

## INTRODUCTION

by  
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Epistemology, otherwise known as *the theory of knowledge*, is best understood in the light of its history. That history involves several traditions. The sources of more than one of them can be witnessed in one of the most striking passages in the philosophical literature, perhaps in literature in general. It is the slave boy episode in Plato's dialogue *Meno*. The main character of the dialogue is Socrates, who is modeled on a real philosopher of the same name. In this episode, he engages an intelligent but uneducated slave boy in conversation to prove a philosophical point. Merely by putting questions to him, without giving him any new information, Socrates leads the boy to realize a nontrivial geometrical truth. Socrates' performance—or is it the boy's performance?—strikes one almost like a conjuring trick. Where did the knowledge of the theorem come from? The reader is witnessing an impressive and at the same time puzzling demonstration of the powers of the human mind. What is even more impressive, the particular mind in question is not that of a genius but of an uneducated slave.

One is tempted to see in the slave boy's achievement a small-scale example of the same kind of achievement as is attributed to Albert Einstein by C. P. Snow. In commenting on Einstein's articles (published in 1905) that revolutionized physics, Snow writes in a *Variety of Man* (1966): "All the papers are written in a style unlike any other theoretical physicist's. . . . The conclusions, the bizarre conclusions, emerge as though with the greatest ease: the reasoning is unbreakable. It looks as though he had reached the conclusions by pure thought, unaided, without listening to the opinions of others. To a surprisingly large extent, that is precisely what he had done."

Epistemology begins from this sense of wonder at the powers of the human knowledge-seeking mind.

*Meno's* slave boy episode marks the beginning of two traditions in epistemology. On the one hand, it illustrates the idea that there is

a realm of truths that are independent of experience and hence reachable by pure thinking alone. Such truths are known as a priori truths. Their nature has been the subject of one of the research traditions in epistemology. This tradition will be discussed below.

On the other hand, the slave boy story brings out another line of thought about knowledge. How do we reach knowledge? Socrates did not deliver any new information to the slave boy; he only asked questions that the boy could have asked and got answered himself—if he had but known which questions to ask. Socrates' superiority does not lie in his knowing more answers than his interlocutors; it lies in his knowing what questions to ask. This suggests that the right method of reaching new knowledge is by raising the right questions. This idea is even imbedded in our vocabulary in that the English word *inquiry* means at one and the same time "the action of seeking for truth, knowledge or information" and "the action of asking or questioning; interrogation" (*Oxford English Dictionary*).

The Socratic idea of knowledge-seeking as questioning was developed by Plato into a method of philosophical training by means of questioning games. These games were studied and systematized by Aristotle, who thereby became the first systematic epistemologist as well as the first logician in the Western tradition.

This tradition of questioning as the key epistemological method flourished again in the Middle Ages in the form of formal questioning games, called obligation games. In our days, it has been represented by such philosophers as R. G. Collingwood and H.-G. Gadamer, who have seen in "the logic of questions and answers" the crucial method of all inquiry.

Most philosophers nevertheless would not recognize this tradition of "inquiry as inquiry" as a part of the mainstream of modern epistemology. It is true that it has not often been discussed in so many words. It is, for instance, not until our own generation that a genuine systematic logic of questions and answers has been developed. However, in a more general perspective this tradition has been alive and well in science itself. For, as such philosophers as Sir Francis Bacon and Immanuel Kant have pointed out, experiments and observations can (and should) be considered as the scientist's questions to Nature.

One of the strengths of the questioning approach to epistemology is that it focuses our attention on the most important question

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that a scientist is likely to ask about knowledge-seeking in general. In presenting and defending his or her results, a scientist has to discuss the extent to which they are supported by available evidence. In other words, the scientist will have to ask: how well established are my results? But from the vantage point of the overall growth of science, an even more important question is: how can we obtain new and better evidence? In terms of the questioning approach, this question means: which new questions should we put to Nature? In other words, what new experiments and observations should we undertake?

One reason for the alienation of philosophers from the questioning tradition is that the questioning idea leads to problems. One of these problems figures already in the *Meno*. We cannot seek knowledge by asking questions unless we know what we are looking for. But if we know it, there is no need to look for it. This question is known as the *Meno* paradox.

