SCIENCE AND SENSIBILIA
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Lecture I. Prolegomena: *Mind and Its Place in Nature*

"How are synthetic judgments *a priori* possible?" That was Kant's momentous question and the *Critique of Pure Reason* was his monumental answer. The question that will be exercising me in my less than monumental series of Immanuel Kant Lectures is a plainer one, but it expresses much the same concern: How, on the strength of mere sporadic triggering of our sensory receptors, is it possible to fabricate our elaborate theory of other minds and the external world?

Much has been written and said on this matter, before Kant and after; some of it even by me, ere now. What I have had to say on it can do with some clarifying, however, and some pulling together, and some filling in. I mean these four lectures, then, to be an improved summing up, and I hope that the occasional new thoughts or clarifications will make up for some necessary repetition of ideas that I have expressed before.

This first lecture will be taken up with prolegomena. The second and third will be devoted to endolegomena. The last lecture will consist largely of epilegomena.

I start, unlike Kant, with man as an animal in the physical world. My ontology is physicalist, rather than mentalist, from the start. For a while, to begin with, I shall dwell on the merits of physicalism and discuss the status of mind in the physicalist setting. I am grateful to C.D. Broad for the resounding title of this first lecture, and to both John Austin and Jane Austen for the equally resounding title of the series.

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Psychophysical dualism is unattractive. If mind and body are to interact, we are at a loss for a plausible mechanism to the purpose. Also we are faced with the melancholy office of talking physicists out of their cherished conservation laws. On the other hand an aseptic dualistic parallelism is monumentally redundant, a monument to everything multiplicacious that William of Ockham so rightly deplored.

Dualism with or without interaction is redundant and reducible to a physicalistic monism, unless disembodied spirits are assumed. For, the dualist who rejects disembodied spirits is bound to agree that for every state of mind there is an exactly concurrent and readily specifiable state of the accompanying body. Readily specifiable certainly; the bodily state is specifiable simply as the state accompanying a mind that is in that mental state. But then we can settle for the bodily states outright, bypassing the mental states in terms of which I specified them. We can just reinterpret the mentalistic terms as denoting these correlated bodily states, and who is to know the difference?

Dualism thus comes off badly. Rejecting it, we are left to choose between a mentalistic and a physicalistic monism, and the choice is easy. The success of the scientific theories of the physical world are overwhelming: the power to anticipate and manipulate nature, for good or ill. Mentalistic method, in contrast, stacks up poorly. The stream of experience, if not organized and conceptualized in terms of bodies as it generally is, would be unmanageable. Even memory would be unavailing, for it hinges mostly on conceptualization of bodily terms. Raw sense data do not keep; they have to be processed.

It is often pointed out that expressions for sense qualities and experiences are formed in large part with help of words that apply primarily to the external world. In fact a stronger claim can be made: *all* talk about one's mental life necessarily pre-

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supposes external correlates. Introspect our mental states as we will, how do we know what to call them?

How did we learn to call our anxieties anxieties, our dull aches dull aches, our joys joys and our awareness awareness? Why do we suppose that what we call joys and anxieties are what other people call by those names? Clearly the answer is that such terms are applied in the light of publicly observable symptoms and then extrapolated along private channels. Someone observes my joyful or anxious expression, or perhaps observes my gratifying or threatening situation itself, or hears me tell about it. She then applies the word 'joy' or 'anxiety'. After perhaps another such lesson or two, I find myself applying those words to some of my subsequent states on the strength of a felt similarity. I thus take to reporting my joy or anxiety in cases where no outward signs are to be observed beyond my report itself. Without the outward signs to begin with, mentalistic terms could not be learned at all. I take this to be essentially Wittgenstein's point about private language.

It is not to be wondered, then, that a physicalistic monism is widely preferred to a mentalistic monism. Considering what a hard and unpromising job it would be to continue to try to persuade those who do not yet prefer it, I am inclined now to take it for granted and proceed from there. For me, then, men, women, and other animals are bodies.

We saw that the identification of mental states with bodily states could be, for the repentant dualist, the work of a moment; just a nominal switch, and he has gone nominally physicalist. The dualist was able to make this switch because for every mental state he had anyway to recognize a bodily state, the state of accompanying a mind in that mental state. On the other hand the physicalist, ironically, must be chary of all this largesse of bodily states. The bodily state corresponding to a

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mental one was only specified by reference to the mental state, and whereas this specification satisfies the dualist, who thinks he knows about mental states, it can leave the physicalist at sea.

