CHAPTER II

MY KNOWLEDGE OF THE OUTSIDE WORLD

But of vision alone is a separate science formed among philosophers, namely perspective..... this most beautiful science. To be sure some other sciences may be more useful, but no other science has such delightfulness and beauty of utility. And therefore it is the flower of all philosophy. Roger Bacon, Opus Majus, 'On the Science of Perspective', I.

Light is something holy and is the universal bond. Victor Hugo, Intellectual Autobiography. (Postscriptum de Ma Vie).

What we are, that we gaze at; and what we gaze at, that we are. Ruysbroeck, The Sparkling Stone, IX.

And does it (the eye) not possess the power which it has, by the sun's dispensation, as an effluence from it? ..... Then the sun is not sight, is it; but, being the cause of sight, it is seen by the same? Plato, Republic, VI. 508.

Whenever there is daylight round about, the visual current issues forth, like to like, and coalesces with it and is formed into a single homogeneous body in a direct line with the eyes, in whatever quarter the stream issuing from within strikes upon any object it encounters outside. Plato, Timaeus, 45 C.

If I see the sun and it makes me blink, what I see is not 93,000,000 miles and eight minutes away, but is causally (and therefore spatio-temporally) intermediate between the light-waves striking the eye and the consequent blinking. Bertrand Russell, Physics and Experience, p. 21.

This made me present evermore
With whatsoe'er I saw.
An object, if it were before
My eye, was by Dame Nature's law,
Within my soul. Her store
Was all at once within me.....

The sun ten thousand legions off, was nigh:
The utmost star,
Though seen from far,
Was present in the apple of my eye.
Traherne, 'My Spirit'.

1. THE SCIENTIST IS CALLED IN.

What am I? In the previous chapter I tried to answer this question by direct inspection, using hearsay as little as possible. And I discovered a mass of paradoxes.

A possible reason for this, and a remedy, suggest themselves. The reason is that I left the firm ground of common sense for the airy and boundless speculations of philosophy; the remedy is that I go back to common sense, and to science, which is only common sense developed.[+] Science, for example, gives a careful and detailed account of the way I see things --- an account that is always being proved in practice.

Let me then call in the aid of the scientist. What has he to say about the way I come to see this sheet of paper and this pen, and the hand that holds the pen? Here is this pink leaf-like object --- vivid, obvious, indubitable, unmediated. And yet, I am informed, there is an immensely complex mechanism by which this perfect lucidity is secured. What, briefly, is that mechanism, and how reliable is it?

[+]Actually the philosopher, starting with the experience of a subject, is in some respects more empirical than the scientist who treats the object as if it were independent of himself and of the knowing relation. As Bradley says "The physical world, whether it exists independently or not, is, for each of us, an abstraction from the entire reality." Appearance and Reality, p. 261. Of course many scientists are aware of these (necessary) limitations. Eddington, for instance, wrote: "those who in the search for truth start from consciousness as a seat of self-knowledge with interests and responsibilities not confined to the material plane, are just as much facing the hard facts of experience as those who start from consciousness as a device for reading the indications of spectroscopes and micrometers." The Nature of the Physical World, pp. 288-9.

2. THE SCIENTIST'S ACCOUNT OF VISION --- LIGHT.

Light is now travelling from my hand to my eye, where it forms a little inverted picture of my hand. The picture gives rise to certain impulses which pass along the optic nerve to the brain. The result is that I see my hand. That (in the smallest possible compass) is the familiar story, the story which I think I understand, which I imagine makes sense --- until I take the trouble to examine it.

Actually the train of events does not start here and now, but 93 million miles away and eight minutes ago in the sun, when certain parts of that body detached themselves and set off on their journey to my hand. In other words, seeing my hand is an item in the expansion (at 700 million miles an hour) of a star. Any tendency to be surprised at this fact is at once dispelled by using the magic word light, or (better still, because more 'scientific') photons. Light is more than a mystery: it comes near to being the mystery. And the mystery does not only or chiefly lie in the contemporary puzzle as to how light can behave both as waves and as particles, nor in the way one set of these waves or particles is unaffected by innumerable other sets traversing the same space, nor in the paradox that the speed of light is the same whether the light-source is approaching or receding from its observer. The deeper problem is suggested by such questions as the following: -- What is the real relation of these three: the object, its light, its observer? Is the object present in the light that radiates from it? Is sunlight the sun itself, as the expression 'sitting in the sun' would imply? If it is not, how can I see the sun? If it is, what is the nature of this solar omnipresence, and how does my hand come to be involved in it?

Whatever sunlight really is, the scientist says that some of it (after filtration by the earth's atmosphere) is absorbed by my hand, and some of it is rejected. And a part of what is rejected travels to my eye, passes through its lens, and makes a small inverted picture of my hand on the retina --- the sensitive screen at the back of the eye. In short, I see because I am a camera.

There is a further difficulty here --- a host of difficulties. First, since light takes time to get across to my eye, I see the hand I once had, not the hand I have now. Second, while I say unthinkingly that I see a hand, the truth is that light (like a taxidermist for whom only the skin counts) reveals only the surface, and less than half of that at a time. Third, if my hand's light is only borrowed sunlight, is it really the sun that I see, or what my hand does to the sun, or what the sun does to my hand? The scientist's tale is that it is the light which my hand rejects that comes on to my eyes; what it accepts goes no further.° That is as much as to say that my hand is pink becauses it refuses pink light, and my tie is green because green is the one colour which my tie will have none of. Is the information passed on to me by light always a lie?

My hand is in one place; and in another place, a foot or so away, is the inverted picture on my retina. What goes on in that twelve-inch interval? I am

Horizontal section through human eye. The eyelid (not shown), iris, lens, and retina correspond respectively to the shutter, stops (or iris diaphragm), lens, and film of a camera. But whereas in the camera focussing is accomplished by altering the distance between the lens and the film, in the eye the shape of the lens is altered to give the same result. The lens of the one is of glass; the lens of the other is an immense population of transparent animals.

°It is much the same story in the sun itself. The radiation which comes to us from the sun's deep interior has to pass through the upper absorption layers, which obstruct radiation of certain wave-lengths. Always the object is known by -- and, in a sense, is -- the light it refuses to absorb, or keep to itself.

assured that neither my hand, nor a replica of it, nor a flock of such replicas, fly through space to my eye. But if what does make the journey is quite different from what lies at either end, many baffling questions arise. It is as if my hand had to be taken to pieces, or turned into code, or somehow made portable for the journey, and then put together again, or de-coded, or unfolded, on arrival. How anything resembling this is possible, and how mistakes and distortion are avoided, are riddles not easily solved. I do not say that my doubts and difficulties are altogether unanswerable, but only that the answers which science has so far given me raise questions no less formidable than the old ones.

3. THE SCIENTIST'S ACCOUNT OF VISION --- NERVES AND BRAIN.

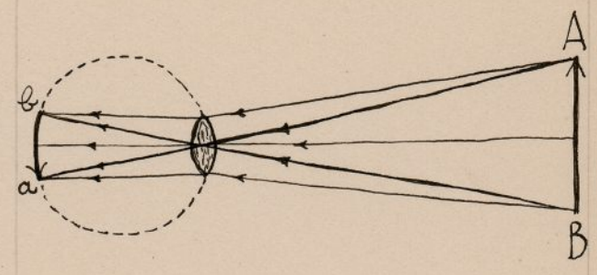
Let me put to one side all these difficulties, and consider the picture of my hand -- shrunken, upside-down, and right-side-left -- which I am told is present in my eye. The question is: how do I get to know this picture?

The answer is no secret. My retina is a mass of many millions of separate receptors --- nerve cells specialized for their task. These cells (in particular, the rods and cones, which lie at the back of the retina), when suitably stimulated, initiate electrical impulses which pass along the optic nerve to the brain. But between the light that falls on the retina and the nervous impulses that lead out of it, is a third term --- chemical processes. Photo-sensitive substances (associated with the rods and cones) are decomposed by the action of the light, and apparently it is this decomposition, and not the light itself, which gives rise to the impulses that are transmitted to the brain.

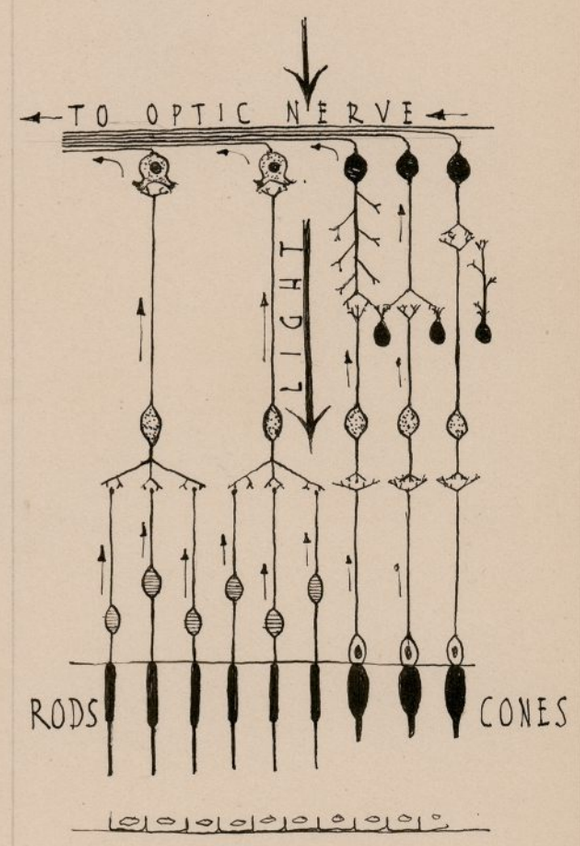
How perfectly designed to draw a veil over the facts are these little words --- light, eye, cell, nerve, brain! When I use them how natural and comprehensible the story seems! But observe the effect of retelling it in cruder, unscientific language (at some cost in accuracy, it is true). I am to imagine an immense herd (more than 100 million of them) of blind and tethered animals. Not I, but these creatures, see my hand. And each sees only a tiny portion of it; and in fact does not see that tiny portion but tastes it; and in fact does not taste it but tastes instead certain chemicals very remote from my hand. And even the word taste is a metaphor for facts still more obscure, and must not be taken too seriously.

Certainly it is nothing like sensations of taste (or the bleaching of the visual purple, or light waves) which passes along the nerve cells that link my retina with the visual areas of my brain, but a series of electrical impulses. And a notable fact is that there seems to be no significant difference between the kind of impulses in one bundle of nerve fibres and those in another. The important thing is the route of the message, the connexions that are made in the brain.

When I say that I am observing my hand, I imply that electrical impulses are travelling, at more than express-train speed, along the attenuated bodies of myriads of animals lying end to end. By various routes these impulses arrive in



Diagrams like this (illustrating the passage of light between the object A-B and its inverted image b-a) are useful, but they have the disadvantage of suggesting that we know what is going on, and what light is.