Another problem is that it is clearly all right to rely on answers to questions in our quest of knowledge as long as one can trust all the answers one receives, but unfortunately such naive faith is not realistic either in ordinary life or in science. How can we cope with possibly mistaken or misleading answers? There are by and large two lines of thought that can be tried here. One possibility is for an inquirer to check answers to his or her questions by asking further questions and comparing the different answers with each other. Such a comparison procedure is what we find in a courtroom where lawyers try to discredit a witness's answers by showing that they contradict each other or contradict well-established answers from other witnesses or from other sources, such as physical evidence. Conversely, lawyers can seek to enhance the credibility of a witness by means of the testimony of other witnesses, for instance, so-called character witnesses. A similar procedure is found in science. Its success is guaranteed only if it can be argued that the method of questioning, or some equivalent method, is what is known as a self-correcting procedure, which ultimately leads to truth. This kind of line of thought has been represented among others by the great American pragmatist Charles S. Peirce. (Peirce did not identify the crucial steps in the self-correcting process of inquiry with questions, however, but with what he called abductive inferences.) The problem of coping with possibly false answers by means of further

questions is a complicated one, however, and has been largely beyond the powers of philosophical epistemologists' logical tools till recently, even though scientists have in practice managed to cope with it.

Another way of attacking the problem of possibly false answers is to try to dispense with them altogether. In other words, one can try—and philosophers have tried—to find some truths, some answers, that are beyond any doubt and on which the rest of the structure of our knowledge can be based. This has been the most common type of approach to epistemology among philosophers. It is sometimes called epistemological *foundationalism*. It is wrought with formidable problems, however.

One problem is where to find the indubitable bases for our knowledge. A perennial candidate has been sense perception. But seeing should not always be believing, because it does not put us in direct touch with its objects. Perceptual illusions and hallucinations have been used as evidence to the contrary. With a modicum of ingenuity, a psychological experimenter can even make us "see" impossible objects. And even when no mistakes are involved, sense perception does not give us directly the information we spontaneously think that we receive from it. For instance, as George Berkeley urged especially forcefully, our depth (three-dimensional) seeing cannot, geometrically speaking, be automatic but is inevitably constructed from different clues, such as an unconscious comparison between the images on the retinas of one's two eyes. If anything, contemporary scientific study of perception has reinforced this indirectness and complexity of the process of sense perception, which makes its messages dependent on all sorts of different preconditions. For instance, according to one contemporary psychologist of perception, David Marr, the processing of visual information in the human central nervous system proceeds by stages. First, out of the visual input a primal sketch (as Marr calls it) is constructed, in which edges, boundaries, and regions of the visual field are distinguished. From this a two-and-a-half dimensional representation is constructed in which surfaces and shapes relative to the viewer are included. Finally, from those perspectival representations a truly three-dimensional object-centered model (representation) is created, according to Marr. Even if his theory is not accepted by all scientists, competing accounts are likely to be even more complex. Needless to say, all the processes described

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by Marr are unconscious. All of them involve neural processing and hence can in principle go wrong. Thus visual perception does not put us in direct contact with reality and is not infallible. Even one of philosophers' favorite examples of sense qualities, color, is not a simple matter of registrations of the kind of light that hits one's retina, but the end product of a complicated construction process in the brain.

In the philosophical literature the foundationalist approach is illustrated by the ideas of the British realists G. E. Moore and Bertrand Russell in the early years of the twentieth century. Moore argued in his famous article "The Refutation of Idealism" that in any experience I can in principle distinguish on the one hand the mere experience as a happening within my consciousness and on the other hand the object of that experience, that is, what is given to me in that experience. That "given" thing is not merely an appearance but something objective that is given to me in that experience. That something is the immediate object of that experience. It is directly given to me, and about it I cannot be mistaken. In perceptual experience, that object is called by Russell and Moore a sense datum. More generally, Russell called whatever is directly given to me an *object of acquaintance*, as distinguished from *objects of description* to which we do not have such a direct access. Accordingly, we can have knowledge either by acquaintance or by description. The reduction of the latter to the former is called by Russell reduction to acquaintance.

Sense data are among the Russellian objects of acquaintance, but they are not the only ones. Hence this object of direct perception, the *sense datum*, must be somehow closer to my consciousness than physical objects and yet belong to the world of physics. But what is it? Moore and Russell never gave a definitive answer, their best suggestion being that what is immediately given to me are the states of my own central nervous system.

