CHAPTER 10

Resolution of the Pivotal Issue (I): The Negative Argument

(1)

THUS FAR I have devoted my efforts to clarifying the mixed question, to clarifying the state of philosophical and scientific opinion by removing patent inconsistencies and irrelevant objections that stand in the way of an accurate appraisal of the state of the question at the present time, and to clarifying the issues by defining as precisely as possible the matters about which significant disagreement still remains. Thus far I have not taken sides. I do not regard the exposure of inconsistencies and irrelevancies as taking sides; that is a necessary part of the work of clarification. Nor do I regard my espousal of the proposition that men and other animals differ in kind, not degree, as taking sides on a question at issue. On that question, as we have seen, there is no other side to take; there can be no disagreement in the light of all the evidence now available, and once inconsistencies are resolved in favor of universally admitted and undisputed facts.

With regard to the question whether man's difference in kind is superficial or radical, I have not taken sides. As we saw in the preceding chapter, that question gives rise to two separate issues —one concerning psychological grounds for interpreting man's difference in kind as superficial, the other concerning neurological grounds for advancing such an interpretation. Of these, as we

noted, the first is pivotal; the second does not arise unless the first is resolved in favor of the negative position, i.e., the denial that man's difference in kind is grounded on a critical threshold in a psychological continuum—lower and higher degrees of *exactly the same* psychological factors and processes.

In the preceding chapter, I indicated the character of the parties who take opposite sides on each of these issues, and I named leading or representative figures who, in virtue of the opinions they have expressed, can be construed as taking part in the dispute of these issues. In the course of so doing, I introduced a number of twentieth-century philosophers—and, with them, a few scientists. They, more than the others who take the negative side of the pivotal issue, propose distinctions and offer analyses that tend to support the negative answer. The preceding chapter, like earlier ones, still carried on the dialectical task of clarifying the present state of well-informed opinion on the question. It did not take sides.

Now I am going to take sides. And I am going to do so on one point only; for after I have done what I think must be done to resolve the pivotal issue, I am going to return to the dialectical role of clarifying the state of opinion on the remaining issue and constructing, so far as I can, the dispute of that issue—a dispute that is now quite active in contemporary thought.

(2)

The side I am going to take is the side taken by those contemporary philosophers and scientists who favor the position that the manifest difference in kind between linguistic and non-linguistic animals is to be *psychologically explained* by the operation in man, and in man *alone*, of an *unobserved* factor that henceforth, for brevity and constancy of reference, I will refer to as the power of conceptual thought. All the italicized words in the preceding statement are critical terms. The explanation of observed behavior always involves reference to unobserved factors, whether psychological or neurological. These are the theoretical constructs that scientists must have recourse to if they are going to explain the data of observation. If the theoretical constructs represent theories or conceptions of nervous mechanisms or processes, they

are, of course, neurological constructs. If they represent theories or conceptions of abilities or activities of the organism as a whole (which may or may not be themselves fully explained in neurological terms), then they are psychological constructs.

Those who posit the power of conceptual thought and assert its exclusive possession by man are not the only ones who employ theoretical constructs in psychology in order to explain the observed behavior of linguistic animals. Those on the other side of this issue do the same thing. The comparative psychologists and others who hold that the behavior of linguistic and nonlinguistic animals can be explained in terms of the same set of psychological factors or processes (with attention, of course, to differences in degree in the two cases) necessarily have recourse to theoretical constructs, too. Whether they call them "ideational factors," "representative factors," "mediating processes," or "nonverbal as well as verbal abstractions or concepts," the unobserved items referred to are psychological constructs, not data of observation.

Which psychological explanation is correct? That is the nub of the question in this pivotal issue. The ultimate criterion of theoretical correctness, to which both sides do or certainly should appeal, is the principle of parsimony. The principle works two ways: on the one hand, it works *negatively* by imposing the stricture that no theoretical constructs should be resorted to that can be dispensed with in explaining the phenomena; on the other hand, it works *positively* by relaxing that stricture in the direction of justifying the employment of whatever theoretical constructs may be needed to explain the phenomena.

It is this double aspect of the principle of parsimony that I had in mind earlier when I said that Occam's razor is a two-edged instrument—one that works in opposite directions. It eliminates theoretical constructs that cannot be *shown* to be necessary for explanatory purposes; but it also justifies the retention of theoretical constructs the need for which can be *shown*. Here, again, the italicized word is critical. It is not enough for a theorist just to assert that such and such a theoretical construct is needed to explain certain phenomena; he must *demonstrate* it, so far as he is able. And since we are moving on the plane of explanation, not of observation, the demonstration must take the form of reasoning or argument. It cannot be accomplished by the intro-

duction of additional data, for these, too, would stand in need of explanation.

While the position for which I am about to argue is no different from the position taken by those contemporary philosophers and scientists who think that the power of conceptual thought *must be posited* to explain the distinctive behavior of linguistic animals and *need not be posited* to explain the behavior of non-linguistic animals (or whatever behavior is common to both linguistic and non-linguistic animals), the arguments for that position which I will presently advance seem to me to go a little beyond what I can find in the literature of this dispute. My arguments certainly repeat or borrow distinctions that others have made. They lean on or adapt analyses that others have put forward. But they also pull together analytical or argumentative points that have not been previously collated; and they marshal these materials argumentatively and focus them within the framework of a somewhat clearer formulation of the mixed question about man than is currently available. It is in this last connection that the dialectical work of the preceding chapters signally contributes to the resolution of the pivotal issue.

