REASON AT WORK

Introductory Readings in Philosophy

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Preface

This book represents our attempt to introduce students to the best in contemporary and historical work in philosophy. In making our selections, we have been guided by several considerations. First, and most important, the readings are intended to illustrate our belief that philosophy is an essential tool for anyone who wishes to engage in serious intellectual work. Despite obvious limitations of space, we believe that our selections illuminate the presuppositions of many of the most important areas of human endeavor. In addition, the readings reflect our belief that, in the last twenty years, philosophers have made significant progress both on traditional questions and in newer interdisciplinary problem areas. Their findings are of interest to anyone who wants a contemporary version of a traditional liberal arts education. Finally, our selections are intended to capture what we find riveting about the discipline—the combination of rigor and imaginative genius that the best work often displays. Like much else, the success of these attempts is left for the reader to assess.

While editing the book, we incurred various debts of gratitude that we are pleased to acknowledge here. When the book was in the review stage, we received helpful comments and suggestions from Professors John Buckley of the University of South Alabama, Hugh Fleetwood of Western Washington University, Richard Arneson of the University of California, San Diego, Walter O'Briant of the University of Georgia, and James Doyle of the University of Missouri. We also wish to thank Harcourt Brace Jovanovich's series editor, Professor Robert Fogelin of Dartmouth College, and all the editors who collaborated with us on this project. At the University of Vermont, where the bulk of the editing was done, we would like to express special thanks to Hilary Kornblith for writing the introductory material for the epistemology section. We are also grateful to Philip Kitcher, Arthur Kuflik, and William Mann for frequent advice. However, our greatest debt is to Leslie Weiger. As with so many other philosophy department projects, she managed most of the difficult technical details of this work. We are, as always, deeply appreciative of her efforts.

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INTRODUCTION

The Elements of Argument

We reason every day of our lives. All of us argue for our own points of view, whether the topic be politics, the value or burden of religion, the best route to drive between Boston and New York, or any of a myriad of other subjects. We are constantly barraged by the arguments of others, seeking to convince us that they know how to build a better computer or how to prevent a serious illness or whatever. When first approaching the subject of reasoning, a student is apt to feel like Molière's M. Jourdain, who suddenly realized that he had been speaking in prose for forty years. Just as prose can be elegant or ungrammatical, however, there are grades of reasoning, from the clear and compelling to the fallacious and sloppy. All scholars must engage in reasoning, but it is the mainstay of work in philosophy. A brief, but quite accurate, description of philosophical method is that we do not observe or experiment, we construct chains of reasoning. Because of its central role in their discipline, philosophers have tried to make their reasoning explicit and to discover the principles underlying good reasoning.

This introductory section of *Reason at Work* presents some basic principles of good reasoning. We hope to provide readers with some of the skills required for constructing good arguments of their own and for analyzing the reasoning of others. These two tasks—the constructive and the critical—are related. A good critic can reconstruct the best version of the argument under appraisal. Equally, a good reasoner is constantly playing critic, subjecting the developing argument to scrutiny. Besides the intrinsic value of improving the skill of reasoning, we hope that this section will also enable students to achieve a better understanding of the argumentation in the readings that follow.

Arguments

In ordinary parlance, an argument is a verbal dispute carried out with greater or less ferocity. The technical, philosophical notion is quite different. An argument is a collection of sentences consisting of *premises* and a *conclusion.* Arguments can have any number of premises, starting with as few as one. In reasoning, we often encounter a *chain of argumentation,* that is, a sequence of arguments. We begin with some premises and infer a conclusion. From this first conclusion, plus some other premises, we infer a second conclusion, and so on down the line until we reach the final conclusion of the entire chain of argumentation. The conclusions of the individual arguments in the chain are usually referred to as *subconclusions,* because although they function as premises for later arguments, they are not premises of the entire chain of argumentation. A statement functions as a *premise* in an argument, or in a chain of argumentation, if the truth of that statement is assumed and not established by the argumentation. *Conclusions* and *subconclusions* are the claims whose truth is supposed to be established and not assumed by the argumentation.

In the following chain of argumentation, 1, 2, and 4 are premises; 3 is a subconclusion, because it follows from 1 and 2 and because, along with 4, it supports 5; 5 is the final conclusion.