Layers of the retina (diagrammatic). The retina has several layers of cells lying above the rods and cones, which are the actual receptors. The rods are used for seeing in semi-darkness and do not distinguish between colours; the cones are used for daylight vision.
The nature of retinal processes is a large subject, with an ever-growing literature. In particular, a great deal of research has gone into the chemistry of the visual purple (rhodopsin) which is the photo-sensitive pigment. See, e.g., R. A. Houston, Vision and Colour Vision, and S. L. Polyak, The Retina.

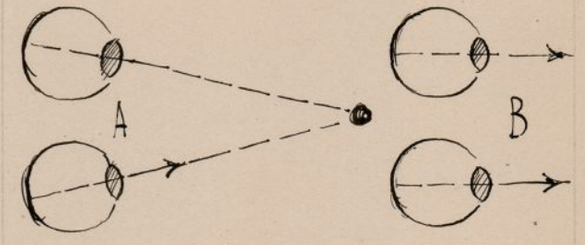
the part of my brain called the visual cortex, where (seemingly and to some extent) the spacing of events corresponds to the pattern of my hand on my retinae.° If this is indeed so, the scientist is back where he was at the start; rather he is worse off, for he is literally in the dark --- what, for instance, has happened in the unlit interior of my head to my hand's pinkness, to its lights and shadows? Even if the impossible were to happen, and a surgeon operating on me at this moment were to find embedded in my brain a perfect replica of my hand, with all its varied tints and innumerable surface details, with its proper structure of tissues --- even such a discovery would do nothing to explain how I come to see my hand. It would simply mean beginning all over again, with the added inconvenience that the object is now only a copy of the original, and that I have neither eyes nor other sense organs in my brain to enable me to perceive it.

Such is the scientific story of how I come to see my hand. I have abridged it drastically. Vision involves far more of my body than retinae, optic nerves, and the visual area of the cortex. Somatic (or internal) and non-somatic (or external) sense-data are inextricably mixed. The eye-movements as I trace my hand's outline, the accommodation of the eye-lenses as they keep the hand in focus, the convergence of the eyes upon their object, the associated movements of my head and neck, --- all these activities mean that nerve impulses are passing between the muscles concerned and various part of the brain, and making their contribution to my seeing.× Even my ears have something to add: impulses from the labyrinths of the inner ear tell their part of the story. Again, though certain parts of the brain are specially linked with vision, it is generally agreed that in some sense the brain functions as a whole: events in it are thoroughly co-ordinated.* And one of its most important functions is the selection of incoming material: even in the matter of seeing my hand I am no helpless receiver of impressions. General interests determine what I shall see. Above all, it is essential to remember that vision is a two-way process, of which the outgoing or afferent half is just as important as the incoming or efferent. Seeing is a mode of reacting. I behave towards my object, and this behaviour cannot be omitted from any adequate account of how I come to know that object.

Science deals in abstractions. The only question is what particular set of abstractions suits the purpose. And a specially useful set is the incoming train of events that connects the sun, the world around me, my retinae, and the visual area of my cortex. This selection from the facts is found to be important in practice. For if this train of events is interrupted anywhere (as when at night the sun is darkened, or my hand is in my pocket; or my eyes are shut, or I have a cataract, or my optic nerves are injured, or certain parts of my brain are diseased) then I do not see my hand. The essential thing is that the train of events shall get through to its terminus in my brain.

°See, e.g., Köhler, The Place of Value in a World of Facts, p. 132, and Petermann, Gestalt Theory, p. 304; also W. E. Le Gros Clark, in New Biology, i, (1945). ~~For an opposing view, see~~ W. Russell Brain, in Philosophy, July 1946, p. 137.

"No valid theory of the body-mind relations is possible until the old theories of matter are abandoned and the whole question thought out afresh" said Professor A. D. Ritchie at the 1949 meeting of the British Association. "No kind of physical or chemical process in the nerve or anywhere else is in the least bit like feeling a pain, hearing a sound or seeing a colour."



Convergence: A, axes of eyes converging upon a near object; B, axes parallel when seeing a distant object.

×To take another example, if I open my eyes in a dark room, the blackness seems to retreat from my eyelids to the space ~~in the room~~ beyond. This projection is presumably associated with nervous impulses proceeding from the muscles whereby I open my eyes.

*For a statement of the view that the cortex functions as a whole, see K. S. Lashley, Brain Mechanisms and Intelligence.
(My own point of view is that 'brain' and object are correlative, and that how much 'brain' is involved is a question of the level of the activity under consideration. When my behaviour as cells is in question, neurones are the relevant units; when the behaviour of the whole animal is in question, the whole nervous system, or rather the whole body, must be studied; when specifically human behaviour, involving for instance moral questions, is being considered, society, and still more inclusive wholes, must be taken into account. In short, how much 'brain' I am using depends on how much of the world I am dealing with. The law of equality holds. I cannot quarrel with J. B. Watson's dictum that a whole man thinks with his whole body in each and every part (still less with Donne's line "That one might almost say her body thought", in 'An Anatomy of the World'); provided the body is not taken as a fixed quantity, but is scaled up and down to match the object of its endeavour.)

4. THE UNKNOWN OUTSIDE WORLD.

If the foregoing account is in the main correct, I know only my brain or a part of my brain. All the rest is inference. Only the end term matters. An infinitely clever surgeon, stimulating my nerve fibres appropriately, could produce in me all the sense experience that I now enjoy by more normal means, and could create for me new worlds unhampered by reference to any outside reality.°

> "In a little house keep I pictures suspended, it is not a fix'd house,
> It is round, it is only a few inches from one side to the other;
> Yet behold, it has room for all the shows of the world....."+

But I am never allowed outside the picture gallery, and can never know whether any of its exhibits bear the slightest resemblance to the outer world.

What and where is the hand I am now observing? One attempt at an answer is to say that when my brain is excited in a certain way I have an 'idea' or 'mental image' of my hand. Hitherto I have been dealing with objects that occupy space, but this 'idea' of my hand takes up no room and has no position. It is not smaller than my idea of an elephant or bigger than my idea of a pin. It is not a five-fingered idea, or a pink idea. It does not lie east of my idea of New York or west of my idea of Tokio. It is not situated in my physical hand, or in my physical head, or in some third place.* It is nowhere. Nevertheless it is perfectly real. It belongs in the spaceless world of the mind.

Does this sound a likely tale? Does it solve the problem? Does it not, in reality, create fantastic new problems, such as the problem of how my brain, which is an insignificant material object in space, gives birth to an entire non-material and non-spatial universe? Is this contemptible fragment, which will soon rot away, capable of making a copy of the world itself, of the infinite complexity of nature? Is a colony of microscopic and lowly animals, shut up and sealed in a little bone cage, equal to such a Godlike task? Surely this mental world, as something distinct from the physical world of which it is supposed to be a reproduction, is useless myth.

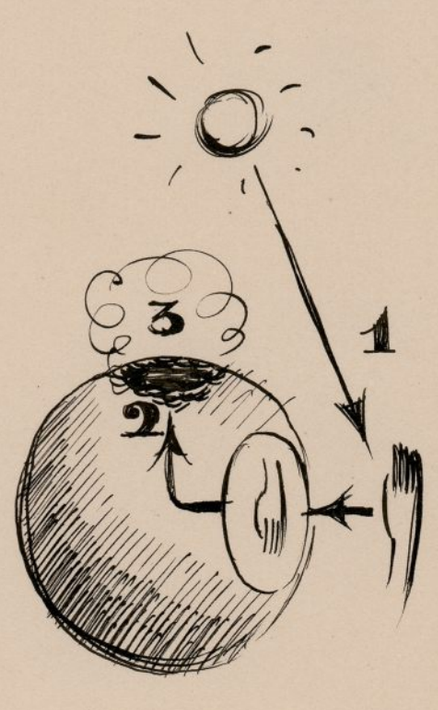
The difficulties for mind-body theories of this sort are indeed formidable. For the theorist has three disparate items on his hands: (1) events in the external physical world; (2) events in the internal physical world of the brain --- events which (heaven knows how) are the equivalent of (1), or represent it; (3) consciousness or ideas or a mental world which, though of an entirely different order from (1) and (2), must be true to both. The difficulty (not to say the absurdity) of supposing that (2), which is only a microscopic part of (1), can yet copy it, is almost as great as the difficulty of attributing to (2) the magical power of creating (3). Nevertheless it is science itself which, seemingly, would force us towards some such fantastic 'solution'. Sir James Jeans wrote: "Reflection shews through how many intervening stages our knowledge of it (matter) must come -- matter, events, effect on our senses, travel along our nerves, passage over the mind-body bridge -- before it reaches our minds. For this reason the matter in which events originate may often be very different from the matter we think we see or hear or feel."× In a similar vein (but much more cautiously than

°When the visual areas of the cortex are stimulated by the application of a weak electric current, the subject does not report pain, but rather visual experience. In one case he saw flames, stars, butterflies, and persons. (See Robert S. Woodworth, Psychology, (1946) pp. 273-4.)

+Walt Whitman, 'My Picture Gallery'.

It is noteworthy that modern Western philosophy is generally reckoned to date from the dualism of Descartes, which sharply divides mind from body, spirit from matter. The mind's attribute of thought, and the body's attribute of extension, are irreconcilable. Having thus cut reality in half, philosophy must put it together again.

*Cf. Plato, Theaetetus, 153 D: "First, to take the case of the eyes, you must conceive that what you call white colour has no being as a distinct thing outside your eyes nor yet inside them, nor must you assign it to any fixed place."



×The New Background of Science pp. 12, 13.

Jeans) Bertrand Russell says: "It is not to be supposed ..... that 'perceiving' an object involves knowing what it is like ..... Certain inferences, of a highly abstract character, can be drawn from our perceptions to the objects perceived; but these inferences are at once difficult and not quite certain."× Science, I suggest, shows the difficulty to be practically insurmountable.

My 'ideas' about the outside world arise at the terminus of the train of events, in my brain. The scientist cannot see them or measure them.† He has then a fourfold choice. He may say that they do not exist; or that they do exist, but as a by-product of no consequence, an epiphenomenon of the real physical events in my brain; or that they are founded on outside fact, which however they can only distort or misrepresent; or, finally, that they are (subject, perhaps, to mutual correction) true copies of the outside world. And the only alternative of these four which the scientist can choose without self-contradiction is the last, for science's very existence is a confession of faith in our ability to know the world outside our bodies.

But it is on his own showing that the scientist's faith is blind, a leap in the dark. Consider all the hazards of the journey from the atoms in the sun to the atoms in my head; consider the variety of the vehicles and how little is known about them, the transformations involved in changing vehicles, the disparity between the universe at one end and the brain cells at the other; consider above all the fact that every bit of information, including all scientific knowledge (including, moreover, the sun-light-eye-nerves-brain story itself) is confined to the end term of the process --- consider all this and say what kind of faith it is which nevertheless believes that somehow the truth about the world gets through to the observer. It is science itself which asserts that the whole sequence, from sun to cortex, may well be a colossal fiction. If the generally accepted account of how I see my hand is in all respects right, then it is rash of me to believe in anything at all out there; to believe I see it truly is an act of blind faith; to believe I know exactly how I see it is sheer craziness. In brief, science trying to explain how it comes by its knowledge is science attempting suicide.