I will try to achieve that resolution in two argumentative steps, one negative, the other positive. This procedure, the reader will recognize, accords with the negative and the positive fashion in which the principle of parsimony works—the two directions in which Occam's razor operates. In this chapter devoted to the negative phase of the argument, I will try to show, in the light of all the experimental or other data obtained by investigation, that the power of conceptual thought *is not needed* as a theoretical construct in psychology to explain the observed phenomena, i.e., the behavior of non-linguistic animals or whatever behavior is common to both linguistic and non-linguistic animals. In the next chapter, devoted to the positive phase of the argument, I will try to show, again in the light of scientific evidence but now also in the light of common experience, that the power of conceptual thought *is needed* as a theoretical construct to explain psychologically the distinctive behavior of linguistic animals.

For the sake of making sure that the reader fully appreciates the argumentative situation with as much clarity and precision as is possible, let me state the matter another way. In this chapter, the crucial question is: What theoretical constructs are needed—

and, therefore, justified by the principle of parsimony—in order to explain psychologically the behavior that is common to linguistic and non-linguistic animals; in other words, non-linguistic behavior? In the next chapter, the crucial question is: What theoretical constructs are needed and justified in order to explain psychologically the distinctive behavior of linguistic animals; and needed here, first of all, to explain linguistic behavior itself? I will argue, in both chapters, against the comparative psychologists and others who think that the answer to the two questions is exactly the same, except for differences in degree. But in this chapter the argument will attempt to show that it is only when the behavior being considered is non-linguistic or common to men and animals that the same theoretical constructs are needed to explain the behavior; whereas in the next chapter the argument will attempt to show that when the behavior being considered is linguistic or distinctive of man, an additional theoretical construct—namely, the power of conceptual thought—is needed to explain the behavior in question.

Before I proceed to examine the experimental observations of animal behavior which, I contend, can be explained without positing the power of conceptual thought, I must ask the reader to follow me in two preliminary sorties. The first is a critical examination of the methodology of comparative psychology and of the fashion in which this group of scientists employs or applies its technical terms. The second is an effort to correct the misuse of technical terms in this field by proposing clearer and more precise formulations of certain theoretical constructs—the ones on which the whole argument turns.

(3)

I pointed out, in Chapter 7, that Lloyd Morgan's procedural canon in comparative psychology is a special adaptation of Occam's razor, or the principle of parsimony. It appears to enjoin comparative psychologists against anthropomorphic interpretations of animal behavior. Do not posit, it cautions, the presence and operation of a higher (i.e., a human) psychological factor, if animal behavior can be explained in terms of a lower psychological factor (i.e., one common to men and other animals). But

the comparative psychologists at work in this century have read Morgan's canon as if it *prescribed* the positing of the same psychological factors to explain both human and animal behavior, and *proscribed* the positing of any additional psychological factors to explain human behavior—*whether or not the behavior to be explained is common to men and animals or is clearly distinctive of man.*

That, in my judgment, is an egregious misreading of Morgan's methodological principle, and one that Morgan himself did not make. The misreading becomes apparent as soon as one understands, as one should, Morgan's principle as nothing but a special application of the more general principle of parsimony as regulative of all scientific—or, for that matter, even philosophical—theorizing. Then it will be correctly interpreted to enjoin the scientist (or philosopher) *not* to posit a theoretical construct *unless* it can be *shown* to be needed to explain the observed phenomena. Read this way, it permits him to posit—more than that, justifies him in positing—whatever theoretical constructs can be shown to be needed.

Misinterpreting Morgan's rule, and committed to the evolutionary principle of phylogenetic continuity, most comparative psychologists thought that, to follow the rule and to be faithful to their commitment, they had to find nothing but differences in degree between the observed behavior of men and other animals; or, failing that, at least to explain whatever differences in kind they did not find by positing the same psychological factors or processes in both, with a difference in the degree of these underlying psychological factors or processes to explain the manifest difference in kind at the level of observed behavior. Some of the early behaviorists thought they could explain animal behavior simply in S-R terms—stimulus, response, and the process of conditioning—without positing any "ideational" factors whatsoever; and so they excluded such factors from their explanation of human behavior, treating it entirely in S-R terms. Others of more recent date, while still behaviorists, have found it necessary or useful to posit what they call "ideational" or "representative" factors that function as "mediating" processes between stimulus and response in animal behavior. They then borrow from the psychological explanation of human behavior such traditional terms as "abstraction" and "concept" and identify them with the

ideational, representative, or mediating factors that they have posited for explanatory purposes. With the qualification added that abstractions or concepts in animals are necessarily non-verbal, whereas they may be verbal or non-verbal in man, these comparative psychologists conclude by maintaining that the same theoretical constructs serve to explain human and animal behavior, both what is common thereto and also what is distinctive of man. Not only does this beg the question, but, in addition, it violates certain obvious rules of sound procedure.