Thus take belief. If the physicalist can satisfy himself that the question whether one holds a given belief is a question of objective fact at all, then he will indeed grant that there is such a bodily state, however obscure its neural mechanism. There are of course cases that even the mentalist or dualist may agree to put aside: belief in Transubstantiation or Predestination or the doctrine of the Trinity, where the trouble comes in making sense of what is said to be believed rather than in the notion of belief itself. But the mentalist or dualist will regard belief as a genuine mental state so long as what is said to be believed is not itself empty or incoherent. On the other hand the physicalist may question the reality even of many beliefs where the meaningfulness of what is said to be believed is itself uncontested.

Consider for example the belief that the author of the Iliad was blind. One may be disposed to say 'Yes' whenever asked 'Was the author of the Iliad Blind?' This disposition is indeed a physical state, an elusive and enduring state of nerves; but it is not the belief. Lip service qualifies as neither a necessary nor a sufficient condition of belief. What then *does* distinguish believers from non-believers that the author of the Iliad was blind? Behavioral criteria are meager, and a plausible distinction in terms of hypothetical neural mechanisms is hard to imagine. Of course the mentalist says there is a clear difference between believers and non-believers that the author of the Iliad was blind, namely, the belief itself; but this begs the question.

Let us then ask ourselves how much the physicalist can reasonably allow himself in the way of borrowed mentalistic terms, and by what standards.

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Mentalistic terms are already loosely anchored in the physical world because of how we learn the; this we saw. Control lapses when the anchor lines run to excessive lengths; such is the effect of excessive extrapolation from checkpoints on the strength of subjective similarity. Indeterminacy continues to mount with the proliferation of further mentalistic expressions that are learned only through their relations to previous ones and have no criteria of their own. If now in an access of behaviorism we were to refuse to admit any mental states but what are supported by full behavioral criteria across the board, the physical status of the admitted ones would be secure. They would be dispositions to physical behavior, governed incontestably by some physical mechanism. The physicalist could settle for the hypothetical basis and simply label it with the

mentalistic term.

However, this extreme of behaviorism would be excessively restrictive. It would be as unreasonable as an unswerving insistence in scientific theory on what Bridgeman called operational definition. Indeed it would be a case of that. We do not have to depend on behavioral criteria to legitimize and support the terms that we take over from the mental vocabulary, but that support is a matter of degree. The mental state itself is not a pattern of behavior but, if anything a state of nerves. Mostly its neural detail remains unknown, and its behavioral signs are then wanted to enable us to say in a general way what hypothetical state of nerves we are concerned with. We noticed that it was by just such indices that we were able to acquire the mentalistic terms in the first place; but a good measure of behaviorist discipline is still needed to keep the terms under control.

For an analogy consider solubility in water. This is a matter of microphysical texture, little understood until modern times. Meanwhile we had a symptom by which to recognize it, namely, dissolution on immersion. This was an earmark of the hypo-

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thetical microphysical texture. Behaving is like dissolving: it provides earmarks of the hypothetical neural states to which our mental terms are to be seen as referring. We can accept those states as physical without knowing their neural mechanism, just as we recognize solubility as physical before we penetrate its microphysics.

Mental states are like diseases. A disease may be diagnosed in the light of its observable signs though the guilty germ be still unknown to science. Incidentally, diagnosis depends heavily on symptoms reported by patients; and such is the way, overwhelmingly, with detection of mental states.

Solubility is in better shape than many diseases and most mental states in two respects: its mechanism is now understood and meanwhile its test, immersion, was almost wholly dependable. Only extreme conditions can impede the dissolution of a soluble substance when immersed. On the other hand, diseases, even ones whose microbiology is understood, are often wrongly diagnosed. In some cases a supposed disease has been ascribed, such as the vapors, that does not really qualify as a disease at all, there being no one germ or other uniform causal mechanism behind it. Now much the same is true of mental states. Often they are wrongly ascribed on inadequate evidence, such as false testimony, and sometimes a supposed mental state is ascribed that does not qualify for physicalism as a state at all. We wondered whether the belief that the author of the Iliad was blind might be such a case.