Sense data are part of the physical world, but they are not themselves physical objects. The reason is that our perceptual experience can mislead us about physical objects, as attested to by perceptual illusions and hallucinations. But the difficulty of finding indubitable bases for our knowledge is not the only problem here. Even if direct perception provides us with such starting points, we still face the problem of showing how the rest of our knowledge rests on them. This looks like a serious problem. The testimony of the senses only provides us with particular truths. Yet much of our most important

knowledge consists of general truths, such as scientific theories. Hence we need some way of either inferring general truths from particular ones or otherwise reducing the former to the latter.

Inferences from particular cases to a generalization (or to other particular cases) are usually known as *inductive inferences*. In view of what has been said, it is no surprise that the problem of induction has been one of the most prominent ones in epistemology. It was thrust to prominence in philosophy by David Hume. Hume was an empiricist who wanted to find the basis for all our "ideas" in the "impressions" with which experience provides us. With great ingenuity, Hume searches for the "impressions" that underlie such general beliefs as our trust in causal connections. In the end, he finds none. "The mind can never possibly find the effect in the supposed cause by the most accurate scrutiny and examination," he concludes. "For the effect is totally different from the cause, and consequently can never be discovered in it. Motion in the second billiard ball is a quite distinct event from the motion of the first, nor is there anything in the one to suggest the smallest hint of the other." Moreover, Hume argues even more cleverly that observing the cause should not on purely empirical grounds even make the effect more probable.

Hume certainly has logic on his side, in that from particular truths no nontrivial general truths (including probabilistic ones) can be inferred purely logically. Hence the structure of our knowledge apparently cannot be understood without postulating some strong a priori truths, such as would justify inductive inferences, for example. In our days, the same conclusion has apparently emerged from the heroic attempt by Rudolf Carnap to construct a probabilistic logic of induction based on purely logical principles. In the end Carnap, too, needs a priori principles in order to prefer one inductive method over others.

In this situation, many philosophers have been led to make, if not a virtue, then at least a philosophical theory out of necessity. They have defended a view that maintains we do not reach our general truths like scientific theories by inference or by any other process that is subject to rules. For instance, according to such philosophers, scientific discovery has no "logic." It is a matter of intuition or some other kind of insight, lucky guesses or whatnot, not of inference. Only afterward can a general truth be justified by comparing its consequences with the results of observations and

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experiments. This kind of view is known as the *hypothetico-deductive* model of scientific (and nonscientific) reasoning. It is sometimes expressed by distinguishing *contexts of discovery*, which allegedly are not subject to rules, and *contexts of justification*, for which a rational theory can be developed.

According to other philosophers, such a view is premature. Some have sought to look at general truths, and the rest of the structure of our indirect knowledge, not as being *inferred* from the basic data but as being *constructed* from them. As Russell formulated what he claims to be "the supreme maxim of scientific philosophizing": "whenever possible, logical constructions are to be substituted for inferred entities." Several major philosophers have sought to implement this idea of considering the entire structure of our knowledge as being constructed out of the given data of experience. Such attempts include Bertrand Russell's *Our Knowledge of the External World* (1914), Rudolf Carnap's *Logical Structure of the World* (1928), and Nelson Goodman's *The Structure of Appearance* (1951). These books are all major intellectual achievements, but as far as their ultimate success is concerned, the most favorable thing to be said is that the jury is perhaps still out.

One can also look at the original ambitious project of the phenomenological philosophy of Edmund Husserl in the same light. His famous "phenomenological reduction" may be compared with Russell's "reduction to acquaintance," and Russell's "acquaintance" can be thought of as a counterpart to what Husserl calls "intuition." An important example of Husserl's efforts in showing how concepts can be "constituted" on the basis of what is immediately given to one's consciousness is his discussion of the phenomenology of the internal awareness of time. The immediately given data include in this case one's spontaneous awareness of what has just happened ("retention") and one's spontaneous awareness of what is about to happen ("protention"). In a wider historical perspective, such a philosophical construction of time can perhaps be compared with the procedure of a modern novelist like Virginia Woolf, who does not present her readers with a ready-made chronology of events but instead forces them to construct the time sequence of her fictional world from the stream of consciousness of her characters.