First of all, it is necessary to separate the description of both animal and human behavior from the intrusion of explanatory theorizing. Then, with respect to the animal behavior described, the procedure should be to employ whatever theoretical constructs are necessary to explain the behavior, and no others, without regard to whether such theoretical constructs adequately explain human behavior or others in addition are needed. And in the case of human behavior, the procedure should be the same: employ whatever theoretical constructs may be necessary, without regard to whether they are or are not necessary to explain animal behavior. To lump human and animal behavior together on the *assumption* that both can be explained by the same theoretical constructs, and then to propose certain theoretical constructs that are *either* needed to explain animal behavior (and, therefore, it is claimed, also explain human behavior) *or* needed to explain human behavior (and, therefore, it is claimed, also explain animal behavior) is to beg the question. The very thing to be shown was assumed to begin with, and the assumption controlled the explanatory theorizing.

As time-honored and as basic as the principle of parsimony is the second rule of sound procedure that is violated by the comparative psychologists whose theories we are here considering. It consists in the simple maxim that technical terms—the terms that represent the theoretical constructs being employed in explanatory efforts and in theorizing about observed phenomena —should *always* be used with the same invariable and univocal meaning. If any departure from one and the same meaning is necessitated in order to express distinctions that a more refined theory finds it necessary to acknowledge, then the same term should be used with the requisite qualifications added; in which case the old term with the added specifying qualifications no

longer represents a single theoretical construct. In its place we have the two new terms, each with a diverse qualification, and these represent two new theoretical constructs that replace the original one. These may have certain features in common, but they are not the same; and to treat them as the same by ignoring the effect of the added qualifications is to equivocate in the use of the original term that was subject to diverse specifying qualifications.

Equivocation may be desirable or indispensable in poetry; it may be unavoidable in ordinary conversation, but there it is relatively harmless and so is condonable: but it is noxious and hence inexcusable in scientific discourse. Yet the exposition of theory in comparative psychology abounds in equivocations, especially in the use of such critical terms as "concept" and "abstraction." These terms, along with "percept" or "perception," "memory," "image," and "idea," represent theoretical constructs in psychology. These terms are of a different order from "stimulus" and "response," both of which represent things *objectively* observable to the scientist who is trying to describe behavior; whereas whatever is referred to by "concept," "image," and "idea" are not. That is why the latter represent theoretical constructs. Whether or not whatever is referred to by "concept," "abstraction," and "idea," or even by "perception," "image," and "memory," are *subjectively* observable, is another question. Even if they were (which I, for one, have good reasons for thinking they are not), the terms that refer to them would still represent theoretical constructs in a psychology that remained thoroughly behavioristic in its methodology—*as it should in order to remain scientific.*

(4)

Further elaboration on two points just made are in order.

The first concerns the difference between such terms as "concept" and "abstraction" and terms like "stimulus" and "response." The scientist who uses the latter terms descriptively stays on the same level—or in the same universe of discourse—when, for explanatory purposes, he refers to *mediating factors or processes* in the central nervous system, or to such things as *inhibition* and *reinforcement.* [1] But when he substitutes percepts, images,

memories, concepts, or ideas for what he has called the mediating factors that operate between stimulus and response, he moves to another level or into another universe of discourse and mixes two analytical vocabularies that should be kept distinct. Worse still, when he identifies whatever is referred to by such terms as "image," "concept," or "idea" with the mediating factors or processes that he conceives as operating between the stimulation of sense organs and the innervation of muscles or glands, he is assuming one of several possible answers to the difficult philosophical question about the relation of body to mind, or of nervous to mental processes.

The second comment I wish to make concerns methodological and metaphysical behaviorism. [2] Metaphysical behaviorism, as I pointed out earlier, is simply one form of materialism: it consists in denying the existence of anything immaterial, and in asserting that whatever exists or occurs is identical with, or at least inseparable from, the existence of bodies and the occurrence of their actions and interactions. In contrast, methodological behaviorism, understood most generally, applies to our knowledge of inert bodies and our knowledge of plants as well as to our knowledge of animals and of men. It is a general principle of method that governs inferences from objectively observed behavior in the form of actions or interactions to the existence of such unobserved properties as powers, habits, or dispositions, none of which can be objectively observed. Inferences of this sort are themselves controlled by the principle of parsimony: we are justified in positing a power, habit, or disposition only if it is needed to explain observed behavior. When what we are thus justified in positing is a general type of power, habit, or disposition, needed to explain the observed behavior not of this or that particular thing, but of this type of thing, whether inert or animate, then our notion of the power, habit, or disposition functions as an explanatory theoretical construct.

In the case of inert bodies, plants, and non-human animals, the procedures of methodological behaviorism have always been followed by natural scientists, ancient and modern, even though the principle of parsimony has not always been observed and though scientists of an earlier generation are usually regarded by more recent ones as having been fanciful or imprecise with regard to the powers or dispositions they attributed to inert or animate

bodies. To say that the procedures of methodological behaviorism have always been followed in the scientific study of natural objects other than man is misleading if it allows anyone to think that some other procedure might have been used instead. That is not the case: no other procedure is possible if it is to be scientific in character, and not just an adventure in myth-making.