A supposed mental state or event qualifies as physically genuine if it is specifiable strictly by physiological description, presumably neurological, without recourse to mentalistic terms. I think this brief statement provides pretty much the right standard, if certain key words in it are appropriately interpreted. The most crucial word is ‘specifiable’. It is not to be taken to mean that neurologists are in a position today, or ever will be, to describe the neural mechanism of the mental state in question.

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It is to mean merely that there exists, all unwritten and uncontemplated, in the manner of a mathematical sequence of words or a Gödel number, a paragraph of physiological language that specifies this unknown mechanism.

Here, incidentally, is a good example of how a modality - in this case ‘specifiable’, ‘*can* be specified’ - is often eliminable by appealing to extensional abstract objects, in this case sequences of Gödel numbers. It is a major benefit conferred by abstract objects.

Another crucial term in my suggested account of physical genuineness is ‘physiological description’. Must I say what counts as physiological language? It should be generous enough to admit auxiliary apparatus from logic and perhaps mathematics. The essential point for present purposes is negative: freedom from irreducibly mentalistic terms. I shall leave it at that.

There is a fanciful technicality of a Goodmanesque kind to guard against. It runs as follows. It is safe to say that any interval of anyone’s life admits in principle of sufficiently detailed physiological description to

distinguish it from all other intervals of that or any other life. Any finite aggregate of intervals of any number of people's lives, then, is specified by an alternation of such descriptions. Take, in particular, the aggregate of just those intervals of people's lives during which the respective people believe that the author of the Iliad was blind. The long but finite alternation of physiological descriptions that picks out this aggregate is a strictly physiological specification, after all, of the belief that the author of the Iliad was blind. From the outset of course, you and I are at a loss for an intelligible way of separating the intervals of belief that he was blind from other intervals, in general. But the mentalist has what he regards as a firm criterion, namely, the belief itself; and now he can claim to have met our demand of specifiability in physiological terms, however, extravagantly.

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What shall we do about this stumbling block? It wanted pointing out, but I propose to run over it rough shod. We might just require of the unwritten physiological description of the belief or other mental state in question that it be reasonably concise. We need not ban alternations and kindred artificialities, but we can draw the line on unwritten descriptions when they run to astronomical lengths.

Thus far I have argued for a physicalistic monism and considered how a substantial part of mentalistic discourse, the more responsible part, might be adapted to that framework. It is the framework in which I intend to pursue something like epistemology. I want to consider how we have been able, from the triggering of our receptors, to project our system of the world.

The initial phase of that process, from reception to perception, is undergoing lively and exciting neurological research, but it concerns me least. It is perception, in turn, that is the springboard or launch pad of all our speculation about other minds and the external world. I shall be concerned with the process from perception onward.

Perception is mental, but its physical reality seems pretty plausible, in contrast to some of the tenuous reaches of belief. Let us consider perception for a while.

A perception is a mental event. Sometimes the word is used carelessly also for the sensory content of that mental event, possibly an image. More careful persons distinguish, calling the content a percept. Still more careful persons may question the utility of any such notion of content. In any case perception properly so called is ordinarily understood as an event of a relational kind, a perception <u>of</u> something, usually of an external object. But semantic puzzles regarding perception have prompted many philosophers such as Husserl and Broad to posit also *intentional* or *epistemological* objects of perception, as over against ordinary physical objects. At any rate it will

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be convenient to think about perception first unrelativized, simply as an event in the mind or nervous system, and to defer the question of objects of perception. To stress this distinction I shall speak of perceptions meanwhile as *perceptual events*.

They are neural events that result from the impinging, on the subject's nerve endings, of forces emanating from the environment. To count as perceptual the event must be marked by awareness, speaking mentalistically. Awareness may be manifested by a look of recognition, by orientation to the sources of stimulation, by a startled or evasive movement, by an exclamation. The awareness is not this behavior, but a neurologically unexplained feature of the neural event. It can be present without being manifested in behavior at all.

Let us consider how we know that awareness is often present without being manifested in behavior. The words 'awareness' and 'perception', like other mentalistic terms, are learned by extrapolation from publicly observable cases along dimensions of subjective similarity, thus coming to be applied irrespectively of outward manifestations. We find by introspection that many of the events that we are thus counting as perceptual, and of which we counting ourselves aware, are ones that we are not outwardly manifesting.

In this obvious account there is a reminder of the continuing value of introspection as a source of

privileged data. Its pitfalls are notorious, but we can skirt them by favoring terms that admit frequently of behavioral evidence and by not letting their subjective extrapolation get out of hand. Prudently used, introspection suggests hypotheses that can be given substantial physicalistic sense and can subsequently be investigated experimentally.

