate of our sensations is all we can know of the outer world, so that it is correct to define this last as the collection of our present, past, and possible sensations. It is not claimed that the outer world is nothing else than this, but it is claimed with good reason that the outer world is nothing else *to us*.

It would be possible to draw from the above considerations a clear definition of sensation, and especially it would be possible to decide henceforth from the foregoing whether sensation is a physical or a mental phenomenon, and whether it belongs to matter or to mind. This is the important point, the one which we now state, and which we will endeavour to resolve. To make the question clearer, we will begin it afresh, as if it were new, and as if the facts hitherto analysed did not already prejudge the solution. Let us begin by giving a definition of sensation from the point of view of experimental psychology.

Sensation, then, is the phenomenon which is produced and which one experiences when an excitant has just acted on one of our organs of sense. This phenomenon is therefore composed

of two parts: an action exercised from outside by some body or other on our nervous substance; and, then, the fact of feeling this action.

This fact of feeling, this state of consciousness, is necessary to constitute sensation; when it does not exist, it is preferable to give the phenomenon another name, otherwise the fault is committed of mixing up separate facts. Physiologists have, on this point, some faults of terminology with which to reproach themselves: for they have employed the word sensibility with too little of the critical spirit. Sensibility, being capacity for sensation, presupposes, like sensation itself, consciousness. It has, therefore, been wrong, in physiology, to speak of the sensibility of the tissues and organs, which, like the vegetable tissues or the animal organs of vegetative life, properly speaking, feel nothing, but react by rapid or slow movements to the excitements they are made to receive. Reaction, by a movement or any kind of modification, to an excitement, does not constitute a sensation unless consciousness is joined with it, and, consequently, it would be wiser to give unfelt excitements and reactions the name of excitability.

The clearest examples of sensation are furnished by the study of man, and are taken from cases where we perceive an external object. The object produces upon us an action, and this action is felt; only, in such cases, the fact of sensation comprises but a very small part of the event. It only corresponds, by definition, to the actual action of the object. Analysis after analysis has shown that

we constantly perceive far beyond this actual action of objects. Our mind, as we say, outruns our senses. To our sensations, images come to attach themselves which result from sensations anteriorly felt in analogous circumstances. These images produce in us an illusion, and we take them for sensations, so that we think we perceive something which is but a remembrance or an idea; the reason being that our mind cannot remain in action in the presence of a sensation, but unceasingly labours to throw light upon it, to sound it, and to arrive at its meaning, and consequently alters it by adding to it. This addition is so constant, so unavoidable, that the existence of an isolated sensation which should be perceived without the attachment of images, without modification or interpretation, is well-nigh unrealisable in the consciousness of an adult. It is a myth.

Let us, however, imagine this isolation to be possible, and that we have before us a sensation free from any other element. What is this sensation? Does it belong to the domain of physical or of moral things? Is it a state of matter or of mind?

I can neither doubt nor dispute that sensation is, in part, a psychological phenomenon, since I have admitted, by the very definition I have given of it, that sensation implies consciousness. We must, therefore, acknowledge those who define it as *a state of consciousness* to be right, but it would be more correct to call it the *consciousness of a state*, and it is with regard to the nature of this state that the question presents itself. It is only this state which we will now take into consideration. It is understood

that sensation contains both an impression and a cognition. Let us leave till later the study of the act of cognition, and deal with the impression. Is this impression now of a physical or a mental nature? Both the two opposing opinions have been upheld. In this there is nothing astonishing, for in metaphysics one finds the expression of every possible opinion. But a large, an immense majority of philosophers has declared in favour of the psychological nature of the impression. Without even making the above distinction between the impression and the act of cognition, it has been admitted that the entire sensation, taken *en bloc*, is a psychological phenomenon, a modification of our consciousness and a peculiar state of our minds. Descartes has even employed this very explicit formula: "The objects we perceive are within our understanding." It is curious to see how little trouble authors take to demonstrate this opinion; they declare it to be self-evident, which is a convenient way of avoiding all proof. John Stuart Mill has no hesitation in affirming that: "The mind, in perceiving external objects, can only take notice of its own conditions." And Renouvier expresses the same arbitrary assertion with greater obscurity when he writes: "The monad is constituted by this relation: the connection of the subject with the object within the subject."[15] In other words, it is laid down as an uncontrovertible principle that "the mental can only enter into direct relations with the mental." That is what may be called "the principle of Idealism."

[15] Ch. Renouvier et L. Prat, *La Nouvelle Monadologie*, p. 148.

This principle seems to me very disputable, and it is to me an astonishing thing that the most resolute of sceptics—Hume, for example—should have accepted it without hesitation. I shall first enunciate my personal opinion, then make known another which only differs from mine by a difference of words, and finally I will discuss a third opinion, which seems to me radically wrong.