A more conclusive rejoinder can be offered from the vantage point of the interrogative (questioning) approach to inquiry.

Whether or not some particular truths are indubitable, the actual input into our cognitive processes often consists of tentative general truths and not only of particular ones. For instance, a controlled experiment, the most important methodological weapon of actual science, can show as its result how one variable (the observed variable) depends on another one (the controlled variable). Such dependence, if true, is a general fact, even when it is restricted to certain limited values of the controlled variable. Of course we are no longer dealing with indubitable starting points for our knowledge. But if such general answers by Nature can be tested by further experiments and observations, there is no need to exclude them from the input that goes into the total structure of our knowledge.

In spirit, if not in the letter, such a view is close to the ideas of Charles S. Peirce. It is also among the ironies of history that Hume, who was restricting the input of our cognitive processes to particular "impressions," should have claimed to be following the methods of reasoning of the great scientist and mathematician Isaac Newton. For Newton's methodology relied essentially on using experiments and systematic observations that already possess some degree of generality. They can hence serve as the "phenomena" from which general laws can, according to Newton, be "deduced."

In recent decades, much of the specialized work in epistemology in English-speaking countries has concerned "contexts of justification" rather than "contexts of discovery." The topics that have been discussed include the definition of knowledge, the different kinds of evidential support ("warrants"), and what is known as belief dynamics. Of these subjects, the definition of knowledge was already discussed by Plato. In his dialogue *Theaetetus*, several attempted definitions of knowledge are examined and rejected, among them knowledge as perception (or should we say, in the light of hindsight, knowledge as acquaintance?), knowledge as true belief, and knowledge as true belief accompanied by an account (*logos*). In our time, other definitions of knowledge have likewise been criticized. The best-known case in point is Edmund Gettier's argument in 1963 to the effect that knowledge cannot be defined as justified true belief. Some others have tried to rely in their definitions of knowledge on the idea that in order to amount to knowledge a belief must not be defeasible, that is, that it would not be dislodged by any possible true information.



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The best-known discussions of the warrant problem are Alvin Plantinga's books *Warrant: The Current Debate* (1993) and *Warrant and Proper Function* (1993). Belief revision theories deal with the justification, not of beliefs, but of belief changes. They are discussed, for instance, in Isaac Levi's book *The Fixation of Belief and Its Undoing* (1991).

But can knowledge be defined by reference only to the evidential support that a candidate for such a status has? Frank Ramsey suggested requiring also that the belief in question is formed by the right kind of method. More generally speaking, knowledge-seeking can be thought of as a "game" in the generalized sense of the mathematical theory of games. This viewpoint offers several interesting insights. For instance, from the theory of games it can be seen that what can in the last analysis be evaluated in knowledge-seeking are entire strategies governing an inquirer's choices in the entire knowledge-seeking process rather than particular "moves" or particular situations that may come about in the process. This makes it questionable whether it is worthwhile to try to define knowledge in purely evidential terms. This is because such a definition would involve evaluating the situation at some particular stage of the epistemic enterprise. At the same time, Ramsey's suggestion is vindicated insofar as we can identify what he called "methods" with strategies in the game-theoretical sense. Again, from the strategic viewpoint one can find certain remarkable connections between strategies of inquiry and strategies of logical deduction. These connections may be seen as justifying the widespread popular conception of logic and deduction as the secret of all good reasoning. Such a "Sherlock Holmes conception of logic and reasoning" would be viable only from a strategic viewpoint, however.

The kind of skeptical challenge exemplified by Hume was met head on even before Hume by another major thinker. The most resolute attempt to find an indubitable starting point for our knowledge was made by René Descartes. He turned the tables on the skeptics who doubted the possibility of knowledge by turning himself—or a part of his self—into a devil's or, rather, a skeptic's advocate.

I resolved to pretend that all the things that had ever entered my mind were no more true than the illusions of my dreams. But immediately I noticed that while I was trying thus to think everything false, it

was necessary that I, who was thinking this, was something. And observing that this truth, "I am thinking, therefore I exist" [in Latin, *cogito, ergo sum*] was so firm and sure that all the most extravagant suppositions of the skeptics were incapable of shaking it, I decided that I could accept it without scruple as the first principle of the philosophy I was seeking.

