Stephen Toulmin

b. 1922   d. 2009

Stephen Edelson Toulmin was born in London and was educated at Cambridge University, where he took his undergraduate degree in mathematics and science in 1942. He served in several capacities during World War II, first as a scientific officer in radar research and development and later in technical intelligence work. After the war, he earned his master's degree in 1946 and his Ph.D. in 1948, both in philosophy at Cambridge. He has held a variety of academic posts, at Oxford University, New York University, Brandeis University, Michigan State University, and the University of Chicago. After more than twenty years at Chicago, in 1995 he moved to the University of Southern California. He has published voluminously in the history and philosophy of science and has won a number of academic honors. Though his work on the structure of argument has had tremendous influence as a theory of rhetoric, Toulmin has betrayed little interest in the field, directing his work almost exclusively to philosophers.

In *The Uses of Argument* (1958), Toulmin notes that Aristotle conceived of logic as the study of how claims and conclusions of all kinds are proved or justified. But, laments Toulmin, logic became instead a highly abstract and formalized system intended to establish absolute, rational standards for the truth of propositions. Speaking as a philosopher, Toulmin is distressed by the isolation of logic, by its virtual irrelevance to the problems of knowledge in most academic disciplines, and by its separation from the practical reasoning that is essential in law, ethics, and daily life. Chaim Perelman (p. 1372) regrets the Cartesian implication that logic is the only ground of truth and that probabilistic reasoning is therefore essentially false. Toulmin, taking a different perspective, is concerned that logic itself is a solipsistic activity, cut off from the real work of human understanding.

To remedy this situation, Toulmin proposes a formal study of practical reasoning, a "logic" of arguments rather than of propositions. In *The Uses of Argument* (excerpted here), he sets forth a model of the structure of arguments that is remarkable for its clarity, flexibility, and reasonableness. His purpose in constructing this model is to demonstrate, first, that most arguments have a more complex structure than the syllogism and, second, that the syllogism misrepresents the very nature of argument by its arbitrary restriction to a three-part structure.

In Toulmin's scheme, a *claim* is based on *data*. Harry (to take Toulmin's example) is, we claim, a British subject. We base this claim on data — in this instance, that Harry was born in Bermuda. To establish the connection between claim and data, we may cite a *warrant.* Thus Harry is a British citizen (claim) by virtue of being born in Bermuda (data), because Bermudians are legally British (warrant). Often, a warrant needs further support, or *backing.* In Toulmin's example, we would cite British nationality statutes regarding British colonies to back up the warrant. The claim may have a *qualifier,* such as *surely, likely,* or *perhaps;* that is, it is likely that Harry is a British subject for the reasons we have given. Finally, there

may be conditions, indicated in the *rebuttal,* that would suspend the claim. Thus Harry was born in Bermuda (data), and so presumably (qualifier) he is a British subject (claim), because a person born in Bermuda will generally be a British subject (warrant), as we know from British nationality statutes regarding British colonies (backing), unless, of course, neither of Harry's parents were British subjects or Harry has become a naturalized citizen of another country (rebuttal).

Toulmin states that his argument model holds across fields (for example, academic disciplines) because the "force" of qualifying terms such as *probably* is the same in all fields, even though the specific criteria for determining what counts as a qualification (that is, what *probably* means) change from field to field. Probability, says Toulmin, has the same rational force in an argument whether it is calculated mathematically, meteorologically, or in any other way. Similarly, all arguments depend on warrants, though the nature of the warrant in a given argument depends on the field. Toulmin concludes that no field is intrinsically more rational or irrational than another. In every field, including formal logic itself, reasons are based on stipulated criteria. Toulmin chides traditional logicians for standing aloof from practical argument and further points out that a number of logical problems might be solved by carefully revising the syllogism along the lines he suggests here.

Like Perelman, Toulmin regrets the division of reasoning into rational and irrational, logical and rhetorical. Both writers try to discover the rationality of arguments about value in law, aesthetics, morals, and politics; Toulmin includes the sciences as well. For Toulmin as for Perelman, knowledge is the product of argument, which therefore deserves the attention of philosophers.

In *Human Understanding* (1972), Toulmin has two aims. First, he challenges Thomas Kuhn's thesis in *The Structure of Scientific Revolutions* (1970) that scientific knowledge advances not by accumulation but by revolutions in world view. Toulmin argues that evolution, not revolution, is the proper model for conceptual change in a discipline. Second, he analyzes and rejects both the absolutist and the relativist standards of rationality that have, he claims, dominated philosophy. Whereas absolutism errs in assuming that there are eternal standards of truth that must be the only grounds of knowledge, relativism errs in assuming that there are no standards at all. Toulmin seeks a middle ground, one where the evolution of concepts might be studied and the concepts themselves judged through an analysis of the arguments that constitute them. Seen as an extension of the concerns raised in *The Uses of Argument,* Toulmin's analysis raises the status of argument in defining rationality, though he studiously avoids using the word *argument,* even where it seems clearly called for. Indeed, Toulmin shows little interest in rhetoric as a subject. In his first book, *An Examination of the Place of Reason in Ethics* (1948), he uses the term *rhetoric* to refer to emotional statements about ethical principles. In place of the terms *rhetoric* and *argument,* he clearly prefers the phrase *practical reasoning.*

Toulmin's many books and articles concern the history, philosophy, and sociology of science, with the only exceptions being his textbook *Introduction to*

Reasoning (1979), based on the argument model in *Uses of Argument,* and the published lecture "Logic and the Criticism of Arguments" (1982; excerpted here). In that essay, Toulmin acknowledges the help of American speech communication scholars in showing him the connection between his work and rhetoric. Here, too, he abandons the hope that formal logic will wither away, but he calls for a rapprochement between logic and argument in pursuit of the study of practical reasoning.

Selected Bibliography

The Uses of Argument was published by Cambridge University Press in 1958 and was reprinted in 1964. "Logic and the Criticism of Arguments" was delivered as a lecture at the University of Michigan in 1982 and was printed in J. Golden et al., *The Rhetoric of Western Thought* (4th ed., 1983).

Other works by Toulmin include *An Examination of the Place of Reason in Ethics* (1948), *Human Understanding, Volume 1: The Collective Use and Understanding of Concepts* (1972), and *An Introduction to Reasoning* (1978), with Richard Rieke and Allan Janik. In *Knowing and Acting: An Invitation to Philosophy* (1976), Toulmin recasts his discussion of argument into an analysis of beliefs, reasons, inferences, and the role of philosophy in human affairs. *The Abuse of Casuistry: A History of Moral Reasoning* (1988), coauthored with Albert R. Jonsen, rehabilitates "case ethics" as a valuable form of practical reasoning or phronesis, tracing its history from Cicero to the Jesuits to Pascal and applying it to some modern instances.

The chapter on Toulmin in *Contemporary Perspectives on Rhetoric,* by S. Foss, K. Foss, and R. Trapp (1985), summarizes the argument scheme and the theory of the evolution of concepts. It includes an extensive bibliography of works by and about Toulmin. Wayne Brockriede and Douglas Ehninger compare Toulmin's argument scheme with traditional models in "Toulmin on Argument: An Interpretation and Application" (*Quarterly Journal of Speech* 46 [February 1960]: 44–53). Their analysis is expanded in their textbook *Decision by Debate* (2nd ed., 1977). Charles Kneupper's "Teaching Argument: An Introduction to the Toulmin Model" (*College Composition and Communication* 29 [October 1978]: 237–41) articulates the usefulness of Toulmin's work for teaching argumentative writing to undergraduates; for some comments on the limitations of Toulmin's model thus used, see Christopher Schroeder's "Knowledge and Power, Logic and Rhetoric, and Other Reflections in the Toulmin Mirror: A Critical Consideration of Stephen Toulmin's Contributions to Composition" (*Journal of Advanced Composition* 17 [1997]: 95–107). *The Toulmin Method: Exploration and Controversy* (ed. William E. Tanner and Betty Kay Seibt, 1991) collects essays presented at a 1988 symposium on Toulmin's work at Texas Women's University; most focus on his uses in literary study and composition instruction, and a bibliography is included. An interview of Toulmin by Gary A. Olson, in which Olson questions Toulmin about the implications of his work for rhetoric, appeared originally in the *Journal of Advanced Composition* and is reprinted in *Philosophy, Rhetoric, Literary Criticism: (Inter)views,* ed. Olson (1994).