My personal opinion is that sensation is of a mixed nature. It is psychical in so far as it implies an act of consciousness, and physical otherwise. The impression on which the act of cognition operates, that impression which is directly produced by the excitant of the nervous system, seems to me, without any doubt, to be of an entirely physical nature. This opinion, which I make mine own, has only been upheld by very few philosophers —Thomas Reid perhaps, and William Hamilton for certain; but neither has perceived its deep-lying consequences.

What are the arguments on which I rely? They are of different orders, and are arguments of fact and arguments of logic. I shall first appeal to the natural conviction of those who have never ventured into metaphysics. So long as no endeavour has been made to demonstrate the contrary to them, they believe, with a natural and naïve belief, that matter is that which is seen, touched and felt, and that, consequently, matter and our senses are confounded. They would be greatly astonished to be informed that when we appear to perceive the outer world, we simply perceive our ideas; that when we take the train for Lyons we enter into one state of consciousness in order to attain another state of

consciousness.

Now, the adherents of this natural and naïve opinion have, as they say in the law, the right of possession (*possession d'état*); they are not plaintiffs but defendants; it is not for them to prove they are in the right, it has to be proved against them that they are in the wrong. Until this proof is forthcoming they have a presumption in their favour.

Are we here making use of the argument of common opinion of mankind, of which ancient philosophy made so evident an abuse? Yes, and no. Yes, for we here adopt the general opinion. No, for we only adopt it till the contrary be proved. But who can exhibit this proof to the contrary? On a close examination of the question, it will be perceived that sensation, taken as an object of cognition, becomes confused with the properties of physical nature, and is identified with them, both by its mode of apparition and by its content. By its mode of apparition, sensation holds itself out as independent of us, for it is at every instant an unexpected revelation, a source of fresh cognitions, and it offers a development which takes place without and in spite of our will; while its laws of co-existence and of succession declare to us the order and march of the material universe. Besides, by its content, sensation is confounded with matter. When a philosopher seeks to represent to himself the properties of a material object,—of a brain, for example—in order to contrast them with the properties of a psychical activity, it is the properties of sensation that he describes as material; and, in fact, it is by sensation, and sensation

alone, that we know these properties. Sensation is so little distinct from them that it is an error to consider it as a means, a process, an instrument for the knowledge of matter. All that we know of matter is not known in or by sensation, but constitutes sensation itself; it is not by the aid of sensation that we know colour; colour is a sensation, and the same may be said of form, resistance, and the whole series of the properties of matter. They are only our sensations clothed with external bodies. It is therefore absolutely legitimate to consider a part of our sensations, the object part, as being of physical nature. This is the opinion to which I adhere.

We come to the second opinion we have formulated. It is, in appearance at least, very different from the first. Its supporters agree that the entire sensation, taken *en bloc* and unanalysed, is to be termed a psychological phenomenon. In this case, the act of consciousness, included in the sensation, continues to represent a psychical element. They suppose, besides, that the object on which this act operates is psychical; and finally, they suppose that this object or this impression was provoked in us by a physical reality which is kept in concealment, which we do not perceive, and which remains unknowable.

This opinion is nowise absurd in itself: but let us examine its consequences. If we admit this thesis, that sensations are manifestations of mind which, although provoked by material causes, are of a purely mental nature, we are forced to the conclusion that we know none of the properties of material bodies, since we do not enter into relations with these bodies.

The object we apprehend by perception is, according to this hypothesis, solely mental. To draw therefrom any notion on material objects, it would have to be supposed that, by some mysterious action, the mental which we know resembles the physical which we do not know, that it retains the reflection of it, or even that it allows its colour and form to pass, like a transparent pellicle applied on the contour of bodies. Here are hypotheses very odd in their realism. Unless we accept them, how is it comprehensible that we can know anything whatever of physical nature? We should be forced to acknowledge, following the example of several philosophers, that the perception of the physical is an illusion.

As a compensation, that which this system takes from matter it attributes to mind, which turns our familiar conceptions upside down. The qualities of sensation detached from matter will, when applied to mind, change its physiognomy. There are sensations of extent, weight, space, and form. If these sensations are turned into psychical events, we shall have to grant to these events, to these manifestations of the mind, the properties of extent, of weight, of form. We shall have to say that mind is a resisting thing, and that it has colour.

It may be said that this fantasy of language is not very serious. So be it. But then what remains of the dualism of mind and matter? It is at least singularly compromised. We may continue to suppose that matter exists, and even that it is matter which provokes in our mind those events which we call our sensations;

but we cannot know if by its nature, its essence, this matter differs from that of mind, since we shall be ignorant of all its properties. Our ignorance on this point will be so complete that we shall not even be able to know whether any state which we call mental may not be physical. The distinction between physical and mental will have lost its *raison d'être*, since the existence of the physical is necessary to give a meaning to the existence of the mental. We are brought, whether we like it or not, to an experimental monism, which is neither psychical nor physical; panpsychism and panmaterialism will have the same meaning.[16]

But this monism can be only transitory, for it is more in the words than in the thing itself. It is brought about by the terminology adopted, by the resolution to call mental all the phenomena that it is possible to know. Luckily, our speculations are not at the mercy of such trifling details as the details of language. Whatever names may be given to this or that, it will remain none the less true that nature will continue to present to us a contrast between phenomena which are flints, pieces of iron, clods of earth, brains—and some other phenomena which we call states of consciousness. Whatever be the value of this dualism, it will have to be discussed even in the hypothesis of panpsychism.[17] As for myself, I shall also continue to make a

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[16] An American author, Morton Prince, lately remarked this: *Philosophical Review*, July 1904, p. 450.