However, when we come to the case of man, the situation is different. During most of the Western tradition and even now in the twentieth century, the study of man has been and is carried on by introspective methods that are presumed to provide us with the direct observation of mental entities, occurrents, states, acts, or processes. If this presumption were true, which I think it is not, it would still be necessary to infer mental powers, habits, or dispositions from the observed data, and to posit them as theoretical constructs in psychology if they are needed for explanatory purposes.

Whether or not the presumption underlying the introspective method in the study of man is valid need not concern us here; for, as I pointed out earlier, the question about how man differs requires a comparative study of man and other animals; and, for that purpose, the evidence to be comparable must be obtained by the *same* method in the study of both. That being the case, the method must be behavioristic, not introspective, since only the former is applicable to both man and other animals. In attempting to resolve the pivotal issue in this inquiry, I will, therefore, not depart from the procedures of methodological behaviorism, either in this chapter or the next.

Though, as I pointed out above, the scientific study of natural objects has always followed the procedures of methodological behaviorism for the simple reason that no other procedures are possible in scientific work, the word "behaviorism" itself is new and dates from the time when students of man decided to forsake introspective methods and to substitute for them the same procedures that are employed in all the other natural sciences. The name is new and its newness is connected with a twentieth-century movement in psychology; but while the name was invented by the author of *Psychology from the Standpoint of a Behaviorist*, John B. Watson, then of Johns Hopkins University, and given currency fifty years ago by both his protagonists and his antagonists, the use of behavioristic procedures in psychology is as old

as Aristotle. [3] What is new with Watson and all the varieties of behaviorism that have developed since his day is not only the name, but the supposition made by most psychologists and even by philosophers who call themselves behaviorists—the supposition, namely, that methodological behaviorism is inseparable from metaphysical behaviorism.

The question whether or not that supposition is true—*please note, not the question whether metaphysical behaviorism is true*—is, in effect, identical with the question whether the difference in kind between men and other animals, which we cannot investigate except by behavioristic methods, must, therefore, be resolved in favor of saying that the difference in kind is superficial. If methodological behaviorism entails or presupposes metaphysical behaviorism, and if the latter denies the existence of anything immaterial, then a radical difference in kind is precluded by the very fact that we must use the behavioristic method to engage in a comparative study of man and other animals. It seems very odd, to say the least, to have the adoption of a method to deal with a question predetermine the answer that must be given. If we allow that to happen, the question itself vanishes into thin air. It is no longer a question that we need to investigate, since the only way in which we can investigate it predetermines the only answer that can be given.

I will, therefore, proceed as if the aforementioned supposition is false; which is not to say that metaphysical behaviorism (i.e., materialism) is false, but only that one can be a methodological behaviorist, as I have tried and will try to be throughout this book, without being committed to the metaphysical doctrine of materialism, as I am not; and, let me add at once, without being committed to its opposite, either. However, it is necessary to recognize that certain leading psychologists today (e.g., Hebb, Harlow, and Osgood, among others) explicitly aver their commitment to metaphysical as well as to methodological behaviorism. They do not contend that they can demonstrate the truth of metaphysical materialism. They say only that they think it is necessary to assume its truth in order to carry on their psychological investigations in a scientific manner, i.e., by the procedures of methodological behaviorism. [4] This, of course, is tantamount to their making the supposition that methodological behaviorism either presupposes or entails metaphysical behaviorism.

In spite of this, these scientists do not confine themselves to the use of neurological constructs for explanatory purposes, nor even to such appropriately behavioristic terms as "mediating factors or processes that are operative between stimulus and response." They have recourse to such mentalistic terms as "abstraction," "concept," or "idea." They hasten to assure us, of course, that as materialists they regard such theoretical constructs as ultimately reducible to neurological mechanisms or processes, or at least to being their inseparable concomitants. Whether they are or not is a question to be considered later in this book. What is more germane to our present discussion concerns the equivocal use that is made of such mentalistic terms as "concept" and "abstraction." The equivocation occurs in one way when they are used without qualifiers to represent exactly the same theoretical constructs to explain the behavior of linguistic and non-linguistic animals. It occurs in an opposite fashion when they are used with such qualifiers as "verbal" and "non-verbal" to apply to linguistic and to non-linguistic behavior; and when, in spite of that, it is nevertheless supposed that the term "concept" or "abstraction" retains the same meaning and refers to exactly the same type of psychological factor or process in men and other animals.

(5)

To carry the negative argument forward, I am now going to propose a hypothesis contrary to the one that I am trying to disprove. Both mine and its opposite must meet the test of accounting for the same experimental data. My hypothesis is that, to such things as the conditioned response, inhibition, and reinforcement, nothing need be added beyond the power of perceptual thought in order to explain animal behavior, especially those forms of animal learning that comparative psychologists suppose involve concept-formation. According to the hypothesis I am proposing, nothing like concept-formation is needed to explain the behavior in question. To test this hypothesis, it is necessary to give precise meanings to such terms as "perceptual thought" and "concept-formation" and to other terms involved in getting these meanings clear.