The notion of fields of argument and the question of the field-dependence or field-invariance of the elements of argument sparked the growth of an entire subfield of rhetoric. The range of issues is suggested by Charles Arthur Willard's *Argumentation and the Social Grounds of Knowledge* (1983) and by the collections of papers published by the National Communication Association in the *Proceedings of the Summer Conference on Argument.*

The *Proceedings,* first published in 1980, have from 1981 usually appeared in alternate years. In addition, the *Journal of the American Forensic Association* has published a large number of articles on argument fields since the 1960s, including a special issue (spring 1982).

From *The Uses of Argument*

For the sake of brevity, it will be convenient to introduce a technical term: let us accordingly talk of a *field* of arguments. Two arguments will be said to belong to the same field when the data and conclusions in each of the two arguments are, respectively, of the same logical type: they will be said to come from different fields when the backing or the conclusions in each of the two arguments are not of the same logical type. The proofs in Euclid's *Elements,* for example, belong to one field, the calculations performed in preparing an issue of the *Nautical Almanac* belong to another. The argument, "Harry's hair is not black, since I know for a fact that it is red," belongs to a third and rather special field — though one might perhaps question whether it really was an argument at all or, rather, a counter-assertion. The argument, "Petersen is a Swede, so he is presumably not a Roman Catholic," belongs to a fourth field; the argument, "This phenomenon cannot be wholly explained on my theory, since the deviations between your observations and my predictions are statistically significant," belongs to yet another; the argument, "This creature is a whale, so it is (taxonomically) a mammal," belongs to a sixth; and the argument, "Defendant was driving at 45 m.p.h. in a built-up area, so he has committed an offence against the Road Traffic Acts," comes from a seventh field, different yet again. The problems to be discussed in these inquiries are those that face us when we try to come to terms with the differences between the various fields of argument here illustrated.

The first problem we have set ourselves can be re-stated in the question, "What things about the form and merits of our arguments are *field-invariant* and what things about them are *field-dependent?*" What things about the modes in which we assess arguments, the standards by reference to which we assess them and the manner in which we qualify our conclusions about them, are the same regardless of field (field-invariant), and which of them vary as we move from arguments in one field to arguments in another (field-dependent)? How far, for instance, can one compare the standards of argument relevant in a court of law with those relevant when judging a paper in the *Proceedings of the Royal Society,* or those relevant to a mathematical proof or a prediction about the composition of a tennis team?

It should perhaps be said at once that the question is not, how the standards we employ in criticising arguments in different fields compare in stringency, but rather how far there are common standards applicable in the criticism of arguments taken from different fields. Indeed, whether questions about comparative stringency can even be asked about arguments from different fields may be worth questioning. Within a field of arguments, questions about comparative stringency and looseness may certainly arise: we may, for instance, compare the standards of rigour recognised by pure mathematicians at different stages in the history of the subject, by Newton, Euler, Gauss or Weierstrass. How far, on the other hand, it makes sense to compare the mathematical rigour of Gauss or Weierstrass with the judicial rigour of Lord Chief Justice Goddard in another matter, and one whose consideration we must postpone. . . .

FORCE AND CRITERIA

At this point a distinction can be made, which will prove later of great importance. The meaning of a modal term, such as "cannot," has two aspects: these can be referred to as the *force* of the term and the *criteria* for its use. By the "force" of a modal term I mean the practical implications of its use: the force of the term "cannot" includes, for instance, the implied general injunction that something-or-other has to be ruled out in this-or-that way and for such-a-reason. This force can be contrasted with the criteria, standards, grounds and reasons, by reference to which we decide in any context that the use of a particular modal term is appropriate. We are entitled to say that some possibility has to be ruled out only if we can produce grounds or reasons to justify this claim, and under the term "criteria" can be included the many sorts of things we have then to produce. We say, for instance, that something is physically, mathematically or physiologically impossible, that it is terminologically or linguistically out of order, or else morally or judicially improper: it is to be ruled out, accordingly, *qua* something or other. And when we start explaining "*qua* what" any particular thing is to be ruled out, we show what criteria we are appealing to in this particular situation.

The importance of the distinction between force and criteria will become fully clear only as we go along. It can be hinted at, perhaps, if we look for a moment at the notion of mathematical impossibility. Many theorems in geometry and pure mathematics state impossibilities of one sort or another: they tell us, e.g., that it is impossible to construct a regular heptagon using ruler and compass, and that you cannot find a rational square root of 2. Such a construction or such a square root is, we are told, a mathematical impossibility.

Now what is involved in saying this? What precisely is signified by this phrase "mathematical impossibility?" It is easy to give too simple an answer, and we must not be in a hurry. The natural thing to look at first is the procedure mathematicians have to go through in order to prove a theorem of this sort—to show, for instance, that there cannot be a rational square root

of 2. When we inquire what they establish in such a proof, we find that one thing is of supreme importance. The notion of "a rational square root of 2" leads us into contradictions: from the assumption that a number x is rational and that its square is equal to 2, we can by brief chains of argument reach two mutually contradictory conclusions. This is the reason, the conclusive reason, why mathematicians are led to consider the idea that any actual number x could have both these properties an impossible one.

Having remarked on this, we may be tempted to conclude at once that we have the answer to our question—namely, that the phrase "mathematically impossible" just means "self-contradictory, or leading to self-contradictions." But this is too simple: to understand the notion properly, one must pay attention, not only to what mathematicians do before reaching the conclusion that something is impossible, but also to what they do after reaching this conclusion and *in consequence of* having reached it. The existence of a mathematical impossibility is not only something which requires proving, it is also something which has implications. To show the presence of the contradictions may be all that is required by a mathematician if he is to be justified in saying that the notion x is a mathematical impossibility—it may, that is, be a conclusive demonstration of its impossibility—but the force of calling it impossible involves more than simply labelling it as "leading to contradictions." The notion x involves one in contradictions and is *therefore* or *accordingly* an impossibility: it is impossible *on account of* the contradictions, impossible *qua* leading one into contradictions. If "mathematically impossible" meant precisely the same as "contradictory," the phrase "contradictory and so mathematically impossible" would be tautologous—"contradictory and so contradictory." But this will not do: to say only, "This supposition leads one into contradictions or, to use another equivalent phrase, is impossible," is to rob the idea of mathematical impossibility of a crucial part of its force, for it fails to draw the proper moral—it leaves the supposition unruled out.

Even in mathematics, therefore, one can distinguish the criterion or standard by reference to which the rational square root of 2 is dismissed

are these levels or distinct activities

it has force

as impossible from the force of the conclusion that it *is* impossible. To state the presence of the contradictions is not thereby to dismiss the notion as impossible, though from the mathematicians' point of view this may be absolutely all we require in order to *justify* its dismissal. Once again, the force of calling the number x an "impossibility" is to dismiss it from consideration and, since we are to dismiss it from consideration from the mathematical standpoint, the grounds for doing so have to be of a kind appropriate to mathematics, e.g., the fact that operating with such a conception leads one into contradictions. Contradictoriness can be, mathematically speaking, a *criterion* of impossibility: the implied *force* or *moral* of such an impossibility is that the notion can have no place in subsequent mathematical arguments.

To insist on this distinction in the case of mathematical impossibility may seem to be mere hair-splitting. Mathematically, the consequences of the distinction may be negligible: philosophically, however, they are considerable, especially when one goes on (as we shall do in a later essay) to make the parallel distinction in the case of "logical impossibility." For this distinction between "force" and "criteria" as applied to modal terms is a near-relation to distinctions which have recently been made in other fields with great philosophical profit.

Let us look at this parallel for a moment. Philosophers studying the general use of evaluative terms have argued as follows:

> A word like "good" can be used equally of an apple or an agent or an action, of a volley in tennis, a vacuum cleaner or a Van Gogh: in each case, to call the fruit or the person or the stroke or the painting "good" is to commend it, and to hold it out as being in some respect a praiseworthy, admirable or efficient member of its class—the word "good" is accordingly defined most accurately as "the most general adjective of commendation." But because the word is so general, the things we appeal to in order to justify commending different kinds of things as "good" will themselves be very different. A morally-good action, a domestically-good vacuum cleaner and a pomiculturally-good apple all come up to standard, but the standards they all come up to will be different—indeed, incomparable. So one can distinguish between the commendatory force of labelling a thing as "good," and

the criteria by reference to which we justify a commendation.

