ALFRED BINET

# THE MIND AND THE BRAIN

**Alfred Binet**

# The Mind and the Brain

## Being the Authorised Translation of L'Âme et le Corps

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# CHAPTER I

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# INTRODUCTION

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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 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.

# Footnote

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[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.

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

# CHAPTER II

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# OUR KNOWLEDGE OF EXTERNAL OBJECTS IS ONLY SENSATIONS

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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.

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, 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.

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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 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 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.