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Now I want to look more closely into the physical reality of perception. Each perceptual event is an event in the body, a neural event; this hardly needs to be argued. What it means to say so, according to my recent suggestion, is that each perceptual event is specifiable in neurological terms, and at no exorbitant length, even if we do not yet quite know how. But we may still ask whether the general term 'perceptual event' itself makes sense from a physicalistic point of view. This is quite another question. Each separate perceptual event is a physical event, with a describable neural mechanism; between the mechanisms of one such event and another there will be differences of detail, in many cases if not in all. Now the question is whether there exists, albeit undiscovered, a general description of reasonable length in neurological terms that brings all these together: that denotes each perceptual event and nothing else.

Donald Davidson has a doctrine of anomalous monism, as he calls it, according to which mental events are physical but mentalistic terms nevertheless do not in general admit of coextensive physicalistic paraphrase. It is a doctrine of token physicalism, as Dennett calls it, and type dualism. The question, then, is whether the term 'perception', or 'perceptual event' illustrates the doctrine. I think it does not - although I share his doctrine in view of other mentalistic terms, as will appear in my third lecture.

I think the term 'perceptual event' is physicalistically meaningful: that the perceptual events can all be assembled under a neurological formulation. This seems reasonable partly because of a broad kinship in the circumstances that induce such events: there is a triggering of sensory receptors by the environment and there is a premium on abrupt sensory contrasts. There is some kinship also between the repertoire of likely responses to one perceptual event and the repertoire of likely responses to another. A further reason for expecting something in common in the neural mechanism of

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all perception is the subjective similarity that made for subjective extrapolation of the term 'perception' or 'awareness' itself. Granted, the range of neural events to be counted as perceptual may remain somewhat vague - vague in respect of how much of our neural activity any one such event should be regarded as including, and vague also in respect of the limits of the class of what should count as perceptual at all. After all, the notion of a mountain has its uses despite being vague in the same two ways: in respect of the boundaries of any one mountain and in respect of what eminences qualify as mountains.

I have appealed repeatedly to subjective similarity in describing the learning of mentalistic terms. It is a relation between perceptual events and is itself a conspicuously mentalistic relation. It is worth pausing over.

Any two things differ and agree in no end of respects, but people attend more to some respects than to others; and thus it is that some of their perceptual events count subjectively as more similar than others. Subjective similarity ratings can be tested, in men and other animals, by reinforcing a response to one stimulus, penalizing it as a response to another stimulus, and then determining whether a third stimulus is more similar to the first than to the second by seeing whether it elicits the response.

Subjective similarity represents mentalism at its best, for it conforms admirably to behaviorist demands, and furthermore we can be confident that as a relation between neural mechanisms of perceptual events it is pretty fundamental. For the behavioral criterion of subjective similarity of perceptions is, roughly speaking, sameness of response. Insofar as likeness of effects suggests likeness of cause, then, the presumption is that subjectively similar perceptual events are significantly alike in their neural mechanisms.

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Somewhat less roughly speaking, perceptual events are subjectively similar to the *degree* that they tend to elicit similar behavior, other things being equal; and their neural mechanisms are presumably similar to a corresponding degree.

I must hedge the matter still a little further. Perceptual events may be as similar as you like and yet elicit unlike responses, because so much depends on what the subject is engaged in at the time. A perceptual event may elicit any of a wide variety of responses, and the point is rather that when two perceptual events are closely similar they *draw* interchangeably on the same repertoire of likely responses. In experimental situations, however, the contingencies are controlled and the subjective similarity of perceptual events is directly attested by similarity of responses.

Evidently in testing the subject for his standards of subjective similarity we are thrown back on our own standards of similarity as regards his responses. Likewise, in accounting causally for his standards of similarity, we would be thrown back on our own standards of similarity of neural mechanisms. I see no harmful circularity in any of this, since it is not a question of definition. Anyway, for similarity of responses there are reasonably objective standards. Behavior can be compared in terms of what muscles are flexed, or more significantly, in terms of what functions are served. Similarity of neural mechanisms is less clear because the mechanisms are in part conjectural, but I imagine that topological comparisons of nerve nets could prove relevant, and also the identity or proximity of brain cells.