As a matter of fact, science generally tries to compromise. It tells me that the vivid and meaningful world I experience is the flimsy construction of my mind, erected on the foundations of a real world, which is a silent, colourless, scentless, impalpable energy-system.† "I think that these tastes, odours, colours, etc., on the side of the object in which they seem to exist, are nothing else than mere names, but hold their residence solely in the sensitive body; so that if the animal were removed, every such quality would be abolished and annihilated."° Yet Galileo (whose words these are) did not doubt that he had knowledge of the real object that lay behind these sensible appearances. As Locke would say, an object's primary qualities (as extension, figure, motion, and number) are inseparable from it, whereas its secondary qualities (such as colour and sound) "are nothing in the objects themselves, but powers to produce various sensations in us by their primary qualities."*

×Outline of Philosophy, p. 72. Cf. Eddington's Science and the Unseen World, pp. 22 ff., where the problem as to how true information about the outside world can get through to the observer is strikingly put. In my view, the mistake of Jeans and Eddington (and Russell is not free from it) is their attempt, foredoomed to failure, to preserve some equivalence between the two ends of the train of of events. The truth is that the contrast between what the object is over there in itself, and what it is here in me, cannot be exaggerated.

†Nor is it relevant to point to certain correspondences between 'outer events' and 'brain events': to the fact, for instance, that one may tell the periods, by looking at an electro-encephalograph, of a flickering light seen only by the patient whose brain is under examination. Both the encephalograph and what the neurologist sees are, like the flickering light, peripheral to the patient; and all they can hope to discover are significant correspondences between events situated in the concentric system whose nucleus is the patient.

+Thus Newton says of light: "For the Rays to speak properly are not coloured. In them there is nothing else than a certain Power and Disposition to stir up a Sensation of this or that Colour." Opticks, I. 2.

°Il Saggiatore: quoted by E. A. Burtt, The Metaphysical Foundations of Modern Science.

*Essay Concerning Human Understanding, II. viii. 10.

But this compromise will not do. If the colour of my hand is illusory, its shape and mass and motion may, for the same reasons, be illusory. The motion of my hand is not less doubtful than its pinkness, or its atoms and electrons less hypothetical than its cells. Too easily we forget that space-time and wave motions and quanta, and the entire superstructure of modern physics, are inferred from and built upon ordinary sense experience. They are secondary constructions, and they stand or fall with their foundations. The physicist must start by taking the apparent world on trust, and he can never undermine that world without bringing down his own.+

+There is an illuminating discussion of this topic in L. Susan Stebbing's Philosophy and the Physicists, II.

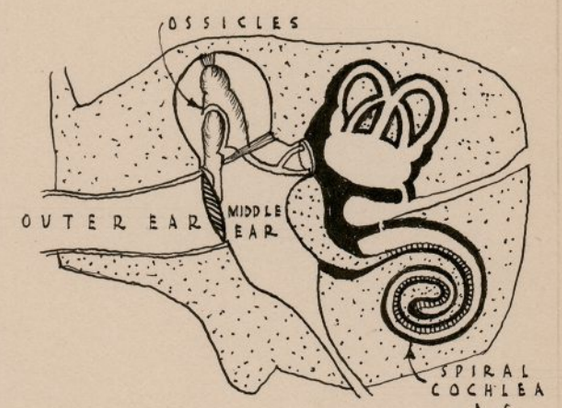
5. THE SENSES OTHER THAN VISION.

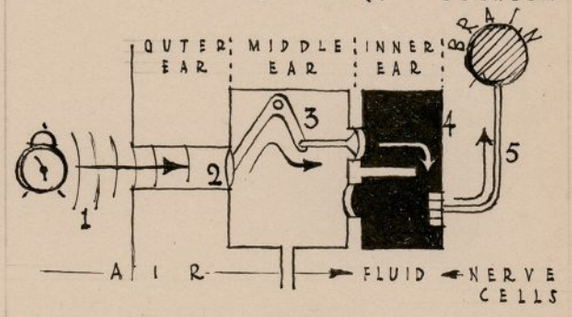
Common sense inquires at this point whether some of my difficulties are not due to the fact that I have limited myself to one sense, namely vision. It is not sight, but touch, that convinces doubting Thomas. Surely the reality of the outside world is vouched for by the combined evidence of all the senses.× In spite of the diversity of their interests they appear to tell a consistent tale, and when witnesses so independent agree, may not their evidence be presumed true?

×Cf. J. B. Baillie, in Contemporary British Philosophy (Ed. Muirhead), 1st Series, p. 39.

Let me examine the credentials of these new witnesses. First, take hearing. I attend for a moment to the ticking of the clock in this room. The sound is as clear, as given, as much beyond argument, as anything I can ever experience. But what is the scientific story?

The striking of metal on metal in the clock sets up waves in the air, which cross the room to my ear and beat on my ear-drum, causing it to vibrate. Behind the drum is the middle ear, and then (constituting the inner ear) a series of complicated chambers full of fluid and containing the actual sensory cells, with their hairlike projections. An arrangement of bony levers in the middle ear passes the vibrations of the ear-drum on to the fluid contents of the inner ear, so disturbing the hair-cells. These are linked with nerve fibres which lead to the parts of the brain concerned with hearing. The stimulation of the hair-cells gives rise to nerve impulses (of the same kind, it seems, as are involved in vision) which are passed on to the cortex, but the frequency and the nature of these impulses are quite different from the frequency and the nature of the vibrations in the ear-drum and the outside air. The kind of sound I hear is a question of which of the many fibres in the auditory nerve are conducting impulses.





Vertical section through human ear, with a model (based on one by Beatty) to show the five stages:--(1) air waves, (2) vibrations of ear-drum, (3) motion of ossicles, (4) motion of fluid of inner ear, (5) nerve impulses -- which intervene between the events in the clock and the events in my brain.

Such, in so far as it concerns this inquiry, is the story of how I hear. It is the story of how I see, with minor alterations. Where is the ticking sound that is now so clear and distinct for me? Not, I am assured, in the clock, not in the air of the room, not in my ear-drum or the fluid contents of my inner ear. Thus far there are only silent waves, mere matter in motion. Nor are the fibres of my auditory nerve noisy with the metallic ticking of the clock on the mantelpiece. The scientist tells me that I cannot hear a sound until the nerve impulses reach the auditory area of the cortex. What happens there in or among the atoms?

How does a world of sound arise out of their silent evolutions? When I listen to a Beethoven symphony, is their dance producing its own accompaniment, which is the music I enjoy? One thing is clear: it is futile to appeal to what I hear for information about the outside world.

But it is touch for which common sense claims a special validity. How does this claim stand?

Actually there is not one sense of touch, but a number of allied senses. Over the surface of the body, or rather just beneath the surface, are distributed nerve endings sensitive to pain, others sensitive to cold, others sensitive to warmth, others sensitive to contact. (Thus I do not feel an object touching my eyeball till it begins to hurt; this is because the eyeball has pain receptors but is short of contact receptors. Conversely, parts of my cheek are well supplied with contact receptors but short of pain receptors --- I can prick my cheek in some places without feeling pain.) These different senses all have the same sort of bodily apparatus: there are the sense organs near the surface, and nerve fibres which connect these with the central nervous system, leading eventually to the brain. And in each instance, if the nerve is cut at any point on its way to the brain, there is no sensation. In fact, a regularly used though drastic method of killing local pain is to cut some of the nerve fibres that lead from the painful area to the brain.+

A man who has lost his leg may go on feeling pain 'in his foot'. Apparently I am no less mistaken when I suppose that my hands are warm, and my feet are cold, and my back itches. All this happens at the terminus. I can only have cold feet in my head, and all aches are headaches. If I am in touch with anything, it can only be with certain portions of my brain, and even these do not reveal themselves to me as tissues or cells, but as something utterly different. About my skin and what it is touching, about my hand and what it is handling, I know nothing. The feel of things out there tells me no more than the look and the sound of them. It does not even guarantee their existence outside my experience of them.

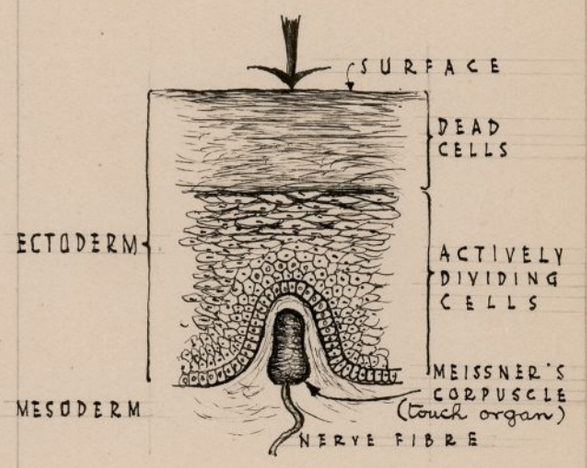
The remaining senses are no better off. As for their combined deliverance, it can hardly be more valid than the separate stories. A consistent tale told by a number of witnesses is no more likely to be true than the unsupported statement of one, if all are ignorant or liars by nature, and have had years together in which to cook up their story. To sum up then, my seeing and hearing, my touching and tasting and smelling, may be taken as true insight into what the world is --- at one particular spot. The rest of the universe may be no more than a superstition.

6. AM I ALONE?

Before going on with this inquiry it is worth while to stop and ponder the question: is there really anything but myself?* At best, science cannot show me that I am not alone, the sole reality. The only course for one who will not go beyond the evidence is to refuse to make up his mind.

As Dr. W. Russell Brain points out (in Philosophy, July 1946, p. 136.) "according to neurophysiology, the observer is like a deaf housemaid who sits in her kitchen and watches the indicators of the electric bells. There are different bell-pushes (receptors) outside the front door and the back door and in the various rooms, but similar currents travel along similar wires and the only difference she can detect is that different indicators move." According to E. D. Adrian,, The Basis of Sensation, (1928), the quality of the sensation depends on the path of the nerve impulses, and this is apparently true where the difference between a sound and a colour and a scent is in question; there is little or nothing else than this to distinguish the messages originating in one sense organ from those originating in another.

+This treatment is applied to tic douloureux --- a very painful kind of facial neuralgia.



A microscopical section (diagrammatic) through the outer layers of the human skin, to show the remoteness of the touch receptor from the object 'touched'.

*"Everything astonishes me,
Myself most of all. When I think
of myself
I can scarcely believe my senses.
But there it is,
All my friends tell me I actually
exist
And by an act of faith I have come
to believe them."
(Christopher Fry's Chaplain is here sounder than the philosopher who is not so sure of others' existence as of his own. If I am anything at all, only my companions are in a position to make the discovery. Amicum habeo, ergo sum.)