Our own discussion has led us to a position which is, in effect, only a special case of this more general one. For the pattern is the same whether the things we are grading or assessing or criticising are, on the one hand, apples or actions or paintings or, on the other, arguments and conclusions. In either case we are concerned with judging or evaluating, and distinctions which have proved fruitful in ethics and aesthetics will do so again when applied to the criticism of arguments. With "impossible" as with "good": the use of the term has a characteristic force, of commending in one case, of rejecting in the other; to commend an apple or an action is one thing, to give your reasons for commending it is another; to reject a suggestion as untenable is one thing, to give your reasons for rejecting it is another, however cogent and relevant these reasons may be.

What is the virtue of such distinctions? If we ignore them in ethics, a number of things may happen. We may, for instance, be tempted to think that the standards which a thing has to reach in order to deserve commendation are all we need point to in explaining what is meant by calling it "good." To call a vacuum cleaner good (we may conclude) is just to say that its efficiency, in terms of cubic-feet-of-dust-sucked-in per kilowatt-of-electricity-consumed and the like, is well above the average for machines of this type. (This is like thinking that the phrase "mathematically impossible" just *means* "involving self-contradictions" and no more.) Such a view, however, leads to unnecessary paradoxes. For it may now seem that the terms of commendation and condemnation in which we so frequently express our judgements of value have as many meanings as there are different sorts of things to evaluate, and this is a very unwelcome suggestion. As a counter to this, it has to be recognised that the *force* of commending something as "good" or condemning it as "bad" remains the same, whatever sort of thing it may be, even though the criteria for judging or assessing the merits of different kinds are very variable.

But this is not the only way in which we may be led astray, or indeed the most serious way.

Having recognised that, in the meaning of evaluative terms, a multiplicity of criteria are linked together by a common force, and that to evaluate something normally involves both grading it in an order of commendability and also referring to the criteria appropriate to things of its kind, we may nevertheless wish to take a further step. For, being preoccupied with some particular type of evaluation, we may come to feel that one particular set of criteria has a unique importance, and accordingly be tempted to pick on the criteria proper for the assessment of things of some one sort as the proper or unique standards of merit for all sorts of thing, so dismissing all other criteria either as misconceived or as unimportant. One may suspect that something of this kind happened to the Utilitarians, who were so whole-hearted and single-minded in their concern for questions of legislation and social action that they came to feel that there was only one problem when evaluating things of all kinds: all one had to do was determine the *consequences* which could be associated with or expected from things of any kind.

The dangers of such single-mindedness become apparent when philosophers of this kind begin to generalise: preoccupied as they are with some one type of valuation, they blind themselves to the special problems involved in other sorts—to all the difficulties of aesthetic judgement, and to many of the issues facing one in the course of one's moral life. There are many sorts of assessment and grading besides the appraisal of legislative programmes and social reforms, and standards which may be wholly appropriate when judging the worthiness of a Bill before Parliament can be misleading or out-of-place when we are concerned with a painting, an apple or even our individual moral quandaries.

The same dangers can arise over arguments. The use of a modal term like "cannot" in connection with arguments from quite different fields involves, as we have seen, a certain common force, like the common force recognisable in a wide range of uses of the word "good." Yet the criteria to be invoked to justify ruling out conclusions of different types are very different. Here, as in ethics, two conclusions are tempting, both of which must be avoided. On the one hand, it will be wrong to say, merely on account of this variation in criteria, that the word "cannot" means quite different things when it figures in different sorts of conclusions: not for nothing are physical, linguistic, moral and conceptual "cannots" linked by the use of a common term. It will also be a mistake, and a more serious one, to pick on some one criterion of impossibility and to elevate it into a position of unique philosophical importance. Yet in the history of recent philosophy both of these conclusions have been influential—the latter, I shall argue, disastrously so.

Before returning to our main question, there is one further caution. We have already, for the purposes of this present investigation, renounced the use of the word "logical"; it will be as well to renounce now the use of the word "meaning" and its associates also. For the distinction which we have here drawn between force and criteria is one which cuts across the common use of the term "meaning," and we need, for our present purposes, to operate with finer distinctions than the term "meaning" ordinarily allows one to draw. It is not enough to speak about the meaning or use of such terms as "good" or "impossible" as though it were an indivisible unit: the use of such terms has a number of distinguishable *aspects,* for two of which we have introduced the words "force" and "criteria." Until we make this distinction, the false trails of which I have spoken will remain tempting, for, when we are asked whether the differences between all the varied uses of the words "good," "cannot" and "possible" do or do not amount to differences in meaning, we shall inevitably find ourselves pulled in opposite directions. If we say that there *are* differences in meaning, we seem committed to making as many different entries in our dictionaries as there are sorts of possibility or impossibility or merit—indeed, as many entries as there are different kinds of thing to be possible or impossible or good—a ridiculous conclusion. On the other hand, to say that there is *no* difference in meaning between these varied uses suggests that we can expect to find our standards of goodness or possibility or impossibility proving field-invariant, and this conclusion is no better. If, however, we make the further distinction between the force of assessments and the criteria or standards applicable in the course of them, we can avoid giving any crude "yes or no" answer to the coarse-

grained question, "Are the meanings the same or different?" As we shift from one use to another, the criteria may change while the force remains the same: whether or not we decide to *call* this a change of meaning will be a matter of comparative indifference. . . .

THE PATTERN OF AN ARGUMENT: DATA AND WARRANTS

"What, then, is involved in establishing conclusions by the production of arguments?" Can we, by considering this question in a general form, build up from scratch a pattern of analysis which will do justice to all the distinctions which proper procedure forces upon us? That is the problem facing us.

Let it be supposed that we make an assertion, and commit ourselves thereby to the claim which any assertion necessarily involves. If this claim is challenged, we must be able to establish it — that is, make it good, and show that it was justifiable. How is this to be done? Unless the assertion was made quite wildly and irresponsibly, we shall normally have some facts to which we can point in its support: if the claim is challenged, it is up to us to appeal to these facts, and present them as the foundation upon which our claim is based. Of course we may not get the challenger even to agree about the correctness of these facts, and in that case we have to clear his objection out of the way by preliminary argument: only when this prior issue or "lemma," as geometers would call it, has been dealt with, are we in a position to return to the original argument. But this complication we need only mention: supposing the lemma to have been disposed of, our question is how to set the original argument out most fully and explicitly. "Harry's hair is not black," we assert. What have we got to go on? we are asked. Our personal knowledge that it is in fact red: that is our datum, the ground which we produce as support for the original assertion. Petersen, we may say, will not be a Roman Catholic: why?: we base our claim on the knowledge that he is a Swede, which makes it very unlikely that he will be a Roman Catholic. Wilkinson, asserts the prosecutor in Court, has committed an offence against the Road Traffic Acts: in support of this claim, two policemen are prepared to testify that they timed him driving at 45 m.p.h. in a built-up area. In each case, an original assertion is supported by producing other facts bearing on it.

We already have, therefore, one distinction to start with: between the *claim* or conclusion whose merits we are seeking to establish (C) and the facts we appeal to as a foundation for the claim — what I shall refer to as our *data* (D). If our challenger's question is, "What have you got to go on?" producing the data or information on which the claim is based may serve to answer him; but this is only one of the ways in which our conclusion may be challenged. Even after we have produced our data, we may find ourselves being asked further questions of another kind. We may now be required not to add more factual information to that which we have already provided, but rather to indicate the bearing on our conclusion of the data already produced. Colloquially, the question may now be, not "What have you got to go on?" but "How do you get there?" To present a particular set of data as the basis for some specified conclusion commits us to a certain *step;* and the question is now one about the nature and justification of this step.