1. The people in the house would have been awakened the night the horse was stolen if the dog had barked.
2. Everyone slept peacefully the entire night the horse was stolen.
3. So, the dog must not have barked.
4. The dog would have barked if the individual or individuals leading the horse out of the stable had been strangers.
5. Therefore, the horse thief (or horse thieves) was (were) known to the dog.*

One crucial fact about philosophical arguments follows immediately from the recognition that arguments always have two basic parts: premises and conclusions. It is sometimes said that a true philosopher never assumes anything; every claim must be proved. Taken literally, this cannot be right. For if you are going to construct an argument at all, you must take some claim (or claims) as your premise(s). It would obviously be backwards to assume the truth of a very controversial claim in order to argue for something that is obvious to everyone. The direction of argumentation must always be, as above, from the more obvious to the less obvious. Ideally a reasoner will assume, as premises, claims that are very uncontroversial and argue that a much more controversial, perhaps even surprising, conclusion follows from those unproblematic assumptions.

A chain of argumentation is exactly as solid as the arguments it contains. If any link is weak, then the entire chain will break down. From a logical point

*Sherlock Holmes offers this chain of reasoning in "Silver Blaze," in *The Memoirs of Sherlock Holmes.*

of view, the crucial aspect of arguments is the relationship between the premises and the conclusion. Logic is that branch of philosophy which studies the inferential relations between premises and conclusion. The task of logic is to establish rules or guidelines about which claims can be inferred from which other claims. This task has been carried out with great success for *deductive inference.* Deductive logicians have provided clear and rich accounts of the standards of good deductive inference. Courses in deductive logic present these theories in detail. We will describe only those aspects of deductive logic that are particularly important for evaluating ordinary reasoning.

Deductive Arguments

The central concept of deductive logic is *validity.* An argument is valid if and only if the following relation holds between its premises and its conclusion: *It is impossible for the conclusion to be false if the premises are true.* Alternatively, in a valid argument, if the premises are true, that guarantees that the conclusion is also true. It is important to realize that logicians are not concerned with truth itself. Logicians will certify an argument as valid whether or not the premises are true. Their concern is only with the relation between the premises and the conclusion. Regardless of whether the premises are true, an argument is valid if, *if* the premises *happen* to be true, then the conclusion *must* be true. If all the arguments in a chain of argumentation are valid, then the entire chain will also be valid. Valid arguments are ideal, because if you start from true premises, true conclusions are guaranteed. Like a trolley car that is bound to follow the tracks, if you start with the truth and make only valid inferences, you will never veer away from the truth.

It is somewhat unfortunate that, in ordinary English, "valid" and "true" are often used as synonyms. Their technical, philosophical meanings are quite distinct. In the primary philosophical use of "valid," it makes no sense to say that a statement is "valid," for validity is a *relation among statements.* Statements can be true, but not valid; arguments can be valid, but not true. "True" and "valid" have distinct meanings, and truth and validity are independent properties; that is, each property can occur without the other. Arguments whose premises are all true can still be invalid and valid arguments can have false premises. Thus, a valid argument can have (i) true premises and a true conclusion, as in (1); (ii) one or more false premises and a false conclusion, as in (2); or (iii) one or more false premises and a true conclusion, as in (3). The only possibility ruled out by validity is that the argument have true premises and a false conclusion.

(1) P_1 Wombats belong to the order of marsupials.
P_2 Koalas belong to the order of marsupials.
C Wombats and Koalas belong to the same order.

(2) P_1 All philosophers lived in Ancient Greece. (false)
P_2 Bertrand Russell was a philosopher.
C Bertrand Russell lived in Ancient Greece. (false)

(3) P_1 All canaries are polar bears. (false)
P_2 All polar bears have feathers. (false)
C All canaries have feathers.

Finally, an argument can have true premises and a true conclusion and still be invalid, as in (4).

(4) P_1 Some roses are red.
P_2 Some violets are blue.
C Some flowers give some people hay fever.

The problem with argument (4) is that, while all the claims are true, the fact that P_1 and P_2 are true gives us no reason whatsoever to believe that C is true.

So far, we have been assuming that the reader can simply "see" when an argument is valid or invalid. But how can we actually test for deductive validity? In one sense, the test for validity comes right out of the definition of validity: A valid argument is one whose conclusion cannot be false if its premises are true. To test for validity, try negating the conclusion while assuming the truth of the premises.

(5) P_1 All Englishmen love the Queen. (false)
P_2 Henry is English.
C Henry loves the Queen.