Donald Hebb suggests that we attribute "thought processes" to animals only when their behavior is not "at a reflexive sense-dominated level"; and, he adds, "verbal behavior is not a necessary requirement." [5] Following Hebb's suggestion, I propose that the non-verbal thought processes of animals—processes that remove the animal, in one way or another, from the domination of the immediate sensory stimulus—consist in (a) perceptual traces or residues, and (b) perceptual attainments. By perceptual traces or residues I mean memory-images that function representatively, i.e., in place of sensory stimuli that are no longer themselves operative. By perceptual attainments I mean the products of perceptual generalization and discrimination. I will use the term "perceptual abstraction" to name such products. Since all these elements are perceptual—either the *consequences* or the *products of perceptual activity*—it seems fitting to identify the thought processes of animals with *perceptual* thought. This is in line with the proposed hypothesis that the power of perceptual thought, its processes and products, are the only theoretical constructs needed to explain animal behavior.

A word more must be said about the perceptual attainment that I have called a perceptual abstraction, resulting from perceptual generalizations and discriminations that are learned. By a perceptual abstraction in an animal I mean a disposition to perceive a number of sensible particulars (or, in laboratory parlance, stimuli) as the same in kind or as sufficiently similar to be reacted to as the same. For example, when an animal has acquired the disposition to discriminate between triangles and circles—in spite of differences in their size, shape, color, or position, and whether or not they are constituted by continuous lines or dots—that acquired disposition in the animal is the perceptual attainment I have called a perceptual abstraction. This disposition is only operative in the presence of an appropriate sensory stimulus, and never in its absence, i.e., the animal does not exercise its acquired disposition to recognize certain shapes as triangles or certain colors as red when a triangular shape or a red patch is not perceptually present and actually perceived.

Outside of the laboratory and in the field, ethologists have found that animals have the disposition to recognize other animals as members of their own species or as members of alien species, in spite of individual differences among the perceived instances.

Here again we have the operation of perceptual abstraction in animal behavior; but here the perceptual abstractions are, according to the ethologists, instinctive or innate. [6] They are not learned through experience by perceptual generalization and discrimination. Hence they are not perceptual *attainments*, but perceptual *endowments*. However, this difference does not affect their character or functioning as perceptual abstractions. While the innate disposition to discriminate between similar and dissimilar animals would appear to be a more complex perceptual abstraction than the acquired disposition to discriminate between triangles and circles, there is evidence that laboratory animals can learn to react in a discriminating manner to fairly complex types of objects. Degrees of animal intelligence are supposedly correlated with the degrees to which they possess the power of perceptual generalization and discrimination—the power to acquire perceptual abstractions. Degrees of this power, Professor Klüver has shown, can be experimentally measured by what he calls "the method of equivalent and non-equivalent stimuli." [7]

Perceptual abstractions are unobserved and unobservable factors in animal behavior, just as perceptual generalization and discrimination are unobserved and unobservable processes. They are theoretical constructs needed to explain certain types of observed animal behavior, just as the perceptual residue or memory-image is a theoretical construct needed to explain other types of observed animal behavior. Furthermore, conceiving the perceptual abstraction as a *disposition* accords with the principles of methodological behaviorism; for if the observed elements of behavior are actions or operations, the unobserved factors in behavior should be theoretically constructed as dispositions to act or operate in certain ways, without regard to whether the dispositions are innate powers or acquired habits.

(6)

Let me return to the hypothesis I have proposed, and let me repeat its central thesis: it maintains that such perceptual residues as memory-images and such perceptual attainments as perceptual abstractions are the *only psychological* constructs needed to ex-

plain the *learned* behavior of animals. I confine my attention to *learned* animal behavior because instinctive animal behavior, as I pointed out earlier, is not comparable with learned human behavior, and so is not relevant to the solution of the problem of man's difference. I also omit reference to conditioned responses and to the processes of conditioning, reinforcement, and inhibition, because while these factors or processes are needed to explain certain forms of *learned* behavior in animals, they are *neurological* constructs—constructs on the same level with stimulus and response. Calling memory-images and perceptual abstractions "mediating factors" is an attempt to put them on the level of stimulus and response by conceiving them as operating between the action of receptors and the action of effectors; but this attempt fails to alter their character as theoretical constructs. They are *psychological, not neurological.*

The thesis stated above can be tested against the same laboratory evidence that is offered by most comparative psychologists (with the possible exception of Klüver and Maier) to show that concept-formation must be attributed to animals in order to explain behavior observed in the laboratory. The thesis to be tested denies that this is so. It denies that the power of conceptual thought and its attainments are needed as theoretical constructs to explain the behavior in question. Before we examine the data by which the proposed hypothesis can be tested, it is necessary to expand the hypothesis to include a clear distinction between the perceptual attainment I have called a perceptual abstraction and the conceptual attainment I will now call a concept. (Both, by the way, are unobservable. Concepts are no more directly inspectable occurrents in experience than perceptual abstractions are. [8])

Clarity on this point is crucial. The comparative psychologists claim that unverbalized perceptual abstractions are non-verbal concepts; they claim that the process of perceptual generalization and discrimination that gives rise to perceptual abstraction is a process of concept-formation. The hypothesis I am proposing denies these claims. It maintains, on the contrary, that the process of concept-formation is beyond the power of perceptual thought, that concepts, non-verbal or verbal, are not the products of perceptual generalization and discrimination, and that perceptual

abstractions cannot be identified with concepts, not even with non-verbal concepts. To do so is to use the term "concept" in a violently equivocal fashion.