Supposing we encounter this fresh challenge, we must bring forward not further data, for about these the same query may immediately be raised again, but propositions of a rather different kind: rules, principles, inference-licences or what you will, instead of additional items of information. Our task is no longer to strengthen the ground on which our argument is constructed, but is rather to show that, taking these data as a starting point, the step to the original claim or conclusion is an appropriate and legitimate one. At this point, therefore, what are needed are general, hypothetical statements, which can act as bridges, and authorise the sort of step to which our particular argument commits us. These may normally be written very briefly (in form "If D, then C"); but, for candour's sake, they can profitably be expanded, and made more explicit: "Data such as D entitle one to draw conclusions, or make claims, such as C," or alternatively "Given data D, one may take it that C."
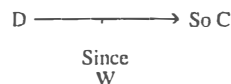
Propositions of this kind I shall call *warrants* (W), to distinguish them from both conclusions and data. (These "warrants," it will be observed, correspond to the practical standards or canons of

argument referred to in our earlier essays.) To pursue our previous examples: the knowledge that Harry's hair is red entitles us to set aside any suggestion that it is black, on account of the warrant, "If anything is red, it will not also be black." (The very triviality of this warrant is connected with the fact that we are concerned here as much with a counter-assertion as with an argument.) The fact that Petersen is a Swede is directly relevant to the question of his religious denomination for, as we should probably put it, "A Swede can be taken almost certainly not to be a Roman Catholic." (The step involved here is now trivial, so the warrant is not self-authenticating.) Likewise in the third case: our warrant will not be some such statement as that "A man who is proved to have driven at more than 30 m.p.h. in a built-up area can be found to have committed an offence against the Road Traffic Acts."
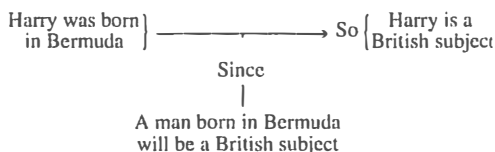
The question will at once be asked, how absolute is this distinction between data, on the one hand, and warrants, on the other. Will it always be clear whether a man who challenges an assertion is calling for the production of his adversary's data, or for the warrants authorising his steps? Can one, in other words, draw any sharp distinction between the force of the two questions, "What have you got to go on?" and "How do you get there?" By grammatical tests alone, the distinction may appear far from absolute, and the same English sentence may serve a double function: it may be uttered, that is, in one situation to convey a piece of information, in another to authorise a step in an argument, and even perhaps in some contexts to do both these things at once. (All these possibilities will be illustrated before too long.) For the moment, the important thing is not to be too cut-and-dried in our treatment of the subject, nor to commit ourselves in advance to a rigid terminology. At any rate we shall find it possible in *some* situations to distinguish clearly two different logical functions; and the nature of this distinction is hinted at if one contrasts the two sentences, "Whenever A, one *has found* that B" and "Whenever A, one *may take it* that B."

We now have the terms we need to compose the first skeleton of a pattern for analysing arguments. We may symbolise the relation between the data and the claim in support of which they are produced by an arrow, and indicate the authority for taking the step from one to the other by writing the warrant immediately below the arrow:

$$D \longrightarrow So\ C$$
$$Since$$
$$W$$

Or, to give an example:

$$Harry\ was\ born\ in\ Bermuda \longrightarrow So\ \{Harry\ is\ a\ British\ subject$$
$$Since$$
$$|$$
$$A\ man\ born\ in\ Bermuda\ will\ be\ a\ British\ subject$$

As this pattern makes clear, the explicit appeal in this argument goes directly back from the claim to the data relied on as foundation: the warrant is, in a sense, incidental and explanatory, its task being simply to register explicitly the legitimacy of the step involved and to refer it back to the larger class of steps whose legitimacy is being presupposed.

This is one of the reasons for distinguishing between data and warrants: data are appealed to explicitly, warrants implicitly. In addition, one may remark that warrants are general, certifying the soundness of *all* arguments of the appropriate type, and have accordingly to be established in quite a different way from the facts we produce as data. This distinction, between data and warrants, is similar to the distinction drawn in the law-courts between questions of fact and questions of law, and the legal distinction is indeed a special case of the more general one— we may argue, for instance, that a man whom we know to have been born in Bermuda is presumably a British subject, simply because the relevant laws give us a warrant to draw this conclusion.

One more general point in passing: unless, in any particular field of argument, we are prepared to work with warrants of *some* kind, it will become impossible in that field to subject arguments to rational assessment. The data we cite if a claim is challenged depend on the warrants we are prepared to operate with in that field, and the warrants to which we commit ourselves are im-

plicit in the particular steps from data to claims we are prepared to take and to admit. But supposing a man rejects all warrants whatever authorising (say) steps from data about the present and past to conclusions about the future, then for him rational prediction will become impossible; and many philosophers have in fact denied the possibility of rational prediction just because they thought they could discredit equally the claims of all past-to-future warrants.

The skeleton of a pattern which we have obtained so far is only a beginning. Further questions may now arise, to which we must pay attention. Warrants are of different kinds, and may confer different degrees of force on the conclusions they justify. Some warrants authorise us to accept a claim unequivocally, given the appropriate data—these warrants entitle us in suitable cases to qualify our conclusion with the adverb "necessarily"; others authorise us to make the step from data to conclusion either tentatively, or else subject to conditions, exceptions, or qualifications—in these cases other modal qualifiers, such as "probably" and "presumably," are in place. It may not be sufficient, therefore, simply to specify our data, warrant and claim: we may need to add some explicit reference to the degree of force which our data confer on our claim in virtue of our warrant. In a word, we may have to put in a *qualifier*. Again, it is often necessary in the law-courts, not just to appeal to a given statute or common-law doctrine, but to discuss explicitly the extent to which this particular law fits the case under consideration, whether it must inevitably be applied in this particular case, or whether special facts may make the case an exception to the rule or one in which the law can be applied only subject to certain qualifications.

If we are to take account of these features of our argument also, our pattern will become more complex. Modal qualifiers (Q) and conditions of exception or rebuttal (R) are distinct both from data and from warrants, and need to be given separate places in our layout. Just as a warrant (W) is itself neither a datum (D) nor a claim (C), since it implies in itself something about both D and C—namely, that the step from the one to the other is legitimate; so, in turn, Q and R are themselves distinct from W, since they comment implicitly on the bearing of W on this step—qualifiers (Q) indicating the strength conferred by the warrant on this step, conditions of rebuttal (R) indicating circumstances in which the general authority of the warrant would have to be set aside. To mark these further distinctions, we may write the qualifier (Q) immediately beside the conclusion which it qualifies (C), and the exceptional conditions which might be capable of defeating or rebutting the warranted conclusion (R) immediately below the qualifier.

To illustrate: our claim that Harry is a British subject may normally be defended by appeal to the information that he was born in Bermuda, for this datum lends support to our conclusion on account of the warrants implicit in the British Nationality Acts; but the argument is not by itself conclusive in the absence of assurances about his parentage and about his not having changed his nationality since birth. What our information does do is to establish that the conclusion holds good "presumably," and subject to the appropriate provisos. The argument now assumes the form:
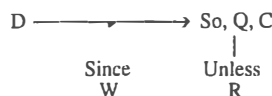
i.e.,
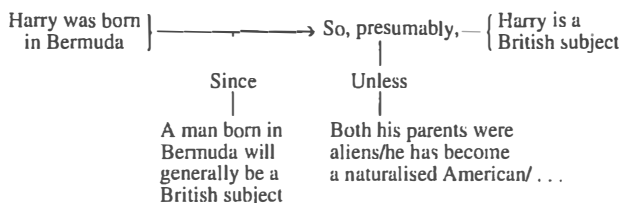
We must remark, in addition, on two further distinctions. The first is that between a statement of a warrant, and statements about its applicability — between "A man born in Bermuda will be British," and "This presumption holds good provided his parents were not both aliens, etc." The distinction is relevant not only to the law of the land, but also for an understanding of scientific laws or "laws of nature": it is important, indeed, in all cases where the application of a law may be subject to exceptions, or where a warrant can be supported by pointing to a general correlation only, and not to an absolutely invariable one. We can distinguish also two purposes which may be served by the production of additional facts: these can serve as further data, or they can be cited to confirm or rebut the applicability of a warrant. Thus, the fact that Harry was born in Bermuda and the fact that his parents were not aliens are both of them directly relevant to the question of his present nationality; but they are relevant in different ways. The one fact is a datum, which by itself establishes a presumption of British nationality; the other fact, by setting aside one possible rebuttal, tends to confirm the presumption thereby created.