Though there can only be one solution to the problem this side of sanity, I shall forgo a curious experience and shall skip a stage in intellectual growth, if I never seriously doubt the existence of everything but my own consciousness, if it never occurs to me that perhaps, like the Red King, I am dreaming the universe. Schopenhauer went so far as to say: "He to whom men and all things have not at all times appeared as mere phantoms and illusions, has no capacity for philosophy." And in this general scepticism must be included the doubt, not merely as to whether other selves exist,° but as to whether I exist as a self. There is at this moment a pink patch moving, there is another larger patch which is white with blue markings, there is a faint grating sound, there is a louder ticking sound, there are warmth and pressure and a number of vague sensations. Or rather there is that first-hand experience for which these inadequate words stand. About a Person who writes, or about a Hand, or about a Page, over and above what is now being presented, there is no certainty. There is only faith.

°There has been much recent controversy about the basis of our knowledge of other persons. See e.g. C. D. Broad, The Mind and Its Place in Nature, pp 319 ff., Bertrand Russell, Human Knowledge -- Its Scope and Limits, pp. 501 ff., and discussions by Professors Aaron and Price, and Dr J. R. Jones, in Philosophy & Proceedings of the Aristotelian Society.

As Bertrand Russell gloomily but justly observes, "It is obviously possible that what we call waking life may be only an unusually persistent and recurrent nightmare." (Our Knowledge of the External World, p. 94.) And there are the well-known lines of Tennyson, in the poem 'The Ancient Sage':

"Thou canst not prove that I, who
  speak with thee,
Am not thyself in converse with
  thyself,
For nothing worthy proving can
  be proven,
Nor yet disproven....."

7. SHALL I REJECT THE SCIENTIST'S STORY?

As Whitehead noted, the real problem is not to fit my perceptions to the world but the world to my perceptions.× If I were both scientific and consistent, I would regard the problem as insoluble. For science, basing its whole enterprise on the independent existence and knowability of an external world, proceeds to transfer item after item from that world to the internal or subjective world (the world of the terminus) till nothing external remains --- not even my body or nervous system, my brain or its cortex. Some writers mistakenly suppose that I have better evidence for the existence of matter in my head than for the existence of remoter objects. If the outer physical world goes, my body (which is of a piece with it) goes also, and I cannot exempt my brain from the criticism which I apply to the rest of the universe.* Science, in short, attacks its own premises.

×Aims of Education.

*Bradley (Appearance and Reality, pp. 262 ff.)is one of the philosophers who points out that naturalism, having reduced the universe to a state of my brain, cannot stop there. "If the outer world is not real, our organs are not real."
Cf. Whitehead, Science and the Modern World, p. 113: "Some people express themselves as though bodies, brains, and nerves were the only real things in an entirely imaginary world. In other words, they treat bodies on objectivist principles, and the rest of the world on subjectivist principles."
It is for making this mistake that L. Susan Stebbing took Eddington and Jeans to task in her Philosophy and the Physicists, II. vi. As John Laird points out (A Study in Realism, p. 30) it will not do to be a naïve realist inside the laboratory, and a subjective idealist outside.

Does this mean that I can afford to ignore what the scientist has to say (seeing that he contradicts himself) and can rely on metaphysics, or intuition, or some other source, for information as to my real nature?

This would certainly be inconsistent of me. For my behaviour, if nothing else, is a permanent demonstration of my profound belief in science. If a brain tumour blinds me, I place myself in the hands of a surgeon who knows where to operate with the best chance of success. If I cannot see this page clearly, I go to the oculist, in the knowledge that he will prescribe for me the right sort of spectacles without recourse to trial and error. If the room is about to be darkened by a solar eclipse, my morning paper has already made me aware of the hour and the minute of it. Whatever I may say to the contrary, in practice I believe in the scientist's account of how I see my hand, and in his account of the world in general.

Of course this proves nothing. My belief, and the evidence on which it is based, may be no more than a relatively coherent part of my world-dream. But even if science were simply the weaving of a subjective pattern, the pattern is wonder-

fully interesting, and well-knit, and consistent, and not less worthy of attention than the other patterns which I weave. Even if (despite my conviction to the contrary) this inquiry were a dream within a dream, it could afford to ignore no dream material that seemed promising --- and science has a wealth of material, much of it quite unused, to offer. I shall therefore take seriously the conclusions of science, and in particular its account of my sense experience. A philosophy which refuses to do so is not likely to be taken seriously itself. The fact is that philosophy unfertilized by science withers, while science lacking roots in philosophy grows rank. The thinker who neglects the scientific knowledge of his time neglects inspiration.†

†Cf. J.B.S.Haldane, Daedalus, p. 28-9.

My problem, accordingly, is twofold: first to reconcile the scientific story of this chapter with itself by removing some of its internal contradictions, and second to reconcile it with the conclusions of the previous chapter. It is obvious that I shall have to be content with a very modest measure of success.×

×Some realists, while not denying that sensations depend on nervous events, make the latter more or less irrelevant -- a matter of machinery -- as the wiring of a radio set is irrelevant to the music it produces. I propose, on the contrary, to treat the scientist's account as philosophically relevant throughout. The theory which I am advancing in this chapter has much in common with the double-aspect theory as expounded by the American Critical Realist C.A.Strong in Why the Mind has a Body (1903) and The Origin of Consciousness (1918).

8. THE CONFUSION IN THE SCIENTIST'S STORY.

The scientist tells me that my world is 'in my head'. At once a rather startling fact, and one that promises well for this inquiry, emerges: this conclusion of science is essentially the conclusion of the previous chapter. There, too, it was found that my world is 'in my head', (or rather it is where I imagined I had a head) and not over there in the distance where I thought it was. The scientist only confirms the philosopher's view. What I experience I experience here. I see the sun because I am in the place where it (whatever *it* may be) is the sun. I see my hand because I am in the place where it is my hand.*

*I do not say that there are no other conditions to be fulfilled, but that this condition (of being in the right place) is the primary one.

In other matters there is not the same agreement. For example, whereas the philosopher of the previous chapter says that I have here on my shoulders *either* a head (as others report) *or* a world (as I report), the scientist of this chapter implies that I have both at once. He overcrowds the spot I call *here*, forgetting that there is (so to say) not enough room on my shoulders for my world and my head at the same time.† Robert Hooke, the 'experimental philosopher', who believed that there was a material storage of ideas, claimed that the microscope revealed ample room in the brain for the two million or so of them which (by his reckoning) a man acquires in a lifetime. We are guilty of the same absurdity when we lump together in one place our brain events and our experience. James Ward, who made no such mistake, wrote: "corresponding to the brain that for the physiologist is but a *small part* of the external world and continuous with it, there is for the psychologist the presentation to an active subject, distinct from it, of *the whole* of this external world --- except, of course, that small part, the brain, presented only to the physiologist."° The confusion arises whenever the physiologist, instead of remaining content with his own function, tries to combine it with the psychologist's. He superimposes the picture of me as I am to myself upon the picture of me as I am to him, with the result that both are spoiled. His story and mine, though equally true, will not mix, and their value lies in keeping them

†H. H. Price points out that "if sense-data are literally inside the brain we are committed to the conclusion that sense-data are always *smaller than* the things to which they belong", or, alternatively, to the conclusion "that our own head is very much larger than it appears from touch to be." Perception, p. 128.

°Realm of Ends, p. 462.

As early as the 3rd century B.C. Strato grasped the essential point that the stimulus is transmuted into a sensation in the mind, and not in the bodily organ.

Bertrand Russell has said that we perceive a part of the stuff of our brains, not of tables and chairs. This is 'overcrowding'. Less objectionable is the description of the brain as the physical back-

apart. My head and my percept are incompatibles. Vision is not a question of an organ here and an object there, plus an idea of the object here; it is a question of an object here and an organ there, with no additional idea of the object anywhere.[+] Here I am, eyeless, nerveless, brainless, headless --- without so much as an atom or an electron of my own. All are crowded out by my world. I keep these organs of mine out there in my regions, for my observers to appropriate. "What the physiologist sees when he examines a brain is in the physiologist, not in the brain he is examining", says Bertrand Russell.[x] In fact it is in both. The surgeon operates upon the brain that is mounted upon his own body, though he calls that brain mine. For my world and my brain belong in entirely different places. And, after all, this is only common sense. Manifestly my head could not draw near to the sun and survive; much less could it contain the sun. When I see the sun, I am not aware of the solar nature of my brain, any more than, when I smell a bad odour, I am (in Bradley's phrase) "aware of the stinking state of my nervous system". The smell is here, my nervous system there. I am where the sun is, not where my brains are.[°] I see what isn't there, with what isn't here.

It is extraordinarily easy to fall into the trap. Thus Jeans wrote: "the atoms of a human body have the special capacity of conveying impressions through our senses to our minds. These atoms affect our consciousness directly, while all the other atoms of the universe can only affect it indirectly, through the intermediary of these atoms."[*] Even if the atoms of my brain could find some *modus vivendi* here with the universe I experience, it is impossible to conceive how they can be responsible for it. Do atoms and universe, then, keep house together in my head, on equal terms? The notion is fantastic. The whole question has been most thoroughly dealt with (though from another angle) by Bergsom, in his inquiry into the question whether memories are stored in the brain.[†] He decides that they are not. The brain is an 'image' (I use his term) like the rest of the world of images, and cannot contain them. And indeed Bergson is here only saying what Bishop Berkeley said two centuries before: "The brain ..... being a sensible thing, exists only in the mind. Now, I would fain know whether you think it reasonable to suppose, that one idea or thing existing in the mind, occasions all other ideas."[+] For Bergson the brain is merely a kind of telephone exchange. And the metaphor is peculiarly apt, seeing that it is part of the essence of a telephone exchange that, at the centre, there shall be a hiatus, a nothing, where the switch-over is made. The brain is an "instrument of analysis in regard to the movement received, and an instrument of selection in regard to the movement executed." I would add that the analysis culminates, and the selection starts, here at the centre, where nothing whatever is left of me.[x]

One of the consequences of trying to crowd my world and my brains into one place is that one or other of them has to be sacrificed. Generally it is the former. My world has to be spaceless because room cannot be found for it in my head, where is it supposed to belong. But I know better. I have only to look to see that there is plenty of room here for my hand, and this page, and all else besides, and that no head stands in the way. One world will do for me. I am not

ground of perception; for the motif or subject of the picture, and its background, are in different planes, different places.

[+] On the fact that it is no accident that the eye cannot see itself, see H. F. Hallett: 'The Essential Nature of Knowledge' in *Philosophy*, Nov. 1945.

[x] *Analysis of Matter*, p. 320. Russell goes on to say that a part, at least, of the brain contents consists of percepts, thoughts, and feelings. And, since the brain consists of electrons, some of the events composing them are likely to be mental states (or parts of mental states) of the man to whom the brain belongs. Similarly Whitehead (*Science and the Modern World*, p. 91.) speaks of "our own psychological field, as it stands for our cognition" as "the self-knowledge of our bodily event". These are instances of what I call overcrowding. My bodily event, my brain, the electrons of my brain, are not to be confused with my percepts or my psychological field. They are regional, not central.

[°] Cf. H. H. Price, *Perception*, p. 127.

[*] *The Mysterious Universe*, V.