[17] This Flournoy recently has shown very wittily. See in *Arch. de Psychol.*, Nov. 1904, his article on Panpsychism.

distinction between what I have called objects of cognition and acts of cognition, because this is the most general distinction that can be traced in the immense field of our cognitions. There is no other which succeeds, to the same degree, in dividing this field into two, moreover, this distinction is derived directly from observation, and does not depend for its validity on the physical or mental nature of the objects. Here is, then, a duality, and this duality, even when it does not bear the names physical and moral, should necessarily play the same part, since it corresponds to the same distinction of fact.

In the end, nothing will be changed, and this second opinion must gradually merge into the one first stated by me, and of which I take the responsibility. We may, therefore, put it out of consideration.

I have mentioned a third opinion, stating that it appeared to me to be radically false. Outwardly it is the same as the last; looked at superficially it seems even confused with it; but, in reality it is of a totally different nature. It supposes that sensation is an entirely psychological phenomenon. Then, having laid down this thesis, it undertakes to demonstrate it by asserting that sensation differs from the physical fact, which amounts to supposing that we cannot know anything but sensations, and that physical facts are known to us directly and by another channel. This is where the contradiction comes in. It is so apparent that one wonders how it has been overlooked by so many excellent minds. In order to remove it, it will be sufficient to recollect that we do not know

anything other than sensations; it is therefore impossible to make any distinction between the physical object and the object of cognition contained in every sensation. The line of demarcation between the physical and the moral cannot pass this way, since it would separate facts which are identical.

We can, therefore, only deplore the error of all those who, to express the difference between mind and matter, have sought a contrast between sensation and physical facts. Physiologists, with hardly an exception, have fallen into this error; when contemplating in imagination the material working of the brain, they have thought that between the movement of cerebral matter and sensation there was a gulf fixed. The comparison, to have been correct, required to be presented in quite another way. A parallel, for instance, should have been drawn between a certain cerebral movement and the act of consciousness, and there should have been said: "The cerebral motion is the physical phenomenon, the act of consciousness the psychical." But this distinction has not been made. It is sensation *en bloc* which is compared to the cerebral movement, as witness a few passages I will quote as a matter of curiosity, which are borrowed from philosophers and, especially, from physiologists.

While philosophers take as a principle of idealism, that the mental can only know the mental, physiologists take, as a like principle, the heterogeneity existing, or supposed to exist, between the nerve impression and the sensation. "However much we may follow the excitement through the whole length of the

nerve," writes Lotze,[18] "or cause it to change its form a thousand times and to metamorphose itself into more and more delicate and subtle movements, we shall never succeed in showing that a movement thus produced can, by its very nature, cease to exist as movement and be reborn in the shape of sensation...." It will be seen that it is on the opposition between molecular movement and sensation, that Lotze insists. In like manner Ferrier: "But how is it that the molecular modifications in the cerebral cells coincide with the modifications of the consciousness; how, for instance, do luminous vibrations falling upon the retina excite the modification of consciousness called *visual sensation*? These are problems we cannot solve. We may succeed in determining the exact nature of the molecular changes which take place in the cerebral cells when a sensation is felt, but this will not bring us an inch nearer to the explanation of the fundamental nature of sensation." Finally, Du Bois Reymond, in his famous discussion in 1880, on the seven enigmas of the world, speaks somewhat as follows: "The astronomical knowledge of the encephalon, that is, the most intimate to which we can aspire, only reveals to us matter in motion. But no arrangement nor motion of material particles can act as a bridge by which we can cross over into the domain of intelligence.... What imaginable link is there between certain movements of certain molecules in my brain, on the one hand, and on the other hand primitive, undefinable, undeniable

[18] This extract, together with the two subsequent, are borrowed from an excellent lecture by Flournoy, on *Métaphysique et Physiologie*. Georg: Geneva, 1890.

facts such as: I have the sensation of softness, I smell the odour of a rose, I hear the sound of an organ, I see a red colour, &c...."

These three quotations show very conclusively that their authors thought they could establish the heterogeneity of the two phenomena by opposing matter to sensation. It must be recognised that they have fallen into a singular error; for matter, whatever it may be, is for us nothing but sensation; matter in motion, I have often repeated, is only a quite special kind of sensation; the organic matter of the brain, with its whirling movements of atoms, is only sensation. Consequently, to oppose the molecular changes in the brain to the sensation of red, blue, green, or to an undefined sensation of any sort, is not crossing a gulf, and bringing together things which cannot be compared, it is simply comparing one sensation to another sensation.

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