One particular problem about applicability we shall have to discuss more fully later: when we set out a piece of applied mathematics, in which some system of mathematical relations is used to throw light on a question of (say) physics, the correctness of the calculations will be one thing, their appropriateness to the problem in hand may be quite another. So the question "Is this calculation mathematically impeccable?" may be a very different one from the question "Is this the relevant calculation?" Here too, the applicability of a particular warrant is one question: the result we shall get from applying the warrant is another matter, and in asking about the *correctness* of the result we may have to inquire into both these things independently.

THE PATTERN OF AN ARGUMENT: BACKING OUR WARRANTS

One last distinction, which we have already touched on in passing, must be discussed at some

(this very much reminds me of Latour)

length. In addition to the question whether or on what conditions a warrant is applicable in a *particular* case, we may be asked why *in general* this warrant should be accepted as having authority. In defending a claim, that is, we may produce our data, our warrant, and the relevant qualifications and conditions, and yet find that we have still not satisfied our challenger; for he may be dubious not only about this particular argument but about the more general question whether the warrant (W) is acceptable at all. Presuming the general acceptability of this warrant (he may allow) our argument would no doubt be impeccable — if D-ish facts really do suffice as backing for C-ish claims, all well and good. But does not that warrant in its turn rest on something else? Challenging a particular claim may in this way lead on to challenging, more generally, the legitimacy of a whole range of arguments. "You presume that a man born in Bermuda can be taken to be a British subject," he may say, "but why do you think that?" Standing behind our warrants, as this example reminds us, there will normally be other assurances, without which the warrants themselves would possess neither authority nor currency — these other things we may refer to as the *backing* (B) of the warrants. This "backing" of our warrants is something which we shall have to scrutinise very carefully: its precise relations to our data, claims, warrants and conditions of rebuttal deserve some clarification, for confusion at this point can lead to trouble later.

We shall have to notice particularly how the sort of backing called for by our warrants varies from one field of argument to another. The *form* of argument we employ in different fields

render in 3D

D ⟶ So, Q. C

Since
W

Unless
R
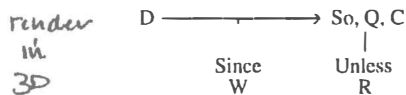
need not vary very much as between fields. "A whale will be a mammal," "A Bermudan will be a Briton," "A Saudi Arabian will be a Muslim": here are three different warrants to which we might appeal in the course of a practical argument, each of which can justify the same sort of
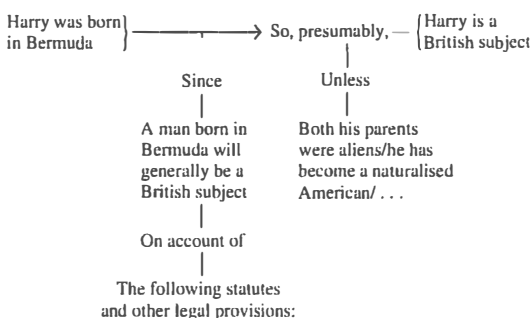
straightforward step from a datum to a conclusion. We might add for variety examples of even more diverse sorts, taken from moral, mathematical or psychological fields. But the moment we start asking about the *backing* which a warrant relies on in each field, great differences begin to appear: the kind of backing we must point to if we are to establish its authority will change greatly as we move from one field of argument to another. "A whale will be (i.e., *is classifiable as*) a mammal," "A Bermudan will be (*in the eyes of the law*) a Briton," "A Saudi Arabian will be (*found to be*) a Muslim"—the words in parentheses indicate what these differences are. One warrant is defended by relating it to a system of taxonomical classification, another by appealing to the statutes governing the nationality of people born in the British colonies, the third by referring to the statistics which record how religious beliefs are distributed among people of different nationalities. We can for the moment leave open the more contentious question, how we establish our warrants in the fields of morals, mathematics and psychology: for the moment all we are trying to show is the *variability* or *field-dependence* of the backing needed to establish our warrants.

We can make room for this additional element in our argument-pattern by writing it below the bare statement of the warrant for which it serves as backing (B):

D ———┬——→ So, Q, C
              Since   Unless
              W   R
       On account of
           B

making room
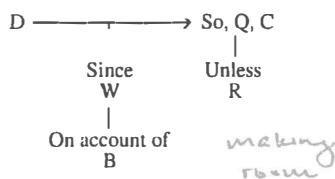
This form may not be final, but it will be complex enough for the purpose of our present discussions. To take a particular example: in support of the claim (C) that Harry is a British subject, we appeal to the datum (D) that he was born in Bermuda, and the warrant can then be stated in the form, "A man born in Bermuda may be taken to be a British subject": since, however, ques-

tions of nationality are always subject to qualifications and conditions, we shall have to insert a qualifying "presumably" (Q) in front of the conclusion, and note the possibility that our conclusion may be rebutted in case (R) it turns out that both his parents were aliens or he has since become a naturalised American. Finally, in case the warrant itself is challenged, its backing can be put in: this will record the terms and the dates of enactment of the Acts of Parliament and other legal provisions governing the nationality of persons born in the British colonies. The result will be an argument set out as follows:

Harry was born in Bermuda ———┬——→ So, presumably, — Harry is a British subject
        Since   Unless
        A man born in   Both his parents
        Bermuda will   were aliens/he has
        generally be a   become a naturalised
        British subject   American/ . . .
        On account of
        The following statutes
        and other legal provisions:

In what ways does the backing of warrants differ from the other elements in our arguments? To begin with the differences between B and W: statements of warrants, we saw, are hypothetical, bridgelike statements, but the backing for warrants can be expressed in the form of categorical statements of fact quite as well as can the data appealed to in direct support of our conclusions. So long as our statements reflect these functional differences explicitly, there is no danger of confusing the backing (B) for a warrant with the warrant itself (W): such confusions arise only when these differences are disguised by our forms of expression. In our present example, at any rate, there need be no difficulty. The fact that the relevant statutes have been validly passed into law, and contain the provisions they do, can be ascertained simply by going to the records of the parliamentary proceedings concerned and to the relevant volumes in the books of statute law: the resulting discovery, that such-and-such a

statute enacted on such-and-such a date contains a provision specifying that people born in the British colonies of suitable parentage shall be entitled to British citizenship, is a straightforward statement of fact. On the other hand, the warrant which we apply *in virtue* of the statute containing this provision is logically of a very different character—"*If* a man was born in a British colony, he *may be presumed to be* British." Though the facts about the statute may provide all the backing required by this warrant, the explicit statement of the warrant itself is more than a repetition of these facts: it is a general *moral* of a practical character, about the ways in which we can safely argue in view of these facts.

We can also distinguish backing (B) from data (D). Though the data we appeal to in an argument and the backing lending authority to our warrants may alike be stated as straightforward matters-of-fact, the roles which these statements play in our argument are decidedly different. Data of some kind must be produced, if there is to be an argument there at all: a bare conclusion, without any data produced in its support, is no argument. But the backing of the warrants we invoke need not be made explicit—at any rate to begin with: the warrants may be conceded without challenge, and their backing left understood. Indeed, if we demanded the credentials of all warrants at sight and never let one pass unchallenged, argument could scarcely begin. Jones puts forward an argument invoking warrant W_1, and Smith challenges that warrant; Jones is obliged, as a lemma, to produce another argument in the hope of establishing the acceptability of the first warrant, but in the course of this lemma employs a second warrant W_2; Smith challenges the credentials of this second warrant in turn; and so the game goes on. Some warrants must be accepted provisionally without further challenge, if argument is to be open to us in the field in question: we should not even know what sort of data were of the slightest relevance to a conclusion, if we had not at least a provisional idea of the warrants acceptable in the situation confronting us. The existence of considerations such as would establish the acceptability of the most reliable warrants is something we are entitled to take for granted.