[†] *Matter and Memory*, pp. 3 ff.

[+] *Hylas and Philonous*, 2nd Dialogue.

[x] "Ixion's fate reversed is mine,
Authentic Juno seems a cloud;
I feel a blessed warmth, I see
A bright circumference of rays,
But darkness, where the sun should be,
Fills admiration with amaze;
And when, for joy's relief, I think
To fathom with the line of thought
The well from which I, blissful, drink,
The spring's so deep I come to nought."
Coventry Patmore, *The Angel in the House*, II. viii. 2.

driven to the desperate expedient of first doubling it, and then depriving one version of its qualities and the other of its space. There is one hand, not a physical system there plus a mental system here. This hand, and page, and pen, that are present to me now, are the real ones. Freed now from all competition with eye and nerve and brain, they have perfect liberty to be themselves here.

There is no inscrutable thing-in-itself,° but only the thing-in-others and others-in-the-thing. The 'real' thing is the totality of what it comes to in other things, and what they come to in it. Thus the object is not the cause of my perception --- it <u>is</u> my perception. More accurately, what it is to me is an important part of what it veritably is. To doubt this is to rush into absurdities. The question: how can I possibly perceive the outside world? is really pointless, because in the attempt to answer it I have to commit the material fallacy of <u>petitio principii</u>, and assume the existence of sense organs and nerves and brain. The only reasonable thing to do is to accept what is given. My hand is what it seems to be. With the plain man I say that roses really are just as red as they appear to be, and birds really do sing when I hear them sing, and toast and marmalade have a flavour of their own. Here, at any rate, philosophy begins with paradox and ends with common sense, while science begins with common sense and ends with paradox.* Redness, a sequence of musical sounds, a bitter-sweet taste, are not various ways of misinterpreting the facts; they are the facts, the sort of stuff that reality is made of. And the reason why science suggests the contrary view is that science mixes the immiscibles --- my brain and my world.

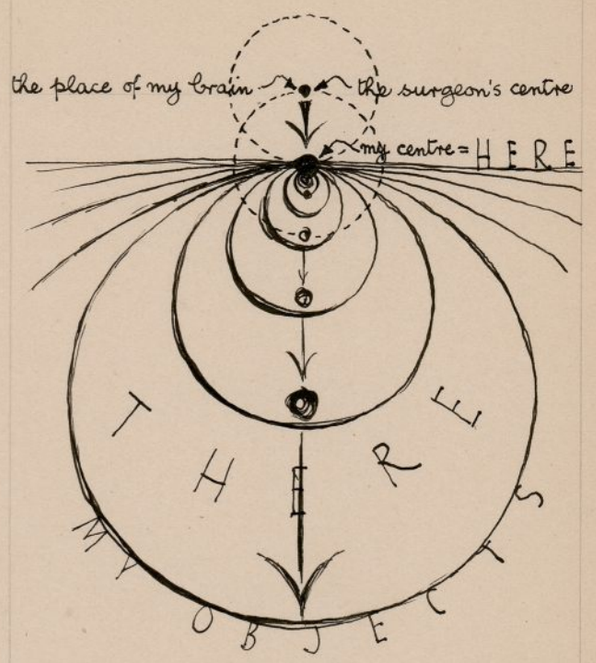
But surely this mistake can be corrected without losing any of science's positive achievements. What prevents the working out of a philosophical science (or a scientific philosophy) whose naïve ideas of where things really are have been reformed along the lines suggested in Chapter I?

9. <u>THE SCIENTIST'S STORY REVISED --- THE INWARD JOURNEY</u>.

I cannot afford to ignore science's story of the train of events from the sun to my brain, but I can retell it thus:

Light from (1) the SOLAR SYSTEM (in particular from the sun) reaches (2) the EARTH (in particular its atmosphere) and eventually (3) my HUMAN BODY (in particular my hand) from which it is reflected to (4) my HEAD (in particular to my eye) some of whose (5) CELLS are specially affected. Since cells consist of molecules,† and molecules of atoms, and atoms of electrons and protons, the story should then go on to show how the changes wrought in my cells are reducible to changes in and among these progressively smaller units.ˣ

Note, first, how this story agrees with the story of the approaching observer of Chapter I. In fact, the scientist who sets out to describe this train of events is such an observer. His account of how I come to see my hand is inevitably an account of his journey through my regions --- that concentric system to which all who would approach me must conform. In other words, to describe my



°Neither is there a 'nuclear solid'. Some realist philosophers try to keep a central something-or-other which, besides being the source of a regional family of sense-data (visual and auditory, thermal and olfactory), is the 'thing that can be touched', or central 'obstacle'. This I believe to be a mistake. The 'feel' of the pen in my hand is not over there at the centre of its regions, but here at the centre of mine. Its character as a 'solid obstacle', though perfectly genuine, is one of its regional characters: centrally, it is nothing of the kind. When the observer, travelling through his object's regions towards their centre, actually arrives there, all trace of solidity and touchability, in both of them, has vanished; and so have all their other characteristics. (Cf. C. D. Broad, <u>Scientific Thought</u>, pp. 342 ff.)

*And here philosophy agrees, moreover, with etymology: to <u>perceive</u> a rose is, literally, to <u>lay hold</u> of it, to capture and seize it, and not to hover round it tentatively, like some irresolute insect. I apprehend a rose, not an eye that apprehends a rose: Schopenhauer is guilty of 'overcrowding' when he says that his immediate object is his body, and that what he knows is not a sun, but only an eye that sees a sun. (<u>The World as Will and Idea</u>, trans. Haldane and Kemp, i. pp. 3, 14.)

ˣIt has, for instance, been suggested (Adrian, 1949) that the essential activity of a nerve cell consists of a surface change during which some of its molecules momentarily escape.

†For the sake of convenience, I do not use the term <u>molecule</u> in the strict sense, as the smallest portion into which a substance may be divided without losing chemical identity; I add the proviso that it shall consist of at least two atoms.

vision is to describe my essential structure. Vision is more than a sense, and light more than a volley of particles or a procession of waves. My light -- the light I am seen by -- is the chief mode of my presence in others, as my vision is the chief mode of their presence in me. Robert Grosseteste described light as the form of corporeal things, spreading spherically to the firmament which is the limit of its rarefication.† "The changes of Bodies into Light," says Newton in his Opticks, "and Light into Bodies is very conformable to the Course of Nature which seems delighted with ~~such~~ Transmutation." The truth is that regional transmutation is of the essence of bodies, and their light is themselves (in one of their principal aspects) taking on new forms, expressing their nature in its immense variety. This ought to be evident: light does not come to me as mere light, by itself and in abstraction from things, but as a star, a cloud, a man, a hand, a page of writing. Light is for us just such luminous objects, in their regional manifestations.

Note, next, that there are three respects in which the observer's account of the train of events from the sun to my brain is quite inadequate: he overlooks the unity of his object, his own behaviour, and half the view.

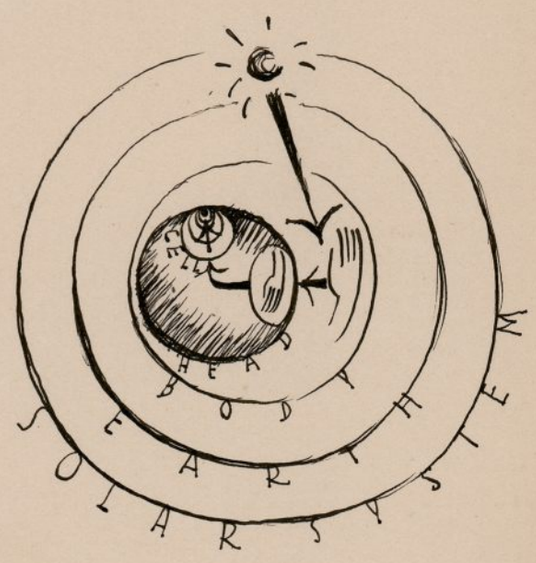
(1) The observer overlooks the unity of his object. His picture suggests things in a row, with light bouncing like a ball from one to another. This picture is misleading, because in fact each object contains the next; at each stage the observer passes from the consideration of a whole to the consideration of one of its parts;--- the solar system contains the earth, as the earth contains my body, and my body contains my head, and so on. The process he is investigating is an internal one --- internal to that developed star which we call the solar system. That is to say, it is a 'physiological' process of my greater body, and conforms to the hierarchical constitution of that body. It is an important part of the body's 'katabolism', or the orderly breaking down of the whole to its ultimate constituents.°

(2) In his anxiety to record the behaviour of his object, the observer overlooks his own. When, for instance, his attention passes from the earth to that portion of the earth which is my body, and from my body as a whole to my head and my eye, he is shifting his position. He approaches me rapidly, and what he sees (namely a planet becoming a man, a man becoming a head, a head becoming cells, and so on) is largely a consequence of what he does. No doubt it is only by travelling so fast and so far in my regions that he is able to collect the material for his story, and no doubt the story is in the main a true one. His fault lies, not in his method, but in his unconsciousness of his method.

(3) The observer overlooks half the view. His unawareness of our relative motion would be excusable, or even of no consequence, if he were a really observant traveller, who looked all around him.* But he ignores a good half of what is given. If, in his pursuit of the train of events to the terminus in my brain, he were to look over his shoulder, he would notice that the movement which involves the breaking down of one heavenly body -- the earth -- into its minutest parts

Light and space are valuable but dangerous abstractions from the concrete reality, which is the great society of mutually immanent hierarchical individuals in a system of regions. In Out of the Silent Planet (p. 36), Mr C. S. Lewis has a fine passage on the unreality of the dismal abstraction of dead space.

†On Light, or the Commencement of Forms. According to Grosseteste, when light, having arisen at a point and spread throughout the universe, reaches the firmament, it is reflected back towards the centre, giving rise in its passage to the nine celestial spheres. (See McKeon, Selections from Medieval Philosophers, i. p. 261.) The doctrine of regions is certainly no new thing, and though many of its old forms are to us fantastic, they embody truths that we are apt to forget. (Cf. The Opus Majus of Roger Bacon, ed. J. H. Bridges, ii, 'On the Science of Perspective'.)



°There are distinguishable within this process what Professor H. H. Price has called 'standing conditions' (e.g., sun, eyes, optic nerves) and 'differential conditions' (e.g., the actual disposition and lighting of objects around me). Cf. Perception, p. 69. My own way of describing the situation is to say that my seeing is an aspect of certain 'vertical' processes whose route varies in detail, but whose main stages are constant because they are hierarchical stages. Nothing less than the entire hierarchical process can be described as the real 'cause' of my seeing.

*"Modern physics", Russell has said, "reduces matter to a set of events which proceed outward from a centre. If there is something further in the centre itself, we cannot know about it, and it is irrelevant to physics." (An Outline of Philosophy, p. 163.) My comment is that we can know nothing else, and that it is (inter alia) physics! Only to make this discovery we must turn round and look out at the universe, instead of in at nothing.