Like the perceptual abstraction, the concept is an unobservable factor in behavior; it is, therefore, a psychological construct and should be defined in dispositional terms. If we restrict ourselves for the moment to concepts that relate to perceived or perceptible objects, a concept can be defined as an acquired disposition to recognize the kind of thing a perceived object is and to understand what that kind of thing is like. For example, to have the concept of dog is to have the disposition to recognize perceived animals as dogs and also to understand what dogs are like. In one respect a concept does what a perceptual abstraction also does. Since the concept enables us to recognize this sensible particular as being of a certain kind, it *ipso facto* enables us to recognize a number of sensible particulars as being of the same kind, and to discriminate between them and other sensible particulars that are not of the same kind. But the concept—of dog, for example—is first of all a disposition to understand what dogs are like; only secondarily is it a disposition to recognize this or that perceived particular as a dog; and it is only in the latter connection that it also functions as a perceptual abstraction does, to enable us to discriminate between sensible particulars that are and sensible particulars that are not the same in kind. In addition, the disposition to understand what dogs are like can be exercised when dogs are not actually being perceived as well as when they are; whereas perceptual abstractions, as dispositions to discriminate between sensible similars and dissimilars, function only when the sensible particulars are being perceived.

If animals had, through perceptual abstractions, the disposition to do more than discriminate between triangles and circles; if they had the disposition to recognize this perceived shape as a triangle and that perceived shape as a circle, together with the disposition to understand what triangles and circles are like; and if they could manifest by their observed behavior the latter disposition quite apart from perceiving any shapes whatsoever—then we would be justified in attributing concepts to them; for without this theoretical construct, their behavior could not be explained. However, as we shall see, no evidence is available to show that animals, over and above the disposition to discriminate

between similars and dissimilars when presented with sensible particulars, also have the disposition to recognize this one sensible particular as being of a certain kind and to understand what kind of thing it is, i.e., to recognize this particular shape as a triangle and to understand what kind of shape a triangle is—in the absence of perceived triangles as well as in their presence.

A further point must be made, and it is of the greatest importance. All perceptual abstractions—in animals and in men—are dispositions that are operative only in the presence of perceived particulars. But human concepts, even when they relate to perceived particulars, are not operative only in the perceptible presence of those particulars; and *not all human concepts relate to perceived particulars.* In addition to concepts of such perceptible objects as dogs and roses, men attain, through the process of theorizing, concepts of such imperceptible objects as elementary physical particles and chemical valences. In philosophy they develop concepts of such imperceptible objects as truth and justice; and in psychological theorizing they employ concepts of such imperceptible objects as memory-images, perceptual abstractions, and concepts themselves.

Concepts of the latter type are the type that we have called theoretical constructs. They are formed (i.e., constructed) by relating other concepts—conjunctively, disjunctively, by negation, etc. Only concepts of the first type (i.e., concepts of perceptible objects) are formed on the basis of perceptual abstractions. Yet even these are not formed solely on that basis, but require, in addition, a process of construction in which concepts are related by conjunction, disjunction, negation, etc. In other words, *no concepts are derived solely from perceptual abstractions; none is simply an abstraction from perceptual experience; all are constructed, though some are constructed on the basis of perceptual abstractions and some are not; and it is only the latter that we call theoretical constructs.* [9]

To summarize: two points made above set up a sharp and clear distinction between perceptual abstractions and concepts. (1) As attained dispositions, perceptual abstractions are exercised only in the actual presence of perceived objects, whereas concepts are exercised even when the appropriate objects are not actually perceived, and even when they cannot be, because the objects are imperceptible. (2) Perceptual abstractions are attained solely

by processes that involve the exercise of perceptual powers (i.e., perceptual generalization and discrimination), whereas concepts, even those that are concepts of perceptual objects, are never solely attained by the exercise of perceptual powers.

The fact that perceptual abstractions and concepts are functionally alike in one respect does not justify the comparative psychologists in saying that perceptual abstractions are rudimentary concepts. Though the concept of a perceptible object is a disposition to discriminate between similar and dissimilar particulars, it is never solely that, and it is that only in virtue of being a disposition to recognize each perceived particular as being of a certain kind and to understand what kind of thing it is. Furthermore, this disposition is operative when the perceptible objects are not actually being perceived as well as when they are. Hence a perceptible abstraction, which is a disposition *only* to perceive a number of sensible particulars as similar and to discriminate between them and other sensible particulars that are dissimilar, and is a disposition that functions *only* when the sensible particulars are being perceived, cannot be regarded even as a rudimentary concept of perceptible objects.

(7)

With my hypothesis sufficiently explicated and its constitutive distinctions made clear enough for the purpose at hand, we are now prepared to look at the relevant laboratory data, to see whether the experimental evidence supports the hypothesis proposed, or supports the contrary hypothesis advanced by most comparative psychologists. The evidence falls into two sets of findings, the first relevant to perceptual residues, the second relevant to perceptual attainments.