Finally, a word about the ways in which B differs from Q and R: these are too obvious to need expanding upon, since the grounds for regarding a warrant as generally acceptable are clearly one thing, the force which the warrant lends to a conclusion another, and the sorts of exceptional circumstance which may in particular cases rebut the presumptions the warrant creates a third. They correspond, in our example, to the three statements, (i) that the statutes about British nationality *have in fact* been validly passed into law, and say this: . . . , (ii) that Harry *may be presumed* to be a British subject, and (iii) that Harry, having recently become a naturalised American, *is no longer covered* by these statutes.

One incidental point should be made, about the interpretation to be put upon the symbols in our pattern of argument: this may throw light on a slightly puzzling example which we came across when discussing Kneale's views on probability. Consider the arrow joining D and C. It may seem natural to suggest at first that this arrow should be read as "so" in one direction and as "because" in the other. Other interpretations are however possible. As we saw earlier, the step from the information that Jones has Bright's Disease to the conclusion that he cannot be expected to live to eighty does not reverse perfectly: we find it natural enough to say, "Jones cannot be expected to live to eighty, *because* he has Bright's Disease," but the fuller statement, "Jones cannot be expected to live to eighty, *because* the probability of his living that long is low, *because* he has Bright's Disease," strikes us as cumbrous and artificial, for it puts in an extra step which is trivial and unnecessary. On the other hand, we do not mind saying, "Jones has Bright's Disease, *so* the chances of his living to eighty are slight, *so* he cannot be expected to live that long," for the last clause is (so to speak) an *inter alia* clause—it states one of the many particular morals one can draw from the middle clause, which tells us his general expectation of life.

So also in our present case: reading along the arrow from right to left or from left to right we can normally say both "C, because D" and "D, so C." But it may sometimes happen that some more general conclusion than C may be war-

ranted, given D: where this is so, we shall often find it natural to write, not only "D, so C," but also "D, so C', so C," C' being the more general conclusion warranted in view of data D, from which in turn we infer *inter alia* that C. Where this is the case, our "so" and "because" are no longer reversible: if we now read the argument backwards the statement we get—"C, because C', because D"—is again more cumbrous than the situation really requires.

AMBIGUITIES IN THE SYLLOGISM

The time has come to compare the distinctions we have found of practical importance in the layout and criticism of arguments with those which have traditionally been made in books on the theory of logic: let us start by seeing how our present distinctions apply to the syllogism or syllogistic argument. For the purposes of our present argument we can confine our attention to one of the many forms of syllogism—that represented by the time-honoured example:

Socrates is a man;
All men are mortal;
So Socrates is mortal.

This type of syllogism has certain special features. The first premiss is "singular" and refers to a particular individual, while the second premiss alone is "universal." Aristotle himself was, of course, much concerned with syllogisms in which both the premisses were universal, since to his mind many of the arguments within scientific theory must be expected to be of this sort. But we are interested primarily in arguments by which general propositions are applied to justify particular conclusions about individuals; so this initial limitation will be convenient. Many of the conclusions we reach will, in any case, have an obvious application—*mutatis mutandis*—to syllogisms of other types. We can begin by asking the question "What corresponds in the syllogism to our distinction between data, warrant, and backing?" If we press this question, we shall find that the apparently innocent forms used in syllogistic arguments turn out to have a hidden complexity. This internal complexity is comparable with that

we observed in the case of modally-qualified conclusions: here, as before, we shall be obliged to disentangle two distinct things—the force of universal premisses, when regarded as warrants, and the backing on which they depend for their authority.

In order to bring these points clearly to light, let us keep in view not only the two universal premisses on which logicians normally concentrate—"All A's are B's" and "No A's are B's"—but also two other forms of statement which we probably have just as much occasion to use in practice—"Almost all A's are B's" and "Scarcely any A's are B's." The internal complexity of such statements can be illustrated first, and most clearly, in the latter cases.

Consider, for instance, the statement, "Scarcely any Swedes are Roman Catholics." This statement can have two distinct aspects: both of them are liable to be operative at once when the statement figures in an argument, but they can nevertheless be distinguished. To begin with, it may serve as a simple statistical report: in that case, it can equally well be written in the fuller form, "The proportion of Swedes who are Roman Catholics is less than (say) 2%"—to which we may add a parenthetical reference to the source of our information, "(According to the tables in *Whittaker's Almanac*)." Alternatively, the same statement may serve as a genuine inference-warrant: in that case, it will be natural to expand it rather differently, so as to obtain the more candid statement, "A Swede can be taken almost certainly not to be a Roman Catholic."

So long as we look at the single sentence "Scarcely any Swedes are Roman Catholics" by itself, this distinction may appear trifling enough: but if we apply it to the analysis of an argument in which this appears as one premiss, we obtain results of some significance. So let us construct an argument of quasi-syllogistic form, in which this statement figures in the position of a "major premiss." This argument could be, for instance, the following:

Petersen is a Swede;
Scarcely any Swedes are Roman Catholic;
So, almost certainly, Petersen is not a Roman Catholic.

The conclusion of this argument is only tentative, but in other respects the argument is exactly like a syllogism.

As we have seen, the second of these statements can be expanded in each of two ways, so that it becomes either "The proportion of Swedes who are Roman Catholics is less than 2%," or else, "A Swede can be taken almost certainly not to be a Roman Catholic." Let us now see what happens if we substitute each of these two expanded versions in turn for the second of our three original statements. In one case we obtain the argument:

> Petersen is a Swede;
> A Swede can be taken almost certainly not to be a Roman Catholic;
> So, almost certainly, Petersen is not a Roman Catholic.

Here the successive lines correspond in our terminology to the statement of a datum (D), a warrant (W), and a conclusion (C). On the other hand, if we make the alternative substitution, we obtain:

> Petersen is a Swede;
> The proportion of Roman Catholic Swedes is less than 2%;
> So, almost certainly, Petersen is not a Roman Catholic.

In this case we again have the same datum and conclusion, but the second line now states the backing (B) for the warrant (W), which is itself left unstated.

For tidiness' sake, we may now be tempted to abbreviate these two expanded versions. If we do so, we can obtain respectively the two arguments:

> (D) Petersen is a Swede;
> (W) A Swede is almost certainly not a Roman Catholic;
> So, (C) Petersen is almost certainly not a Roman Catholic:

and,

> (D) Petersen is a Swede;
> (B) The proportion of Roman Catholic Swedes is minute;

> So, (C) Petersen is almost certainly not a Roman Catholic.

The relevance of our distinction to the traditional conception of "formal validity" should already be becoming apparent, and we shall return to the subject shortly.

Turning to the form "No A's are B's" (e.g., "No Swedes are Roman Catholics"), we can make a similar distinction. This form of statement also can be employed in two alternative ways, either as a statistical report, or as an inference-warrant. It can serve simply to report a statistician's discovery — say, that the proportion of Roman Catholic Swedes is in fact zero; or alternatively it can serve to justify the drawing of conclusions in argument, becoming equivalent to the explicit statement, "A Swede can be taken certainly not to be a Roman Catholic." Corresponding interpretations are again open to us if we look at an argument which includes our sample statement as the universal premiss. Consider the argument:

> Petersen is a Swede;
> No Swedes are Roman Catholics;
> So, certainly, Petersen is not a Roman Catholic.

This can be understood in two ways; we may write it in the form:

> Petersen is a Swede;
> The proportion of Roman Catholic Swedes is zero;
> So, certainly, Petersen is not a Roman Catholic,
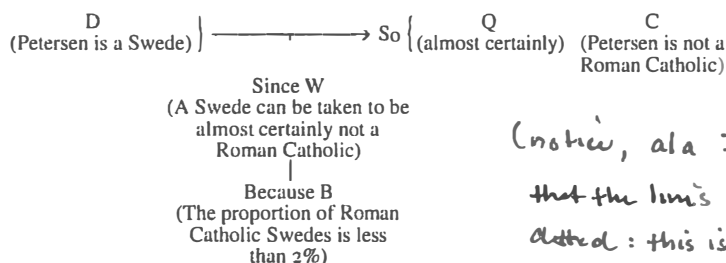
or alternatively in the form:

> Petersen is a Swede;
> A Swede is certainly not a Roman Catholic;
> So, certainly, Petersen is not a Roman Catholic.