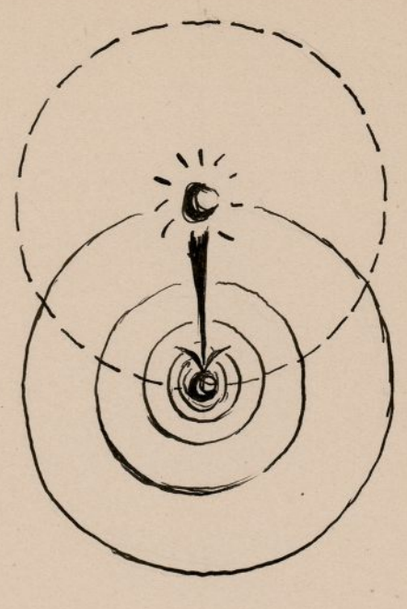
involves the building up of another--- the sun. Thus he starts off by noting sub-atomic and atomic events 'in the sun'. As yet he is a long way, however, from the region where the sun as a whole exists. Nor does he take notice when he comes to that region, for he has turned earthwards. He sees the planet become a country, the country become a town, the town become the body of a man --- at least he would do so, if he were sufficiently observant. Drawing nearer still, he comes to the regions of smaller and smaller particles. The train of events has arrived at its destination, and the essence of his report is that the journey has been my undoing. But, all the while that he has been facing me, things have been happening behind his back. Let him now turn round and look in the opposite direction, and he will see with me that my unmaking has been the sun's making, that my loss has been my world's gain. To one who looks <u>at</u> me here I am nothing; to one who looks <u>with</u> me I am the sun and all things. And the only way to understand how I come to know the world is to look both ways, combining the attitudes of cox and crew. In this matter, the efficient observer is like the mythical bird which flies backwards to see where it has come from, as well as like the ordinary bird which has eyes only for where it is going.

In other words, the train of events which science describes may, and indeed must, be read in two utterly different ways. If this duality is ignored there is bound to be endless confusion. Light is at once the breaking down of its recipient to nothing, and the building up of its source from nothing. I see the sun because I give way to it and make place for it, becoming nothing for myself so that the sun shall become everything for me. It is here in me that the sun acquires genuine sun-hood --- its increase is my decrease.† As Heraclitus taught, the upward and the downward paths are the same, yet opposite. Science's limitation is that it neglects the former. The complete observer finds it necessary to grow eyes in the back of his head. For I am two-directional, and will baffle every observer who does not conform to the same pattern.*

10. <u>THE INWARD JOURNEY CONTINUED</u>.

So far, I have glossed over the near end of the train of events, from my peripheral sense organs to my cortex. How does the physiologist's description of what is occurring in my nervous system fit in with the physicist's description of what leads up to these occurrences? Till I can give some answer to this question there is a blank in the centre of the picture.

I must first get the observer to look again, and retell his story rather more fully. He goes back to my outer regions, and notes the condition of the planet as a whole --- the wear and tear of its crust, the distribution of its weather, the flow of its raw and manufactured materials, its wars, the manifold and shifting relations between continents and between countries. Desiring more detailed information about these tendencies, he draws nearer, and observes how they issue in the condition of a particular country. The state of the country has meaning because it is seen to follow upon the state of the earth as a whole. Still approaching, the observer sees the country's condition narrow down to the condition of the

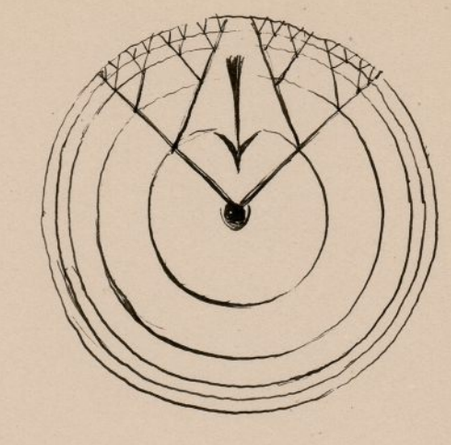


"The sceptic", according to Emerson, "affirms that the universe is a nest of boxes with nothing in the last box." And so do I, adding that there is also, if you turn round, everything in the last box. "The ground of hope", as Emerson himself remarks, "is in the infinity of the world, which infinity reappears in every particle." ('Immortality')

†It is no chance coincidence that devout experience tells the same story. For example, John Smith the Platonist wrote: "this his being nothing is the only way to be all things; this his having nothing the truest way of possessing all things." See Inge, <u>Christian Mysticism</u> (1899), p. 291. Many other contemplatives, from the writer of the <u>Tao Te Ching</u> to St. John of the Cross, have taught the same doctrine. Cf. II <u>Cor</u>. VI. 10.

*In the concentric system of Plotinus, the soul falls away from the One at the Centre, to the outermost rim of being, yet leaves behind something of itself. Thereafter its business is to find its way back; but first of all to turn about, to face the distant Centre it has left. (See particularly <u>Enneads</u> VI. v. 7.) I try to show that there is the same need to look back over our shoulders as we come to each new region, and that the resulting vision is proportional to the distance we have travelled. Newton (<u>Opticks</u>, Query 21) suggested that each body is the centre of an aether whose density <u>increases</u> with its distance from the centre, and that gravitation is the sinking of neighbouring bodies to less dense inner regions of this aether. The regional schema of this book might be described as a fusion of these two systems -- the Neoplatonic and the Newtonian -- or their reconciliation.

town, and then to my condition as a man, as a nervous system, as a brain, as a brain-centre. Now in these convergent processes there are marked changes in quality and in scale, but there are no breaks. Like the tributaries of a river, events in the outer regions flow into and maintain the central stream nearer home. It is impossible to make sense of what is going on where I am a man, unless events where I am more extensive are studied. For example, the sun (by its elevation) settles whether I shall now leave off this work or shall go on with it, shall sleep or wake; the planet (by its weather) settles whether I shall put on or leave off my sweater; the country (by its Ministry of Food) settles whether I shall presently eat an omelette made of fresh eggs or of dried eggs, or no omelette at all; the town (by its Surveyor) settles when I shall cease to be deafened by the roar of pneumatic drills in the street; and the house (by its occupants and routine, or lack of routine) settles whether I shall be allowed to conclude this paragraph or shall be interrupted by two boys and a dog. All these are items in the economy of one Body, and any attempt to explain the behaviour of its human nucleus apart from the rest is like trying to write the biography of a hand without dragging in the head.

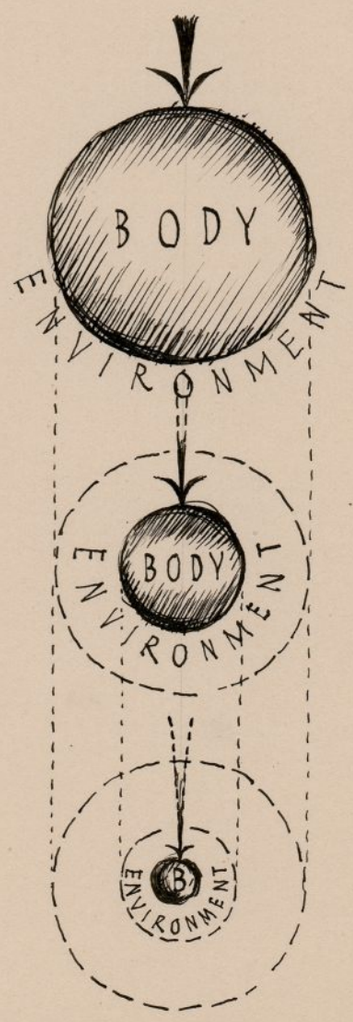


"The world" -- I quote W. Macneile Dixon -- "by our bodies is scaled down...to the measure of our powers."+ It is further scaled down by our nervous systems. Bergson wrote: "As the impressions received at the periphery of this body seem to him (the psychologist) sufficient for the reconstruction of the entire material universe, to his body he at first reduces the universe."x The scientist does not stop at this point, but goes on to reduce the body to the nervous system, and the nervous system to the central cord and brain, and these to the cerebrum, and this to some particular area of the cortex. It is only the practical difficulty of pushing his researches any further that prevents him from arriving at a mere point.

+The Human Situation, p. 369.

xMatter and Memory, p. 52.

My nervous system (on its afferent side) is a confluent arrangement of paths and 'clearing houses', by which regional influences, having reached my human body, go on working inwards. Its centripetal processes continue those of the world outside, and are not radically different from them. Just as my observer noted how conditions in my outer regions govern conditions nearer home, so now he notes how the latter govern conditions nearer still, in the region of my human body. The state of the world as a whole leads, by orderly stages, to the state of my nervous system as a whole, and this to the state of one of my brain cells as a whole. Truly speaking, there is but one stimulus --- my total effective environment for the time-being. And there is but one sense organ --- the whole surface of my body for the time-being, whether that body is a planet's or a man's or a cell's. The The scientist's piecemeal account of visual and aural and tactile stimuli, of such separate organs as eyes and ears, or Meissner's corpuscles and Krause's end-bulbs, of this nerve impulse as distinct from that, is as misleading taken item by item as it is indispensable to the making of the complete picture. Distinct afferent impulses do not oblige the investigator by coming in one after the other, like so



many trains running to schedule. The process must be looked upon as spherical, and not merely linear; as a circumference seeking a centre, and not merely one point seeking another. The afferent impulses in my nervous system are not messages getting through to me: they are my destruction and the concomitant making of my object.

The self makes way for the not-self. Which of the two the scientist recognizes is a question of which way he is looking. If he is a psychologist, it is difficult for him, as he pursues the ingoing (or destructive) processes, to avoid glancing over his shoulder to see the outside situation building up to completeness. Thus Mr. C. K. Ogden (to take an example at random) writes: "The highest centres are those which have to take note of the widest and most intricate situations .... For reasons which are clear enough in outline they lie in the head --- in the 'cerebrum' and the 'cerebellum'."+ Mr Ogden is facing both ways. But in the end, when the situation is wholly revealed, the brain centres are wholly abolished. Or, in the words of Hegel, "the infinite expansion of nature, and the absolute retraction of the ego upon itself, are fundamentally identical."×

The need for taking the situation as a whole is clear once examples are considered. The suicide's act is inexplicable till (say) his overdraft and the state of trade are taken into account. A stimulus of intense heat will normally evoke impulses in motor neurones, initiating muscular movements such that the man retreats from the source of the heat. But when the heat-stimulus is combined with certain auditory stimuli (e.g., cries for help) it may have just the opposite effect and the man may rush towards the fire. Always it is the total situation which evokes a total response, in the general interest.

+The A B C of Psychology, III.

×Edward Caird, Hegel, p. 61.

11. THE OUTWARD JOURNEY.

This is far from being the end of the story. The huge system of up-lines that converge upon the terminus is matched by the equally huge system of down-lines that fan out from it. In short, I act. Departures depend upon arrivals, but it is just as true that arrivals depend upon departures. I see, to do; but also I do to see. I am no mere registrar of things. My action upon the world contributes half my knowledge of the world, as its action upon me contributes the other half.