(1) The first set of findings consists of evidence derived from delayed-reaction and detour experiments. The data can be summarized as follows: (a) In delayed-reaction experiments, the animal, prevented from reacting immediately to a present stimulus, subsequently reacts, in the absence of that stimulus, in the way that it would have reacted to the stimulus at the time it was present, had it not been prevented from doing so. The inter-

val of the delayed reaction varies from extremely short intervals measured in seconds to a day or two at the most in a few exceptional cases. [10] (b) In detour experiments, the animal, blocked from a direct path of reaction to a present stimulus, takes a circuitous path that removes the stimulus for a time from the perceptual field. [11]

Can the behavior described be explained without the use of any psychological constructs whatsoever? Earlier experimenters with animals thought that it could be; but more recently, comparative psychologists (e.g., Hebb, Harlow, Osgood, and others) maintain that, to explain such behavior, it is necessary to posit mediating factors in the central nervous system—what Hebb calls "neural or humoral sets." These mediating factors (involving more than just connective action on the part of the CNS) explain, in the case of delayed-reaction experiments, the activation of the effectors at a time later than the activation of the receptors on the observed periphery of the animal's behavior; and, in the case of detour experiments, they similarly explain the animal's behavior during the time that the stimulus he is reacting to is not operative on his sense organs. [12]

The psychologists mentioned above and many others (especially those, such as Hunter, who made early use of the delayed-reaction experiment) are not content with this level of explanation. They wish to give a psychological as well as a neurological explanation of the observed behavior. To do this, they think it is necessary to introduce, on the psychological plane, something they call a "representative" or "ideational" factor as the psychological counterpart of the mediating factor in the central nervous system. Why? Because in the absence of the original stimulus (to stay on the psychological plane, they should say "with the cessation of the animal's perception of a certain object"), some psychological factor which takes the place of that perception must be operative to explain what the animal does after the elapse of a relatively short time or during the time that the animal is reacting to the object though it is not within his perceptual field. [13]

The scientists we are here considering call this factor "representative" because it takes the place of—it operates in place of —the perception that is no longer operative. But is it necessary to regard this representative factor as an idea or a concept? Only if ideas or concepts, which may be representative factors in cer-

tain types of human behavior that are quite unlike animal behavior in delayed-reaction and detour experiments, are the *only* representative factors that can be appealed to for explanatory purposes. As Maier and Schneirla point out, this simply is not the case. Conceptual attainments are not needed to explain the phenomena. Such perceptual residues as memory-images—either in immediate reverberating memory or in recall after longer intervals—suffice to explain the described behavior. No other theoretical constructs are needed except, perhaps, that of an emotional or appetitive drive that activates the memory in the case of the delayed reaction after an interval longer than seconds. Since, in the explanation of human behavior, memory-images are perceptual residues and ideas or concepts are not, it is a violation of Lloyd Morgan's rule to use ideas or concepts, as distinct from perceptual residues, when they are not necessary for the explanation of the behavior described. [14]

(2) The second set of findings consists of evidence derived from experiments on equivalent and non-equivalent stimuli, on generalization and transfer, on animal maze-learning, on cue-learning, on discrimination, and on solving multiple-choice problems. The data can be summarized as follows. The animal which, by learning or otherwise, reacts to a particular stimulus or cue in a particular way, transfers that same reaction to other stimuli or cues that are like it in type, though not like it in all particular respects. The amount of variation in the set of stimuli able to elicit the same response measures the degree of similarity required in order for the differing stimuli to function as equivalent. [15]

Can this behavior, as described, be explained without the use of any psychological constructs whatsoever? Yes, like the delayed reaction, it can be explained in neurological terms. That, at least, is the claim of McCulloch and Pitts, of Craik, and of others who have constructed electrical devices that simulate the action of the central nervous system in the perception of shapes and in pattern-recognition. However, these neurologists and computer technologists are not content to stay on that level of explanation, but insist upon introducing such terms as "concept" and "universal" into their treatment of the phenomena. [16] They are joined by the comparative psychologists who not only make these experi-

mental findings the basis for attributing abstraction to animals, but also think that they have evidence here for concept-formation on the part of animals. [17]

They would be correct in their theory of the matter if they were content to employ a purely perceptual attainment, such as a perceptual abstraction, in order to explain a purely perceptual phenomenon; namely, discrimination between similars and dissimilars. But they do not stop there. As we have already noted, they make the same evidence that is the basis for inferring that animals abstract, generalize, and discriminate also the basis for inferring that animals form concepts. Of course, they have a right to use the word "concept" in this way—as referring to the same psychological factor that I have called a perceptual abstraction. But if they use the word "concept" in this way, then they do not have the right to use it also for a psychological factor that is operative in human behavior—a disposition to understand what a certain kind of object is like, whether or not it is actually being perceived and whether or not it is perceptible. To use the same word for psychological factors as different as these is to equivocate in a manner that renders a scientific theory almost worthless. [18]

The violence of the equivocation leads to the following patently fallacious piece of reasoning.

I. Concepts are
   (A) acquired dispositions
      (1) to recognize perceived objects as being of this kind or that kind and, at the same time,
      (2) to understand what this or that kind of object is like; and, in virtue of (1) and (2), also
      (3) to perceive a number of sensible particulars as being the same in kind and to discriminate between them and other sensible particulars that are different in kind; concepts are also
   (B) acquired dispositions to understand what certain kinds of objects are like
      (1) when the objects are not actually perceived, and
      (2) when they are not perceptible.