In (5) we would negate the conclusion, yielding "Henry does not love the Queen." Now the queston is, can we still maintain the truth of the premises? Obviously not, for if we try to claim that Henry does *not* love the Queen, while holding to the truth of P_2, "Henry is English," then we shall have to give up the truth of P_1, "All Englishmen love the Queen." Conversely, if we claim that Henry does not love the Queen and try to maintain P_1 as well, then we will have to give up P_2. Since we cannot maintain the truth of both (or all) premises while negating the conclusion, this argument is valid. If it is possible to preserve the truth of the premises, while denying the conclusion, as in (6), then the argument is invalid.

(6) P_1 Only U.S. citizens vote in American elections.
P_2 Jones is a U.S. citizen.
C Jones votes in American elections.

Even though P_1 and P_2 are true, C could be false, if Jones is one of the citizens who does not bother to vote.

While the test just described is always sufficient to determine validity, sometimes it is difficult to tell whether an argument passes or fails this test, for example, argument (7).

(7) P_1 All Republicans are happy or handsome.
P_2 No Republican is silly.
P_3 All happy people are silly or hard-working.
Sub C All Republicans are hard-working or handsome.
P_4 All hardworking people are silly or handsome.
C All Republicans are handsome.

To simplify and systematize the task of determining validity, logicians have appealed to the notion of *logical form.* Since classical antiquity, philosophers have recognized that different arguments could share the same form. For example, arguments (8) and (9) have a common form.

(8) P_1 Either the Yankees or the Red Sox will win the pennant.
P_2 The Yankees cannot win the pennant.
C Therefore, the Red Sox will win the pennant.

(9) P_1 With the new Congress, taxes will either go down or up.
P_2 Taxes never go down.
C Therefore, taxes will go up.

This common form can be seen more clearly if we represent the claims contained in the arguments by letter variables. Both arguments have the following form:

F_1 P_1 A or B.
P_2 Not A.
C B.

Clearly, any argument of this form must be valid. For the first premise asserts that either A or B is true and the second premise claims that A is not true. Thus B must be true.

There are many, many valid argument forms. We list some of the more common forms alongside an example of each form.

(10) P_1 The 1960s were not a time of peace.
C Therefore, the 1960s were not a time of peace and prosperity.

(11) P_1 If interest rates come down, the stock market goes up.
P_2 Interest rates have come down.
C The stock market is going up.

F_2 P_1 Not A.
C Therefore, not both A and B.

F_3 P_1 If A, then B.
P_2 A
C B

(12) P_1 All Mozart compositions are melodious.
P_2 The "Window" aria was composed by Mozart.
C The "Window" aria is melodious.

F_4 P_1 All A's are B.
P_2 a is an A.
C a is a B.

(13) P_1 Jones was an honest politician.
C Some politicians are honest.

F_5 P_1 a is A and a is B.
C Some A's are B's.

Finally, argument (7) above has the following form:

F_6 P_1 All A's are B or C.
P_2 No A is a D.
P_3 All B's are D or E.
Sub C All A's are E or C.
P_4 All E's are D or C.
C Therefore, all A's are C.

In an older tradition in logic, students would be expected to memorize numerous valid argument forms, many of which have special names. F_1 is called "constructive dilemma," F_3 "modus ponens," and F_4, a "syllogism in Barbara." A serious drawback of this system—aside from the archaic names—is that students simply cannot memorize all the valid forms, because there are too many of them. We suggest, instead, that students think of logical form as a tool to use in determining validity. When presented with an argument, it is extremely helpful to *schematize* that argument by using letter variables. Care must be taken in figuring out the correct schematic presentation of an argument. The first point to realize is that *one sentence* will often contain *two claims*. For example, (8) P_1, "Either the Yankees will win the pennant or the Red Sox will win the pennant" actually involves two distinct claims, "the Yankees will win the pennant" and "the Red Sox will win the pennant." It asserts a relation between these claims, namely, the relation that one of these two claims is true, so it should be represented as "Either A or B." Sometimes it is possible to schematize an argument adequately just by using letter variables to stand for *claims*. Of course, the same claim should always be represented by the same letter and each distinct claim must be represented by a different letter.