This is one of the most famous passages in epistemological literature. It has even more facets than *Meno's* slave boy episode. First of all, what is the nerve of Descartes's argument, and what does it prove? Elsewhere, he formulates his conclusion as the impossibility to deny his own existence. If René tries to tell his alter ego Descartes, "I don't exist," by so doing he on the contrary shows that he does exist, quite as much as (say) Mark Twain could have proved his existence by saying to a doubter "Mark Twain does not exist." Or not quite, for the listener must for the purpose know that the speaker is indeed Mark Twain. By the same token, a witness to Descartes's experimental attempt to think to himself "I don't exist" must know who that "I" is, and know it a priori because it is supposed to be the first and foremost philosophical truth. Otherwise the only conclusion he could draw from "*I am thinking*" is, as the witty German thinker Georg Christoph Lichtenberg put it, *es denkt* (*thinking is going on*). But the only person who is witnessing Descartes's thought-experiment and who can know for certain who Descartes's "I" is is Descartes himself. In this sense, Descartes has proved his existence only to himself. You cannot prove *Descartes's* existence to yourself by the *cogito, ergo sum* argument, even though you can hopefully prove *your* existence to yourself in the same way. In this sense, Descartes's famous insight is subjective. In this respect, it has set the tone of much of the later epistemology. For instance, the grand projects of Husserl, Russell, and Carnap are attempts to show how I can construct *my* knowledge of the world from *my* experiences. Descartes himself could not claim that his "clear and distinct" ideas like the *cogito* insight gave him universally applicable knowledge until he had established by further arguments the existence of a God who does not deceive us.

Descartes's controversial insight is not unrelated to yet another tradition in epistemology. One of the most interesting aspects of the *cogito* argument is that Descartes in it produces the grounds for his

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conclusion by his own activity of thinking. This is reminiscent of the idea that we can have knowledge, and even particularly important knowledge, of what we ourselves make or otherwise produce—and perhaps only of such creations of ours. This idea of “genuine knowledge as maker’s knowledge” is a double-edged one, however. It can be used—and has been used—to emphasize the exalted nature of humanistic and societal knowledge and to denigrate our knowledge of nature. For instance, Thomas Hobbes maintained that

the science of every subject is derived from a precognition of the causes, generation, and construction of the same. . . . Geometry therefore is demonstrable for the lines and figures from which we reason are drawn and described by ourselves; and civil philosophy [i.e., political science] is demonstrable, because we make the commonwealth ourselves. But because of natural bodies we do not know the construction, but seek it from the effects, there lies no demonstration of what the causes be we seek for, but only what they may be.

On the other hand, the same idea could be used to emphasize the importance of acquiring knowledge of nature just because such knowledge gives us power over nature. Sir Francis Bacon’s slogan “knowledge is power” is the best-known expression of this idea.

Hobbes’s statement is controversial and arguably contains a confusion. In geometry, we may perhaps be said to argue by means of figures we “draw and describe” ourselves, but our arguments are not about self-constructed figures on paper but about what they signify, that is, geometric objects in space. However, the great Immanuel Kant took the bold step of correcting Hobbes’s confusion by extending his ideas. As he put it in his famous *Critique of Pure Reason*: “Reason has insight only into that which it produces [itself] after a plan of its own.” In particular, Kant maintained that we can have higher-grade knowledge (which he identified with what he called synthetic knowledge a priori) in mathematics because we have ourselves imposed a framework of mathematical concepts on reality. Kant thought that that imposition takes place in sense perception, a view which has been shown not to do justice to the facts. But his basic idea of focusing in epistemology on what we humans do in

obtaining our knowledge of objects rather than on those objects is both interesting and promising, even though it has not been used very much in contemporary epistemological theorizing.

Kant's ideas can also be seen as echoing the interrogative approach to epistemology. It is not accidental that it was Kant who compared experiments to questions put to Nature. Another echo of Kantian activist ideas in epistemology can perhaps be seen in Ludwig Wittgenstein's idea that the relations of our language and our knowledge to the world are constituted by certain rule-governed human activities which he called language games.