II. As experiments show, animals have, through the attainment of perceptual abstractions, acquired dispositions to

perceive a number of sensible particulars as being the same in kind and to discriminate between them and other perceived particulars that are different in kind.

III. Therefore—because what is said in II above coincides with what is said in I, (A), (3) above—animals have concepts in some rudimentary form.

The conclusion may be true, but its truth is not established by the premises. What the premises do plainly show is that the experimentally observed behavior of animals can be adequately explained in terms of perceptual abstractions and the processes of perceptual generalization and discrimination that give rise to perceptual abstractions. These are the only theoretical constructs needed for explanatory purposes. Concepts (understood as quite distinct from perceptual abstractions) and concept-formation (understood as quite distinct from perceptual generalization and discrimination) are not needed and, therefore, they cannot be justified as theoretical constructs in the explanation of the observed behavior.

(8)

This concludes the negative phase of the argument. The hypothesis proposed, so far as it related to what theoretical constructs are and are not needed to explain the observed behavior of non-linguistic animals, has been checked against the relevant experimental evidence, and has found support therein. It remains to see whether the hypothesis, so far as it relates to what theoretical constructs are needed to explain human behavior, especially man's linguistic behavior, can be equally well supported. That belongs to the positive phrase of the argument and to the next chapter.

Two concluding comments may serve as a transition to the next chapter. *First*, I have said a number of times that the theoretical constructs that represent the processes or products of perceptual thought suffice to explain not only the behavior of non-linguistic animals but also whatever behavior is *common* to linguistic and non-linguistic animals. This may not be true for that part of human and animal behavior which involves percep-

tual abstractions. In the case of animals, perceptual abstractions are operative without benefit of the simultaneous operation of concepts. But if we assume for the moment that men have the power of conceptual thought, then it is unlikely that perceptual abstractions ever function in human behavior without the simultaneous operation of the concepts that provide an *understanding* in addition to a *recognition* of the perceived objects. It may rarely be the case (and then perhaps only under pathological conditions, such as those of agnosia) that perceptual abstractions are exercised blindly, i.e., the object is recognized but not understood. Only in such rare cases does the power of perceptual thought explain human behavior in the same way that it explains animal behavior. For the rest, it does not; because wherever in human behavior both concepts and perceptual abstractions are simultaneously operative with regard to the same perceived objects, that behavior cannot be equated with animal behavior. The only behavior that is common to linguistic and non-linguistic animals consists of performances (whether by men or by other animals) that do not involve concepts in any form or fashion. [19]

Second, it may be objected that all that has thus far been shown is that men *have* and animals *do not have* verbal concepts; and that when distinction is made between verbal and non-verbal concepts, perceptual abstractions can be identified with non-verbal concepts; in which case it would not be wrong, in the light of the evidence, to hold that animals do have concepts (i.e., non-verbal ones).

If by a verbal concept is meant a concept that is or can be expressed in words—not just in a name by itself, but in a sentence using that name—then it is at once clear that animals do not have verbal concepts, and equally clear that men do. If by a non-verbal concept is meant a concept that is not expressed in words, *but always can be*, then it seems to me just as plain that men have non-verbal concepts as well as verbal concepts, and that animals have neither.

However, the push of the objection may be in another direction. It may be to the effect that men have the type of concept that they do have *because they have words*, whereas animals have a different type of concept *because they are without words*. Thus understood, the objection contends that human concepts arise from or have their genesis in the use of language, and these are,

therefore, properly called *verbal* concepts (i.e., concepts dependent on the use of words). In contrast, the objection may contend, animal concepts that do not arise from or have their genesis in the use of language are properly called *non-verbal* concepts (i.e., concepts not dependent on the use of words). Perceptual abstractions, which are no more than the disposition to recognize perceived objects as being of this or that kind, would then be the non-verbal concepts possessed by animals; whereas human concepts, which provide an understanding of what this or that kind of object is like (whether it is perceived, not perceived, or imperceptible), would then be verbal concepts in the sense above indicated.

The reply to the objection, thus understood, consists in challenging the sense in which the objection applies the terms *verbal* and *non-verbal* to concepts. (1) Are men able to form the type of concepts that they do form *because they have the words with which to form them*? (2) Or are men able to use the words that they do use significantly *because they have the concepts with which to use them*? Only if the answer to the first question is affirmative can the sense in which the objection uses *verbal* and *non-verbal* be sustained: for only then will all human concepts be verbal in type; and all non-human concepts, non-verbal in type. If, however, the reverse is the case and the answer to the second question is affirmative, no concepts are *verbal* in the sense in which the objection applies *verbal* and *non-verbal* to concepts; for then man's meaningful use of words depends on his having concepts, not the other way around. His having concepts and his use of them do not depend on his having and using words, though his use of language certainly helps to multiply and refine his concepts.

To attempt to show that concepts are the cause of man's meaningful use of words is all one with the effort to show the need (in order to explain the linguistic behavior of men) for theoretical constructs that represent the processes and products of conceptual thought—concept-formation and concepts. This is the task set for the next chapter and the positive phase of the argument. If it is successfully discharged, as I think it can be, the objection based on the distinction between *verbal* and *non-verbal* concepts will have been dismissed as without foundation.