Other arguments have a more complex structure, because distinct claims share a common part and the shared part plays a role in the inference. In example (12), "All Mozart compositions are melodious" and "The 'Window' aria was composed by Mozart" share a common idea, "being composed by Mozart." Further, the fact that these two premises share this part is crucial in

allowing us to infer the conclusion. In such cases, distinct letters must be used for elements within claims. Otherwise, the schema would mask rather than reveal the logical interrelations between the claims. The standard procedure for assigning letter variables to elements within claims, is to replace attributes that different individuals can share—"being red," or "being composed by Mozart," for example—by capital letters, and names of individuals by lower case letters. So argument (12) should be represented as above:

F_4 P_1 All A's are B's.
P_2 a is an A.
C a is a B.

To sum up: Where possible, schematize arguments by assigning letter variables only to distinct claims. When the inferential structure of the argument is hidden by this procedure, assign letter variables to elements within claims.

A compelling deductive argument should be valid. Otherwise, the premises should not lead us to accept the conclusion. However, validity is not enough. Even if the truth of a conclusion may be validly inferred from the truth of certain premises, that gives us no reason at all to accept the conclusion, unless we have good reason to believe that the premises are, in fact, true. Unfortunately, there is no magical device we can use to determine truth. For philosophers, as for anyone else, establishing the truth of claims is often a complex, difficult, and uncertain project. Still, through their explicit study of argumentation, philosophers have recognized that there is a general method that can be used to assess the worth of premises, even in the absence of a test of truth.

In analyzing arguments, philosophers noticed that the key terms in some premises were either so vague or so ambiguous that the premise ought to be rejected out of hand. For example,

(14) P_1 The Constitution requires that public education be theologically neutral.
P_2 The theory of evolution is really just a religious doctrine.
C Therefore, since evolution is taught in schools, the Biblical account of creation should also be taught in order to ensure theological neutrality.

While P_2 is also highly questionable, we will just consider the terminology employed in P_1 and the conclusion. What is the key expression "theologically neutral" supposed to mean? Given a standard interpretation of the Constitutional doctrine of the separation of Church and State, if P_1 is to be true, then "theologically neutral" must be read as something like "devoid of theology." Notice, however, that this cannot be the intended reading of "theologically neutral" in the conclusion, or the conclusion would be self-contradictory, asserting that the way to make public education devoid of theology is to start teaching the Biblical account of creation. There, "theologically neutral" must be inter-

preted to mean something like "theologically balanced." In this example, the ambiguous terminology completely vitiates the argument. The only reason the premises even appear to support the conclusion is that the same phrase occurs in both P_1 and C. That connection is illusory, however, because the phrase is used ambiguously. In cases like this, the argument may be dismissed without trying to determine the *truth* of the premises. In fact, when a key term in a premise is either ambiguous or vague, there is no way to figure out whether the premise is true or not. For, if we are unsure about what the premise asserts, we are in no position to find out whether what the premise asserts is true.

Thus, when philosophers move from assessing the validity of an argument to assessing the plausibility of its premises, they make a preliminary inquiry into the *clarity* of the premises. Their two questions are: Are key terms used ambiguously? Is any key term too vague to be assigned a meaning? Sometimes, vagueness is very easy to spot as, for example, in the popular advertising claim, "Lipton tea is brisk." Here we are given no idea at all about what "brisk" is supposed to mean when applied to tea, as opposed to, say, a "brisk" walk. So we are in no position to weigh the plausibility, let alone the truth, of the claim. In other cases, it requires considerable practice and serious thought to figure out whether the claim made by a premise (or a conclusion) is acceptably clear. To take a contemporary example, most people believe in equality of opportunity for all. This superficial consensus can mask deep differences, however, because "equal opportunity" can mean many different things. To give just three possibilities, "equal opportunity" can mean "a right to equal consideration for all jobs," or "a right to equal education or training in the skills required by more prestigious jobs," or "a right to proportionate distribution of the actual jobs available." It will be easier or more difficult to defend the claim that the "equal opportunity" is correct, depending on which of these meanings is used. So when trying to assess the plausibility of a premise, the first step is to try to assign some clear meaning to its key terms. Often, different assignments will have to be tried, before it is possible to determine the best reading for the term or phrase in the argument. For, as we saw in (14), while one reading may work well in one premise, that reading may be disastrous in other parts of the argument. To avoid trading on any ambiguities, the same reading must be used for every occurrence of the term. As the example of "equal opportunity" suggests, thinking carefully about what the terms in an argument mean is just as important for constructing sound arguments as it is for criticizing the arguments of others.