Subjective similarity is not a mere matter of likeness of stimulation: not a mere matter of triggering approximately the same nerve endings on the two occasions. When a square object is seen from different angles, dissimilar trapezoids are projected on the eye; yet our behavioral test would rate these views as much more similar subjectively than those same two trapezoids if they were drawn on paper and viewed head on.

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We are extraverted, and so are other animals. An animal's glimpses of his prey from unlike angles and in unlike attitudes are much of a sameness in the responses they elicit, despite gross differences of shape and size in the images presented. What the Gestalt psychologists celebrate as a Gestalt might be defined as a class of subjectively similar perceptual events.

Subjective similarity is the avenue of what Psychologists call stimulus generalization. Learning, habit formation, depends on subjective similarity of perceptual events. Clearly then we must have some similarity standards before learning begins. Some must be innate. Behaviorists are firmly committed to the innateness of subjective similarity standards. These are the bedrock of the psychology of stimulus and response.

If a perceptual event is subjectively similar to an earlier one, we tend to expect a perceptual event similar to what followed that earlier one. Such is the unspoken rule of thumb, the jungle law of induction: similar events have similar sequels. This proneness to induction is simply the mentalistic side of our behavioral test of subjective similarity. Rewarded for his responses to one perceptual event, the subject responds similarly to a similar perceptual event because he expects, by induction, a similar reward.

Our standards of subjective similarity are innate only in part; they develop as we learn. Induction is not only grounded in subjective similarity, it is itself the force for change in the standards. These soon reach a point where the term 'similarity' becomes incongruous. For the dog that has learned to salivate at the sound of the dinner bell, the sound has become to induce the same response that might be induced by the smell of meat; but it would be queer to call the sound and the smell similar. Let us use Roger Shepard's more neutral word: *proximity*. When we come to recognize

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someone's voice, his voice becomes *proximate* to the sight of his face. The ground of stimulus generalization is proximity, not just subjective similarity. Proximate perceptual events are ones that are similar in respect of the responses elicited. Stimulus generalization purely by subjective similarity is what Clark Hull called

primary generalization; the rest is *secondary*.

Subjective similarity is all there is to perceptual proximity before learning comes into play, but afterward perceptual proximity veers off and goes its separate way. I see no objective way of saying where subjective similarity gives way to mere perceptual proximity in the broad sense, nor perhaps does a line need to be drawn. Perceptual proximity is what the behavioral test continues to show, and it is the continuing basis of habit formation, or stimulus generalization. With the accretion of further habits or stimulus generalizations the relation of perceptual proximity continues to evolve.

The essence of learning, or habit formation, or stimulus generalization, is in mentalistic terms just this: we try to recreate a perceptual event if we like its sequel. This process involves three basic sorts of mental event, namely perception, expectation, and action, and one mental force, namely pleasure or drive. In their neural incarnations all these may be expected to play a pretty central role in neurology, in contrast to more tenuous mental affairs such as thinking about Vienna or believing that the author of the Iliad was blind. It is that basic mentalistic level, and perception in particular, that will be the point of departure for my further speculations - speculations on how it has been possible to proceed from perceptual events to all that we know or believe about man and nature.

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Surely this move from perception to knowledge or belief is a move from the frying pan into the fire, if we mean to flee mentalism. We have come to terms with the moderately mentalistic notion of perception, and it would be well in the end to do what we can for the more extravagantly mentalistic notions of knowledge and belief. But it would be discouraging to have to settle all that before we can get on with the external world.

Happily there is a way around: there is verbal behavior. What a man is prepared to assent to is not an altogether dependable criterion of what he believes, but it will serve pretty well as a substitute. Directing our attention to it, we can keep to the solid ground of the overtly physical. We study the conditions surrounding the spoken and written word, spoken or written about the world.

Words are learned, in the beginning, by stimulus generalization. An utterance works favorably in one instance, so the child tries it again after an event that is perceptually proximate to the previous occasion. This learning of words can be seen also as an implicit induction regarding the behavior of one's elders: one expects them to utter an expression or assent to it in situations sufficiently similar to those in which they have done so before.

We noted earlier that mental terms publicly learned come to apply to private cases by extrapolation along similarity lines. The continued application of terms to publicly accessible cases proceeds in the same way, but these cases are happily open to continued check. The widespread success of such checks testifies to a general intersubjective harmony in standards of perceptual proximity: people generally come out alike in extrapolating their terms from one checkpoint to another. It is a pre-established harmony without which the learning of words would be impossible.