Arrived at my brain, my observer has reached the signal-box where connexions are made and broken between the incoming and outgoing traffic. So far from containing the railway system, the signal-box completes its reduction to a point. But from that point the system widens out again. Having witnessed my ungrowth, my observer now witnesses my regrowth. My action spreads, by way of efferent nerves, from my brain to my muscles and my body as a whole. What I do as a man plays its part in my town's impact on the country, and in my country's impact upon the nations; not only do I contribute to these larger activities --- I own them, identify myself with them. And so, divaricating without limit, the consequences of a connexion made here between an afferent and an efferent nerve fibre are eventually felt in my remotest regions. Nearer the centre, these effects are not more real: they are only more obvious. This sentence, this page of writing, this room with its books and pictures, this house, clearly express my nature, are eloquent of what I am. They are my response. And so (as I shall later try to show more convincingly) is the entire sequence of greater wholes to which I belong: they body forth my meaning. As my scientific observer is content to say, there is on the one side stimulus and on the other reaction; they are like the symmetrical chambers of an infinite hourglass, of which the one is useless without

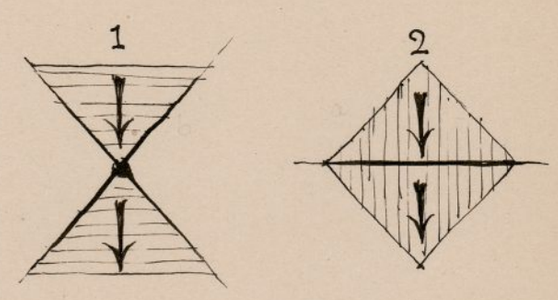
Many have noted that our experience of the world has an active or outgoing side, and for the ancient philosophers vision was no passive affair. From Plato and Euclid and Galen to Leonardo the doctrine of the visual current, going forth from the eye to meet the object, was accepted. The Schoolmen called this current the lumen complanatum. See Plato, Timaeus, 45; Heath, Greek Mathematics, i. 441; and cf. Bergson, Creative Evolution, p. 240, and Matter and Memory, p. 74.
Dr. Johnson, 'refuting' Berkeley by kicking a stone, at least had the right idea. The stone's existence for him rests as much on his actions towards it as upon its action towards him.

the other. Or, as I see the matter, one world is present to me here, under two aspects --- the situation as I passively apprehend it, and the situation as I actively intend it.

Note the difference between the observer's account and mine. Whereas he finds WORLD → NOTHING → WORLD, I find NOTHING → WORLD → NOTHING. Or, in more detail:---

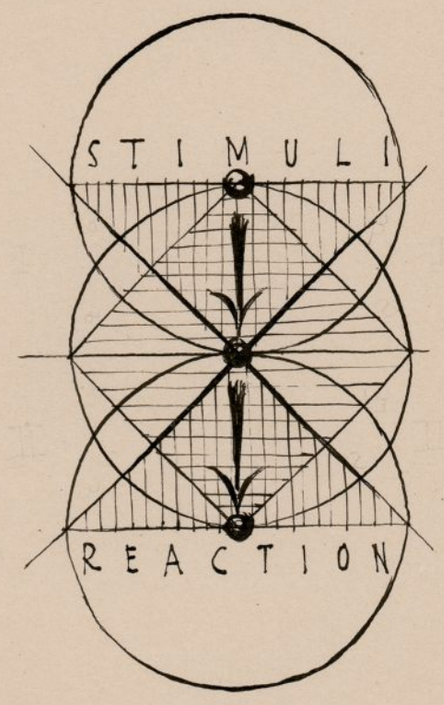
(1)	WORLD of afferent or centripetal processes	→	NOTHING the hiatus or synapse at the centre	→	WORLD of efferent or centrifugal processes
(2)	NOTHING my object is nothing in itself	→	WORLD my object is itself in me	→	NOTHING my object is nothing in itself

His story (1) is precisely the opposite of mine (2). And the complete story is the combined story.



Each of us should stick to his story, and avoid all premature attempts to compromise. Only when we fully admit the violence of the contradiction, does the new synthesis (which is also in some sense an explanation) begin to emerge. The synthesis may be summarized thus:--

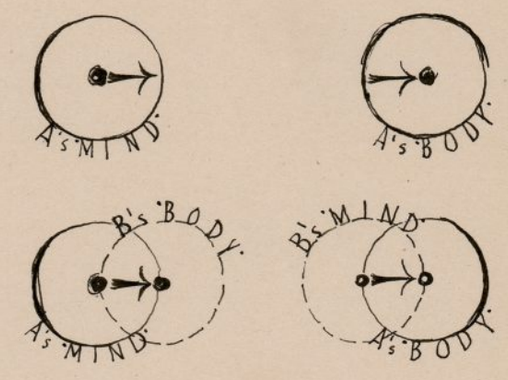
(I) The stimuli proceeding inwards, from objects centred in my regions, are at once (a) the building up of those objects to full status here in me, and (b) my own reduction to a mere receptacle for them. (II) My reaction to these objects is at once (a) my building up from nothing here to my varying status in them, and (b) their reduction to mere receptacles for me. And these four are not separate processes, but moments within a unity.



12. MIND AND BODY.

Something remains to be said about that well-worn riddle of psychology: how can body (which is material, and exhibits mass and motion, shape and position, and behaves according to physical laws) affect and be affected by mind (which is non-material, without shape and position, and behaves according to psychological laws)? Can mind interfere with the course of physical events? If so, how? If not, whence this illusion of its efficacy?

The riddle is unnecessarily baffling because it is wrongly conceived and wrongly phrased. The distinction between mind and body is one of direction, not one of content, or of essential nature. My mind is my view out,* and my body is my observers' view in. Their experience and mine are of the same order. The same data which are in respect of me physical (that is, a part of the view in to me) are in respect of my observer mental (that is, a part of the view out from him); whether these data are looked upon as body or as mind depends on whether they are being considered as mine or as his.



*I use the term view, of course, in the widest sense, as containing much more than visual elements.

Common sense at once objects that my mind is more than the view I take of the world. My mental contents do not always take objective form. For instance, I may feel happy or miserable in myself and without reference to any outside things, or I may be in pain. Then there is the inner core of feeling, generalized and vague but ever-present, which Bradley called "the foundation of the self".× Such experi-

×Appearance and Reality, p. 80.

ence (says common sense) is not my registration of some exterior object in whose regions I happen to be situated, but is registration of myself.

My answer (which at this stage must be brief) is that to be happy is to have a happy outlook; to be miserable is to find misery everywhere; to be in pain is to experience a painful object in a given place. To become aware of a sensation, no matter how central or vague it may be, is to objectify it, to set it over against me. Before I attend to it and after I forget it, it is no longer there for me, no longer existent --- my pain, or discomfort, or happiness, or contentment, which I do not feel, is a contradiction in terms. It is Bradley who says: "You may take your self as deep-lying and inward as you please, and may narrow it to the centre; yet these contents may be placed in opposition to your self, and you may desire their alteration."+ Until they are so placed (I add) they can only have a kind of prospective reality. Doubtless some of the qualities I register here are so arbitrarily distributed, so fleeting, and so nebulous, as to suggest that they belong to me rather than to the objective world. But to experience them at all is to objectify them, and to objectify them is to place them there. It is only by pulling them out of the central void that I can make something of them.

+Op. cit., p. 94. Cf. Whitehead's dictum: "We know ourselves as a function of unification of a plurality of things which are other than ourselves." Science and the Modern World, p. 187. And indeed the basic doctrine is at least as old as Plato -- "There is no single thing that is in and by itself". Theaetetus, 153 E.

My mind, then, is the world revealing itself in me, while my body is my self-revelation to the world. The problem of interaction remains, but it may now be re-worded. It becomes this problem: how does what my observers are here in me (my mind) affect what I am over there in them(my body), and vice versa? How do the contents of this centre affect the contents of other centres? I have your body here and call it mind; you have my body there and call it mind. The question is: how do these two pieces of mind (or pieces of body) get at one another? And this is simply the question I have been considering all along. The truth is that the mind-body problem, the problem of mind-body interaction, does not as such exist at all: it is only a badly-phrased variation of the fundamental problem of the relations of mutual observers, within their interlocking regional systems. Until I realize clearly where my body is (namely, throughout my regions) and where my mind is (namely at the centre), and until I realize clearly my social character (lacking others to observe me I am bodiless, and lacking others to observe I am mindless), I shall go on creating artificial problems. The mind-body relation is not private, but spread over the entire network of individuals, and world-wide. "The concept of an organism includes", says Whitehead, "the concept of the interaction of organisms."× And the concept of the interaction of organisms includes the concepts of mind and body. Truly speaking, I have neither mind nor body: only the mesh of mutual observers has mind and body, and the two terms are interchangeable.*

My point of view here is in some respects similar to the Neutral Monism of Russell and the American New Realists. According to this theory, whether the constituents of the universe appear as 'material objects' or as 'thoughts' depends upon their context; in themselves they are neutral entities. See, e.g., Russell, Outline of Philosophy, pp. 214 ff; E. B. Holt and others, The New Realism, pp. 372 ff. W. K. Clifford, in his Lectures and Essays, has a theory of 'mind-stuff' which is somewhat similar to the 'neutral entities' of the New Realists.

×Science and the Modern World, p. 130.

*And the more advanced the mind, the wider the spatio-temporal mesh, as I shall try to show. So Rilke, speaking of our life, addresses the heaven-remote Angel:

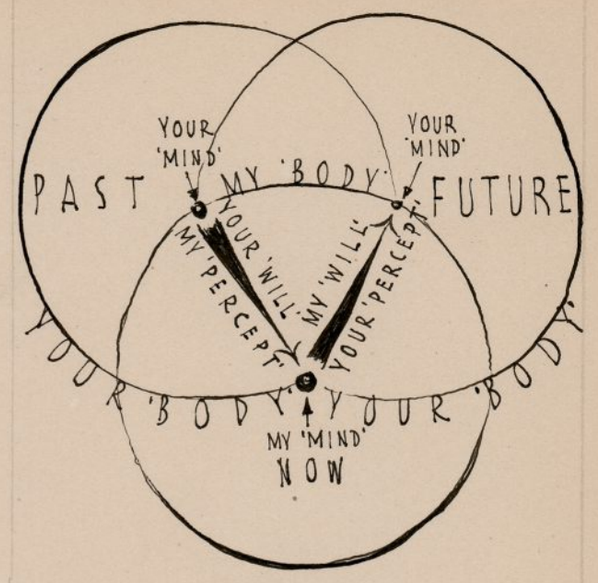
"In your gaze
it shall stand redeemed at last, in a final uprightness.

.....So, after all, we have not failed to make use of the spaces, these generous spaces, these, our spaces."

Duino Elegies, VII, trans. Leishman and Spender.