But what about the kind of a priori knowledge that Socrates helped *Meno's* slave boy to reach? The primary example of such a priori knowledge is mathematical knowledge. Kant's theory of mathematics as dealing with properties and relations that we ourselves unwittingly project on reality is essentially an attempt to answer this question. Much earlier, Plato assigned mathematical objects to a higher, supersensible reality of which we can have knowledge only by means of reason, not sense perception. A contemporary version of Plato's theory conceives of mathematics as dealing with an abstract realm of all possible structures, sometimes identified with the universe studied in the fundamental part of mathematics called set theory. In an apparent contrast to such views, a tradition in the epistemology of mathematics has tried to reduce mathematics to logic and even maintained that logical and hence presumably also mathematical truths are empty tautologies in the sense that they do not convey any information about reality.

There is no consensus in the epistemology of mathematics and more generally in the epistemology of a priori knowledge. But perhaps there is in the last analysis less real disagreement here than first meets the eye—or, rather, meets the mind. Just because mathematics is, according to the Platonists, about a different region or reality, it presumably does not convey any factual knowledge of the concrete reality. And perhaps that higher reality can be both objective and created by human thought. Bridges and highways are not made any less objective by the fact that they are made by us humans.

A subject often discussed under the heading of epistemology is the nature of truth. It might be suggested that this inclusion is based on a confusion, namely, a confusion of what it is for a proposition or belief *to be* true and what it is for it *to be known to be* true. But

even if there is such a confusion—as there undoubtedly has been and still is—to make the proper distinction between the two is part of the business of epistemology.

Our naive pretheoretical idea of truth is undoubtedly something like a correspondence between a proposition and a fact. As Aristotle put this idea, “To say of what is that it is not, or of what is not that it is, is false, while to say of what is that it is, and of what is not that it is not, is true.” Systematized and clarified, ideas of this kind are known as *correspondence theories of truth*. In view of their obvious plausibility, why should any philosopher have maintained anything different? Some have challenged the distinction between truth and known truth. What use can there be for an idea of truth unless its applicability to particular cases can be known? But in many cases we cannot decide once and for all whether a certain belief is true. The best we can do is to see how well it squares with other well-entrenched beliefs of ours. Sophisticated versions of such lines of thought have led some philosophers to maintain that the truth of a belief should be thought of in terms of its coherence with other beliefs. Views of this kind are known as *coherence theories of truth*.

Lines of thought of this kind are subject to charges of the confusion just mentioned. There is nevertheless a much deeper issue involved here. Maybe the nature of truth lies in correspondence between language and reality (or of thought and reality), but can we express such a correspondence in our language? Don't we have to use language to refer simultaneously to facts and also to itself? Is this possible? In brief, is truth expressible in language? Several of the greatest philosophers of the twentieth century (and perhaps of other centuries as well) have denied such expressibility. As Wittgenstein once put this claim, “The limit of language shows itself in the impossibility of describing the fact that corresponds to a sentence . . . without repeating that very sentence.” On such a view, we cannot approach truth directly. We cannot define it. We cannot meaningfully ask what the truth is or look for truth. Philosophical truth has to reveal itself to us. Truth is not correspondence but openness, *Erschlossenheit*, as Martin Heidegger expressed it.

This line of thought leads to a view of the entire philosophical thinking, including epistemology, that is radically different from most of the traditional ones. According to this view we much approach reality not as an object of scientific investigation but as if

it were a text that we have to decipher. This approach is known as *hermeneutical philosophy*. Its main representatives have been Heidegger and Gadamer.

But is truth ineffable, as hermeneutical philosophers assume? Here sober logical analysis suddenly becomes relevant to the major philosophical issues of our times. For a long time, the definitive answer was taken to be a result of the great logician Alfred Tarski first published in 1933. This result says that, given certain assumptions, the concept of truth for a language cannot be defined in the same language, but only in a richer one. Since there is no richer language over and above our actual working language, it seems to follow that a philosophically interesting concept of truth cannot be defined. Tarski's argument relies on a mathematically sophisticated version of the old chestnut known as the Paradox of the Liar. If I say, "What I am now saying is false," am I saying something true or false? Either answer seems to lead to a contradiction. Tarski argues that such paradoxes make it impossible to use the concept of truth coherently in our actual colloquial language. However, recent results have dramatically reversed the picture Tarski's result seems to suggest. The assumptions on which Tarski's theorem rests have been shown to be arbitrary and unnecessarily restrictive. The normal situation in a sufficiently rich language is that truth can be defined. The consequences of these new results for the different theories of truth and for epistemology largely remain to be worked out.