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If similarity or proximity of perceptual events in neural similarity, then this pre-established intersubjective harmony of standards is a matter of anatomical similarity in the main, and stands to reason. Community of training in a shared environment has also of course contributed.

In the remaining fifteen minutes I want to reflect more generally on epistemology and what becomes of it when it is naturalized and focused on language.

The traditional concerns of epistemology are of two sorts, that I call *conceptual* and *doctrinal*. On the conceptual side epistemology is traditionally a critique of ideas. On the doctrinal side it is a critique of evidence for the truth of science. Reoriented now to language, the concern of epistemology on its conceptual side comes to be a concern with the empirical content of language, the empirical meaning of words.

Language is a human artifact, learned by people from people. Our words have only such meanings as we may come to give them by emulating the behavior of other people in observable circumstances and by heeding

the encouragement and correction that others people offer to us on the strength of their observation of our behavior in observable circumstance. The inner states that accompany our words are irrelevant to meaning except as they affect these overt exchanges. Whatever empirical content our words may have, then, should be discoverable by reconstructing the steps by which they might have been learned and thus working back to perception, the fountainhead of empirical meaning. Thus the conceptual side of epistemology becomes, for physicalism, and investigation of the learning of language --specifically of cognitive language.

The traditional epistemologist working on the conceptual side could be expected to contribute in two ways to the doctrinal side. He explicates the concepts and thereby the doctrines, thus clearing the way for the doctrinal epistemologist's quest for evidence of the truth of those doctrines. But in addition he makes a head start in that

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quest itself. For his uncovering of empirical meaning proceeds by relating our concepts to perception, and perception is precisely where any evidence must lie for truths about the world.

This relationship between the conceptual and the doctrinal becomes especially clear when we redirect our epistemological pursuits upon verbal behavior. In tracing the use of a word back to perception, what we are tracing are the perceptual truth conditions of the sentences in which the word is used. But to do this is to settle the question of empirical evidence for them.

Such tracing of perceptual truth conditions is bound to be a very complex affair, relating sentences to one another and relating them in bundles to perceptions. For it is clear that sentences for the most part do not have perceptual truth conditions that they can call their own. They relate only indirectly to perception, in combination with other sentences with which they interlock to construct a block of theory. All in all the analysis of this structure is a forbidding prospect, but one does see where to begin: with a study of how language is learned or could have been. The traditional business of epistemology, both conceptual and doctrinal, gives way primarily to a study of language learning. The question how it was possible, given sensory stimulation, to fabricate science, becomes the question how it is possible to learn the language of science. Yet I feel that in such an inquiry we are still in the main stream of epistemology. We have changed horses perhaps, but not streams.

A notable effect of this physicalistic reorientation, or naturalization of epistemology, is that it spells the end of a long and irresponsible tradition of mentalistic semantics. We have been heirs to a myth of the museum: a conception of meanings as mental objects to which one or another set of labels may be attached depending on one's

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language. When at last we look to behavior for criteria of semantic relations among linguistic expressions, things in the museum tend alarmingly to waver and dissolve.

Old epistemological questions about our knowledge of the external world take on new and perhaps clearer forms. There is the traditional question of the basis for our idea of bodies. For me this becomes a question of how we learned, or could have learned, to talk of such objects. This question resolves into three: what should be counted as reference, how we could learn to refer, and why, in particular, to refer to bodies. Similar questions recur in relation to higher levels of scientific theory. When particle physicists get to talking about electrons, photons, and finally quarks, and of weak forces, and when they get to attributing not only spin but color, in some strange sense, and even strangeness itself, what sort of empirical meaning can be claimed for such posits and such predicates? In what sense can one be said to understand these terms, and how could one come to do so?

Clearly these questions are in part the business of the developmental psychologist, in particular the psychologist concerned with the learning of language, and in part the business of the particle physicists and the like, who are responsible for explaining their terms. However, this distribution of responsibility does not cover the whole ground. The question about the nature of reference, for instance, partakes rather of logic and

semantics. Our perplexities about the status of the higher flights of scientific theory, moreover, are outside the working scientist's orbit; he can help only under persistent and skillful interrogation, unless he is pretty philosophical himself. Even the questions proper to developmental psychology, likewise, are largely ones that the psychologist is apt to tackle only at the philosopher's behest, prompted as these questions are by peculiarly epistemological concerns. The divergence of purpose can be

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seen in the fact that we may content ourselves with an imaginative account of how theory construction was *possible* rather than insisting on the developmental facts as the psychologist must. It can even happen that deviation from those facts is better for our purposes, as affording a schematic account that is free from philosophically irrelevant complexities of detail.