What happens when 'my mind acts on my body' is that my view of my observers gives place, by a centrifugal process, to their view of me. What happens when 'my body acts on my mind' is that my observers' view of me gives place, by a centripetal process, to my view of them. Let me put the matter another way. The body-mind duality is, basically, the cognition-conation duality. If we are observing

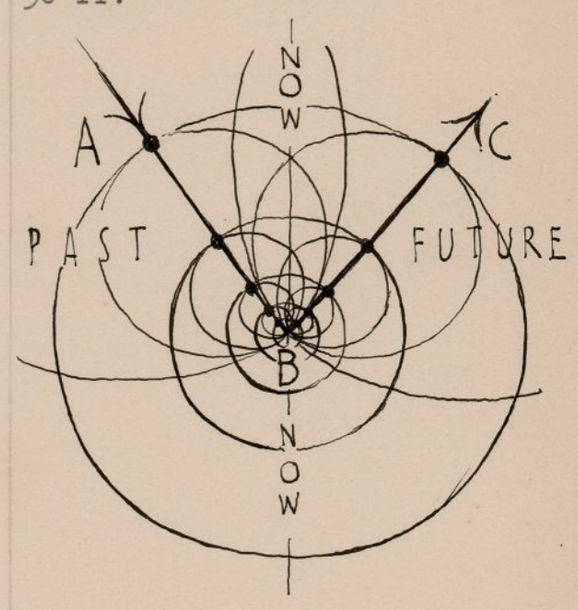
each other, you determine what I shall see and I determine what you shall see. I perceive what you will; you perceive what I will. And the process which is your action upon me is one with and the same as the process whereby I receive my impression of you: the movement which is conative for you is cognitive for me, and vice versa. The difference, again, is one of direction. Each wills his bodily expression in the other, and perceives the other's bodily expression in himself. The forms we take in each other are (as Schopenhauer puts it) materializations of our will. "The act of will and the movement of the body are not two different things objectively known, which the bond of causality unites; they do not stand in the relation of cause and effect; they are one and the same, but they are given in entirely different ways, --- immediately, and again in perception."+ Or, as I would say, they can be read from two directions. Body is mind in reverse, and presentation is will in reverse.



+Schopenhauer, The World as Will and Idea, i. p.130; cf. ii. pp. 482 ff.

This does not run counter to Whitehead's broad distinction between the physical and the psychical, as the contrast between "what the antecedent world in fact contains" on the one hand, and on the other hand the ideal elements or new "forms of definiteness" which belong to the present moment's decision.× For me now at B, A→B is the past side of the transaction, the side of my object as physical, the side of stubborn fact, while B→C is the future side, the side of my object as something to be remade by me, the side of mentality and persuasion. The distinction between mind and body is thus a temporal distinction as well as one of direction. In my object, though it is given as a unity, may be discovered two aspects or poles, the one physical or past, and the other psychical and future. Thus it has two homes in my regions, not one. It is bifurcated --- a fact that in later chapters will assume great importance.

×Process and Reality, pp. 29, 58 ff.



Meantime it will be sufficient to remember that the obscure problems of our knowledge of the outside world, of the relation of mind to body and the mode of their interaction, of the dualism of passion and action, of the dualism of cognition and conation, are all illuminated by the regional schema with which this inquiry started. They are all reducible, in principle, to that irreducible mystery --- the mutual immanence of myriads of individuals of every grade, individuals which are nothing in themselves, yet all things in each other.

Appendix to Chapter II

THE REGIONAL SCHEMA AND BODILY EVENTS

To save the foregoing discussion from undue abstractness, I add here, in barest outline, some further instances of the working of the regional schema.

In a certain sense, no man ever had or can ever have a body. Wherever I go, I can never get away from here, which is the one place in the universe where I am utterly discarnate. For this is the spot where my body, whose status and dimensions roughly agree with those of its observer, finally makes way for him: occupied with his body, I think nothing and make nothing of mine. Now this duplicity or exchange, though seemingly so absurd, is in fact everywhere borne out. Thus, however furiously I drive my car, I can never get clear of the bottleneck which separates the vast converging road system ahead from the equally vast road system behind me; yet, seeing that I do not travel blindly, both systems are present to me here. It is a condition of my effective driving that this spot, though a mere point on the map, shall nevertheless contain the map.

It is worth noting that the network ahead of the traveller sooner or later joins up with the network he leaves behind; and that his object, though bifurcated, is not duplicated.

Whether I am exploring the network of highways in the body politic or in the individual organism, the principle is the same --- I am caught in that curious bottleneck which contrives to find room for the bottle. Descartes° supposed that the pineal gland was the conarion, the place where converging vital spirits meet and cross one another's paths, and where body contacts soul; actually, however, every locality in my body is, as often as the observer places himself there, the central crossroads where the 'physical' self narrows to nothing, and is replaced by the 'psychical' not-self.× In particular, every synapse of my nervous system, where the network ahead and behind is constricted to a mere gap, is such a junction. In general, the condition of the psychical is the extinction of the physical. But the psychical is fugitive, elusive; it cannot stay. For example, 'what I see' is present here in my retina; nevertheless it is referred away from here to the outer world on the one hand, and to the visual area of my cortex on the other. Similarly when I go on to the visual area, the object evades me again: I am referred back to the retina, and on to the rest of the brain.* (It is widely held that perception does not occur directly the incoming nervous impulses reach the visual area: they must fan out again to involve a great deal of the brain before this can happen; and indeed many would add, with Bergson†, that the act of perception includes the prolonging of the subject's active centrifugal movements right up to the object itself. The object visits me provided I see it home.)

°Traité des Passions de l'Ame, I. 30. Descartes' choice fell upon the pineal gland because it is not one of those many organs which are paired, but one whose office is, seemingly, to provide a central point of union between such pairs as the hemispheres of the brain, or the eyes.

×Cf. E. Graham Howe, The Triumphant Spirit, pp. 94 ff. (and particularly the X-diagram on p. 97) on the psychological aspect of this constriction. "The kind of work we have to do", writes Mr Howe, "is rather like Alice getting through the keyhole into her Wonderland, or the Rich Man getting into Heaven. We must get down to it, and get into it, before we can get through it. It is as if Life is pouring through little holes, the whole through the holes, the one through the many.... Large forces can only operate through such small focal points.... As 'persons' we are located at such focal points. We are the blow-holes of the spirit."

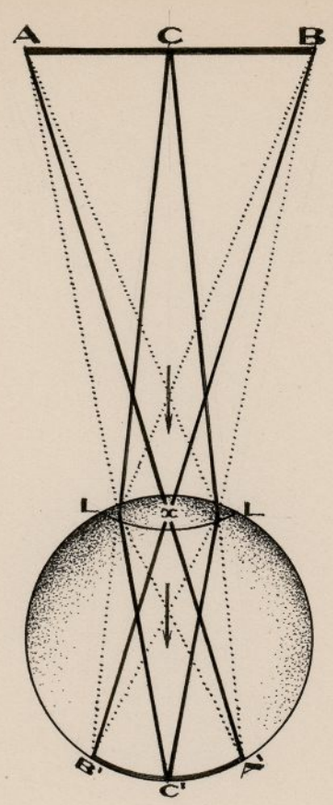
*Sir Charles Sherrington (Man on His Nature, p. 277) has drawn attention to the fact that the principle of convergence of control does not culminate in any "final supreme convergence on one ultimate pontifical nerve-cell, a cell the climax of the whole system of integration". Instead, the highest brain region is "an enormous expansion into millions of cells". This is inevitably so, unless we are prepared to attribute suprahuman and magical powers to a mere cell; yet from its own point of view each cell is the climax and centre of the entire system, the exchange where all lines cross.

And if, instead of going from the retina to the brain in search of the visual object, I take the opposite path and set up my observation post in the pupil of my eye, the same double ambiguity confronts me. Once more I become a mere gap or hole, an empty reception-centre for my object --- a paradox which the Latin word pupilla and the Greek word kore (both meaning 'a little girl' as well as 'the pupil of the eye';† or, as I would say, the visual object, and a nothing) seem to celebrate. The modern observer has another way of putting the matter. He draws a

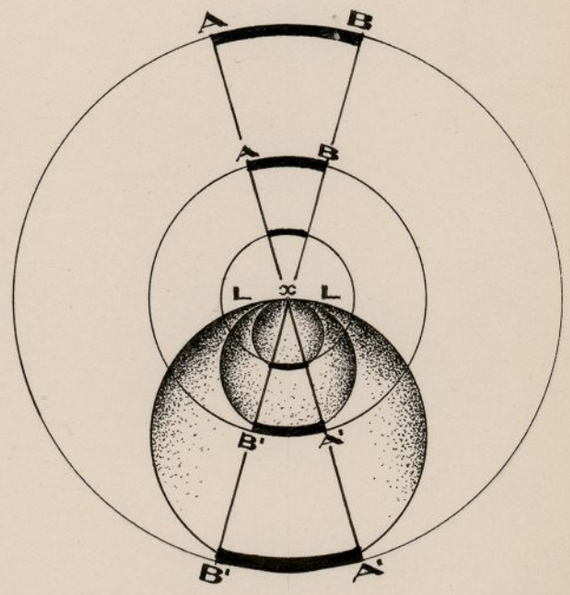
†E.g., Matter and Memory, pp. 125 ff.

†Cf. the First Alcibiades of Plato, and Donne's poem, 'The Extasie'.

diagram consisting of two contrary elements: (1) a double cone of light-rays based on the object A-B narrows to a point (x) here at the eye-lens L-L, and then expands again on the other side till it forms the retinal image B'-A'; (2) a reversed double cone of light-rays, proceeding from C in the object to C' in the image (or from A to A', B to B', etc.) has its base here at LL and its apices in the object and in the retina. His optical diagram is, to be sure, only a special case of the schema which is the topic of the foregoing chapter --- once more the object (A-B), though in itself a mere point (C), is completed here in me (L-L), provided I send it on again (to C'); and once more the condition is that I shall myself narrow down to nothing (at x).



Of course it is true that, for the outside observer, the symmetry of this regional pattern is far from perfect, and there is a great difference between the distance of the object from the lens and the distance of the retinal image; but from my point of view at the centre there is nothing to choose between the depth of the outer cone CLL, and the depth of the inner cone LLC'. In effect, my eyeball is as commodious as the universe; for the adjustment of the curvature of its lens, in order to focus the object clearly, amounts to an adjustment of the eye's depth, so that the retinal image does not belong in one of my regions, and the object in another. Nor is this a new doctrine. Aristotle, in common with other ancient thinkers, recognized that the eye must somehow conform to the thing which is seen; and long before Aristotle, Empedocles supposed the eyeball to contain a rudimentary system of cosmic regions --- namely a concentric arrangement of fire, earth, and water-vapour.° In fact, Victor Hugo's question is a very sensible one: "Tes deux yeux ne se sont-ils jamais tout à coup emplis d'un million d'astres si bien que tes paupières étaient les deux bords du firmament?"×



°Burnet, Early Greek Philosophy, pp. 231, 236.

×Les Tables Tournantes de Jersey. Cf. Rilke: "One space spreads through all creatures equally --- inner-world-space. Birds quietly flying go flying through us. O, I that want to grow, the tree I look outside at's growing in me!" Later Poems (trans. Leishman), p. 128.