Here again the first formulation amounts, in our terminology, to putting the argument in the form "D, B, so C"; while the second formulation is equivalent to putting it in the form "D, W, so C." So, whether we are concerned with a "scarcely any . . ." argument or a "no . . ." argument, the customary form of expression will tend in either case to conceal from us the distinction between an inference-warrant and its backing. The same will be true in the case of "all" and "nearly all": there, too, the distinction between saying "Every, or nearly every single A *has been found* to be a B" and say-

ing "An A *can be taken*, certainly or almost certainly, to be a B" is concealed by the over-simple form of words "All A's are B's." A crucial difference in practical function can in this way pass unmarked and unnoticed.

Our own more complex pattern of analysis, by contrast, avoids this defect. It leaves no room for ambiguity: entirely separate places are left in the pattern for a warrant and for the backing upon which its authority depends. For instance, our "scarcely any . . ." argument will have to be set out in the following way:

$$
\begin{array}{c}
\text{D} \\
\text{(Petersen is a Swede)}
\end{array} \Big| \longrightarrow \text{So} \Big\{ \begin{array}{cc} \text{Q} & \text{C} \\ \text{(almost certainly)} & \text{(Petersen is not a} \\ & \text{Roman Catholic)} \end{array}
$$

Since W
(A Swede can be taken to be
almost certainly not a
Roman Catholic)
|
Because B
(The proportion of Roman
Catholic Swedes is less
than 2%)

(handwritten note: (notice, ala Ingold, that the line's arent dotted: this is wayfaring and not transport))

Corresponding transcriptions will be needed for arguments of the other three types.

When we are theorising about the syllogism, in which a central part is played by propositions of the forms "All A's are B's" and "No A's are B's," it will accordingly be as well to bear this distinction in mind. The form of statement "All A's are B's" is as it stands deceptively simple: it may have in use both the force of a warrant and the factual content of its backing, two aspects which we can bring out by expanding it in different ways. Sometimes it may be used, standing alone, in only one of these two ways at once; but often enough, especially in arguments, we make the single statement do both jobs at once and gloss over, for brevity's sake, the transition from backing to warrant—from the factual information we are presupposing to the inference-licence which that information justifies us in employing. The practical economy of this habit may be obvious; but for philosophical purposes it leaves the effective structure of our arguments insufficiently candid.

There is a clear parallel between the complexity of "all . . ." statements and that of modal statements. As before, the *force* of the statements is invariant for all fields of argument. When we consider this aspect of the statements, the form "All A's are B's" may always be replaced by the form "An A can certainly be taken to be a B":

this will be true regardless of the field, holding good equally of "All Swedes are Roman Catholics," "All those born in British colonies are entitled to British citizenship," "All whales are mammals," and "All lying is reprehensible"—in each case, the general statement will serve as a warrant authorising an argument of precisely the same form, D→C, whether the step goes from "Harry was born in Bermuda" to "Harry is a British citizen" or from "Wilkinson told a lie" to "Wilkinson acted reprehensibly." Nor should there be any mystery about the nature of the step from D to C, since the whole *force* of the general statement "All A's are B's," as so understood, is to authorise just this sort of step.

By contrast, the kind of *grounds* or *backing* supporting a warrant of this form will depend on the field of argument: here the parallel with modal statements is maintained. From this point of view, the important thing is the factual content, not the force of "all . . ." statements. Though a warrant of the form "An A can certainly be taken to be a B" must hold good in any field in virtue of *some* facts, the actual sort of facts in virtue of which any warrant will have currency and authority will vary according to the field of argument within which that warrant operates; so, when we expand the simple form "All A's are B's" in order to make explicit the nature of the backing it is used to express, the expansion we

must make will also depend upon the field with which we are concerned. In one case, the statement will become "The proportion of A's found to be B's is 100%"; in another, "A's are ruled by statute to count unconditionally as B's"; in a third, "The class of B's includes taxonomically the entire class of A's"; and in a fourth, "The practice of doing A leads to the following intolerable consequences, etc." Yet, despite the striking differences between them, all these elaborate propositions are expressed on occasion in the compact and simple form "All A's are B's."

Similar distinctions can be made in the case of the forms, "Nearly all A's are B's," "Scarcely any A's are B's," and "No A's are B's." Used to express warrants, these differ from "All A's are B's" in only one respect, that where before we wrote "certainly" we must now write "almost certainly," "almost certainly not" or "certainly not." Likewise, when we are using them to state not warrants but backing: in a statistical case we shall simply have to replace "100%" by (say) "at least 95%," "less than 5%" or "zero"; in the case of a statute replace "unconditionally" by "unless exceptional conditions hold," "only in exceptional circumstances" or "in no circumstances whatever"; and in a taxonomical case replace "the entirety of the class of A's" by "all but a small subclass . . . ," "only a small subclass . . ." or "no part of . . . ." Once we have filled out the skeletal forms "all . . ." and "no . . ." in this way, the field-dependence of the backing for our warrants is as clear as it could be. . . .

ANALYTIC AND SUBSTANTIAL ARGUMENTS

This distinction is best approached by way of a preamble. We remarked some way back that an argument expressed in the form "Datum; warrant; so conclusion" can be set out in a formally valid manner, regardless of the field to which it belongs; but this could never be done, it appeared, for arguments of the form "Datum; backing for warrant; so conclusion." To return to our stock example: if we are given information about Harry's birthplace, we may be able to draw a conclusion about his nationality, and defend it

with a formally valid argument of the form (D; W; so C). But the warrant we apply in this formally valid argument rests in turn for its authority on facts about the enactment and provisions of certain statutes, and we can therefore write out the argument in the alternative form (D; B; so C), i.e.:

Harry was born in Bermuda;
The relevant statutes (W_1 . . .) provide that people born in the colonies of British parents are entitled to British citizenship;
So, presumably, Harry is a British citizen.

When we choose this form, there is no question of claiming that the validity of the argument is evident simply from the formal relations between the three statements in it. Stating the backing for our warrant in such a case inevitably involves mentioning Acts of Parliament and the like, and these references destroy the formal elegance of the argument. In other fields, too, explicitly mentioning the backing for our warrant — whether this takes the form of statistical reports, appeals to the results of experiments, or references to taxonomical systems — will prevent us from writing the argument so that its validity shall be manifest from its formal properties alone.

As a general rule, therefore, we can set out in a formally valid manner arguments of the form "D; W; so C" alone: arguments of the form "D; B; so C" cannot be so expressed. There is, however, one rather special class of arguments which appears at first sight to break this general rule, and these we shall in due course christen *analytic* arguments. As an illustration we may take the following:

Anne is one of Jack's sisters;
All Jack's sisters have red hair;
So, Anne has red hair.

Arguments of this type have had a special place in the history of logic, and we shall have to pay close attention to them: it has not always been recognised how rare, in practice, arguments having their special characteristics are.

As a first move, let us expand this argument as we have already done those of other types. Writing the major premiss as a statement of backing, we obtain:

Anne is one of Jack's sisters;
Each one of Jack's sisters has (been checked individually to have) red hair;
So, Anne has red hair.

Alternatively, writing warrant in place of backing, we have:

Anne is one of Jack's sisters;
Any sister of Jack's will (i.e., may be taken to) have red hair;
So, Anne has red hair.

This argument is exceptional in the following respect. If each one of the girls has been checked individually to have red hair, then Anne's hair colour has been specifically checked in the process. In this case, accordingly, the backing of our warrant includes explicitly the information which we are presenting as our conclusion: indeed, one might very well replace the word "so" before the conclusion by the phrase "in other words," or "that is to say." In such a case, to accept the datum and the backing is *thereby* to accept implicitly the conclusion also; if we string datum, backing and conclusion together to form a single sentence, we end up with an actual tautology—"Anne is one of Jack's sisters and each one of Jack's sisters has red hair *and also* Anne has red hair." So, for once, not only the (D; W; so C) argument but also the (D; B; so C) argument can—it appears—be stated in a formally valid manner.