I am sometimes asked what happens to the normative force of epistemology when epistemology is absorbed thus into the empirical science of psychology. Are we bound to say that in science anything goes, just so it is already going?

By no means. The critique of thinking has its place in applied science, on a par with engineering. Far from being nullified by the naturalizing of epistemology, it is bolstered by it; for the findings of science itself become available for normative use. Science tells us about the possible causal chains that lead from events in the outer world to our sensory receptors. It is only by these chains, science says, that we can learn about the world. Science finds no hint of mechanism for telepathy, clairvoyance, or horoscopic influences. When we hear testimony of occult events, we find with Hume that explanations in terms of motives and illusions fit more readily into our global science than any hypothesis is apt to do that would accommodate the supposed occult effects. If we have a seemingly occult experience ourselves, we may have to leave it unexplained; certainly calling it occult does not explain it. Acknowledging a problem as unsolved is of course uncomfortable, and discomfort is the healthy reaction; it spurs us on.

A scientific understanding of causal connections thus has a normative bearing on how to think. It teaches us to rely on our senses. It is indeed still the familiar empiricism. The naturalizing of epistemology has merely put the basis for it in the proper light.

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But science tells us to rely on our sense circumspectly. For it is science still that identifies the illusion of the bent stick in water, the illusion of water warm to one hand and cold to the other, and the illusion of dreams. It was such illusions that sowed the seeds of doubt that engendered epistemology in the first place, and it is science itself that counsels us against the illusions. Science is its own best critic, and it is where epistemology begins and belongs.

Recalling the distinction between the conceptual side and the doctrinal side of epistemology, we notice that the normative force that we have just now been considering is on the doctrinal side. It is a critique of beliefs. It is a counsel of empiricism, or dependence on the testimony of the senses, but of critical empiricism. It is critical in requiring that the interpretations of the data be adjusted for coherence and simplicity; and it is through such adjustments that some of the *prima facie* interpretations get sorted out as perceptual illusions.

On the conceptual side normative considerations loom equally large. Terms need to be grounded in perceptual criteria so as to provide perceptual evidence for our scientific doctrines. Here again the empiricist counsel of traditional epistemology emerges.

Empiricism or positivism at its radical extreme would aspire to a completely operational lexicon. The reasonable line rather is one that plays two values one against the other. There is a premium on perceptual criteria: the fuller the better, other things being equal. But there is also a premium on structural simplicity and the other related qualities, whatever they are, that make for a satisfactorily explanatory scientific theory. A term that promises well in this latter way can be excused its remoteness from perceptual criteria. A judicious weighing of these two values is what is called for.

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Up to a point, everyone's lexicon is already bound to conform to the empiricist demand for perceptual criteria. Everyone learns the language from other speakers on the basis, directly or indirectly, of the intersubjectively observable circumstances in which it is appropriate to assert or assent to sentences. Mostly, when he gets beyond what I shall be calling observation sentences, the connection is perforce indirect; sentences are learned through the mediation of other sentences to which they are related by shared vocabulary or analogical constructions, and for the most part their empirical content is excessively filtered and thin. But our moderate empiricist norms are likewise tolerant of terms whose empirical content is pretty tenuous, I suggested, if the terms make up for this weakness by contributing appreciably to the explanatory structure. Roughly, thus, the normative counsel is just to go on as usual but make a tighter job of it. Science, in J.B. Conant's words, is enlightened common sense.

The situation was illustrated near the beginning of this lecture when I remarked that mentalistic terms are already loosely anchored in the physical world by how we learn them, but that control lapses when the anchor lines run to excessive lengths. Normative considerations prompt us at that point to look to behaviorist discipline as a corrective.

In what is to follow we can foresee a certain duality. On the one hand I shall be speculating on language acquisition, and on the other I shall continue to bring normative considerations to bear, especially regarding mentalistic language and to what extent it is physicalistically defensible. I want also to discuss the utility of some of the central devices of cognitive language, notably the pronoun or variable, and the nature of objective reference, and the significance or insignificance of ontology. Normative epistemology, for the physicalist no less than for Kant, is a "prolegomenon to any further metaphysic."

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