Non-Deductive Arguments

We have looked briefly at one type of inferential relation between premises and conclusions—the relation of deductive validity. As noted above, the science of deductive logic has been worked out in great detail and with impressive precision. As we turn from deductive arguments to non-deductive arguments, matters look very different. Current theorizing about non-deductive inference

is much less certain, much less clear-cut than its counterpart in deductive reasoning. For reasons that we will touch on below, it may turn out that a rigorous and complete theory of non-deductive logic is not possible! Nevertheless, we must try to deal with non-deductive reasoning, because there are many good, but non-deductive inferences that we encounter in everyday and scientific discussions. Suppose, for example, that a particular drug is given 100,000 trials across a wide variety of people and it never produces serious side effects. Even the most scrupulous researcher would conclude that the drug is safe. Still, this conclusion cannot be validly inferred from the data.

(15) P_1 In 100,000 trials, drug X produced no serious side effects.
C Drug X does not have any serious side effects.

We can use our regular method of testing validity to show that this argument is invalid (see p. 4). Assuming the negation of the conclusion—drug X *has* a serious side effect—can we preserve the truth of premise P_1? It could turn out that a serious side effect only shows up on the 100,001st trial. Thus the premise, P_1, could be true, even though C is false, so the argument is valid.

There are many more good, but invalid arguments. Here is a mundane example.

(16) P_1 The dining room window is shattered.
P_2 There is a baseball lying in the middle of the glass on the dining room floor.
P_3 There is a baseball bat lying on the ground in the yard outside the dining room.
C The dining room window was shattered by being hit with a baseball.

Here is an example from a current scientific debate.

(17) P_1 The evolution of organisms depends on particular facts about environment and competitors.
P_2 Among many other facts, the development of mammals (and so, of human beings) probably depended on the accidental extinction of the dinosaurs, who had dominated the mammals.
C Since it is very unlikely that the sequence of facts which permitted the rise of human beings will ever be repeated, it is unlikely that we will encounter humanoid creatures on other planets.*

* Stephen Jay Gould offers this argument in *Discover* (March, 1983). Gould's main point is that while evolutionary considerations make the discovery of other humanoids unlikely, they do not tell against the possibility of discovering other forms of intelligent life.

If we cling to the standard of deductive validity, then all three of the above arguments—and all other arguments like these—will have to be dismissed as bad reasoning. That constraint on argumentation is unacceptable for three reasons. First, these arguments appear to be perfectly reasonable, at least at first glance. Second, it is hard to see how we could get by without engaging in the sorts of reasoning represented by these examples. Finally, and perhaps most critically, it seems unreasonable to demand that the truth of the premises must *guarantee* the truth of the conclusion. Very often it is reasonable to believe something that is merely very probable, given the evidence. To take a different example, given the number of traffic lights in Manhattan, it is reasonable to believe that, if you drive the entire length of the island in normal traffic, you will have to stop at some traffic light or other (and probably at several). At least, we would be willing to make a small wager on this point.

Logic has, therefore, a second task. It needs to provide criteria for evaluating good, but non-deductive, inferences. This work may never be carried out with the precision and detail found in theories of deductive inference. Still, philosophers have distinguished various types of non-deductive arguments and have offered suggestions about standards for evaluating these sorts of arguments.

Induction

Without any detailed knowledge of combustion, we know that if we place a dry piece of paper into the flame of a candle, the paper will burn. We know this because we have witnessed or heard about many similar events in the past. In the past, the paper has always burned, so we infer that the paper will burn in the present case. This common type of reasoning is called *induction*. In induction, one relies on similar, observed cases, to infer that the same event or property will recur in as yet unobserved cases. We reason that since paper has always burned when placed in a flame, the same thing will happen in the present case. In this example, we are using previous experience to make a single prediction. Inductive reasoning can also warrant general conclusions. Having determined that, in all the carbon atoms that have been tested, the atomic weight is 12, we infer that all atoms of carbon have an atomic weight of 12. As the reader can easily verify, neither a single-case induction nor inductive generalizations can be validly inferred from their premises.

(18) P_1 In all observed cases, paper burns when placed in a flame.
C If the piece of paper in front of us is placed in a flame, it will burn.

(19) P_1 All the carbon atoms which have been tested have an atomic weight of 12.
C All carbon atoms have an atomic weight of 12.

For different cases, we will have different amounts of evidence on which to draw. If only ten instances of a disease have been observed, then we will have much less confidence in predicting the course of the disease than if we had