Most of the arguments we have practical occasion to make use of are, one need hardly say, not of this type. We make claims about the future, and back them by reference to our experience of how things have gone in the past; we make assertions about a man's feelings, or about his legal status, and back them by references to his utterances and gestures, or to his place of birth and to the statutes about nationality; we adopt moral positions, and pass aesthetic judgements, and declare support for scientific theories or political causes, in each case producing as grounds for our conclusion statements of quite other logical types than the conclusion itself. Whenever we do any of these things, there can be no question of the conclusion's being regarded as a mere restatement in other words of something already stated implicitly in the datum and the backing: though the argument may be formally valid when expressed in the form "Datum; warrant; so conclusion," the step we take in passing to the conclusion from the information we have to rely on—datum and backing together—is a substantial one. In most of our arguments, therefore, the statement obtained by writing "Datum; backing; *and also* conclusion" will be far from a tautology—obvious it may be, where the legitimacy of the step involved is transparent, but tautological it will not.

In what follows, I shall call arguments of these two types respectively *substantial* and *analytic*. An argument from D to C will be called analytic if and only if the backing for the warrant authorising it includes, explicitly or implicitly, the information conveyed in the conclusion itself. Where this is so, the statement "D, B, and also C" will, as a rule, be tautological. (This rule is, however, subject to some exceptions which we shall study shortly.) Where the backing for the warrant does not contain the information conveyed in the conclusion, the statement "D, B, and also C" will never be a tautology, and the argument will be a substantial one.

The need for some distinction of this general sort is obvious enough, and certain aspects of it have forced themselves on the attention of logicians, yet its implications have never been consistently worked out. This task has been neglected for at least two reasons. To begin with, the internal complexity of statements of the form "All A's are B's" helps to conceal the full difference between analytic and substantial arguments. Unless we go to the trouble of expanding these statements, so that it becomes manifest whether they are to be understood as stating warrants or the backing for warrants, we overlook the great variety of arguments susceptible of presentation in the traditional syllogistic form: we have to bring out the distinction between backing and warrant explicitly in any particular case if we are to be certain what sort of argument we are concerned with on that occasion. In the second place, it has not been recognised how exceptional genuinely analytic arguments are, and how difficult it is to produce an argument which will be analytic

past all question: if logicians had recognised these facts, they might have been less ready to treat analytic arguments as a model which other types of arguments were to emulate.

Even our chosen example, about the colour of Anne's hair, may easily slip out of the analytic into the substantial class. If the backing for our step from datum, "Anne is Jack's sister," to conclusion, "Anne has red hair," is just the information that each of Jack's sisters has *in the past* been observed to have red hair, then — one might argue — the argument is a substantial one even as it stands. After all, dyeing is not unknown. So ought we not to rewrite the argument in such a way as to bring out its substantial character openly? On this interpretation the argument will become:

> Datum — Anne is one of Jack's sisters;
> Backing — All Jack's sisters have previously been observed to have red hair;
> Conclusion — So, presumably, Anne now has red hair.

The warrant relied on, for which the backing is here stated, will be of the form, "Any sister of Jack's may be taken to have red hair": for the reasons given, this warrant can be regarded as establishing no more than a presumption:
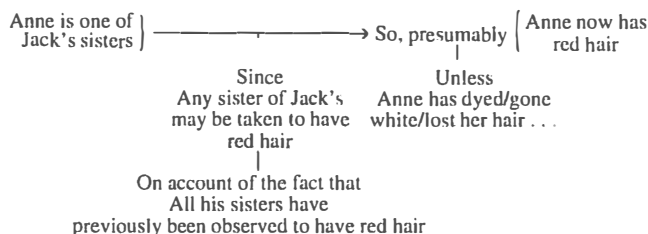
It seems, then, that I can defend my conclusion about Anne's hair with an unquestionably analytic argument only if at this very moment I have all of Jack's sisters in sight, and so can back my warrant with the assurance that every one of Jack's sisters has red hair at this moment. But, in such a situation, what need is there of an *argument* to establish the colour of Anne's hair? And of what relevance is the other sisters' hair colour? The thing to do now is use one's eyes, not hunt up a chain of reasoning. If the purpose of an argument is to establish conclusions about which we are not entirely confident by relating them back to other information about which we have greater assurance, it begins to be a little doubtful whether any genuine, practical argument could *ever* be properly analytic.

Mathematical arguments alone seem entirely safe: given the assurance that every sequence of six or more integers between 1 and 100 contains at least one prime number, and also the information that none of the numbers from 62 up to 66 is a prime, I can thankfully conclude that the number 67 is a prime; and that is an argument whose validity neither time nor the flux of change can call in question. This unique character of mathematical arguments is significant. Pure mathematics is possibly the only intellectual activity whose problems and solutions are "above time." A mathematical problem is not a quandary; its solution has no time limit; it involves no steps of substance. As a model argument for formal logicians to analyse, it may be seducingly elegant, but it could hardly be less representative.

From *Logic and the Criticism of Arguments*

It is time to state these points in more constructive terms. For this purpose, let me present three theses.

1. The rational criticism of arguments involves two distinct arts: one "analytical," the other "topical." The techniques of the first art are concerned with the question, "Am I arguing *rightly* (or impeccably)?" — i.e., Am I avoiding formal inconsistencies, and other errors of intellectual accountancy? Those of the second are concerned with the question, "Are these the *right* (or relevant) arguments to use when dealing with this kind of problem, in this situation?" — i.e., Are they of a kind appropriate to the substantive demands of the problem and situation? The art of reasoning "rightly" is one concern of *formal logic,* with the help of which we recognize internal contradictions and similar formal errors. But the art of identifying and explaining the nature and mode of operation of "right" arguments is a field for which professional philosophers today no longer have a name. Historically, it was called by a dozen different names — among others, *topics, argumentation, rhetoric, organon,* and *method.* Today, this art is coming to be known as "*in*formal" logic; but there are disadvantages to this *negative* name, which defines its scope only by what it is not, viz., "formal." To make its actual scope and significance clearer, I would for myself prefer a more positive name, such as *substantive* logic.

2. The two arts quite properly employ distinct vocabularies. The language of formal logic comprises terms like "premise" and "conclusion," "entailment" and "principle of inference," "valid" and "invalid," "necessary" and "contradictory": the language of substantive logic comprises terms like "grounds" and "claim," "support" and "warrant," "sound" and "shaky," "presumably" and "unfounded." Far from these vocabularies having a significant overlap, it is well to keep them distinct; for, once again, the *arguments* to which they are addressed are not "arguments" in the same sense. The formal connections in a string of propositions are *strong or weak,* in the sense of "valid" or "invalid"; and a string of propositions is an "argument" in my first sense. The substantive support which an attorney or scientist gives a claim, by producing the particular grounds he does, in the forum and at the time he does, is *strong or weak,* in the sense of "sound" or "shaky"; and, by stating his case as he does, each man presents an "argument" in my second, human interaction sense.

There are just a few, very general terms that have a use in both these arts: for example, the term "fallacy." In thinking about these borderline issues, however, it becomes doubly prudent to keep in mind the differences between formal and substantive criticism. For instance, people writing introductory logic texts are sometimes tempted to equate the term "fallacious" with the term "invalid"; and this confuses the elementary student, by suggesting that fallacies are typically formal blunders, rather than (as they more often are) errors of substance. Scientific arguments may successfully use theoretical "models," just as legal arguments successfully use theoretical "interpretations." Yet, in both fields, arguments are also sometimes rejected, as appealing to "false analogies"; and, formally speaking, both the successful and the fallacious arguments are quite similar. What mark fallacious analogies off from fruitful models and theories, in practice, are matter of *substance:* e.g., the fact that the "theory" or "model" in question is *warranted* by deeper underlying principles, whereas by contrast the corresponding appeals to "mere analogy" are "unwarranted."

3. The art of criticizing arguments on "topical" rather than "analytical" grounds is one in which (as Aristotle insisted from the outset) the central issues can be faced, and formulated, only if we address ourselves to *the nature of the case:* i.e., to the general demands of the problems currently under consideration, and the "forums" that are available for resolving them.

In Aristotelian usage, such issues are issues of *prudence*. In legal contexts, they overlap into *juris*prudence: there, they are concerned with the "standards of proof" required in judicial proceedings of different kinds, the "rules of evidence" relevant in different branches of law, and the demands of "due process" that govern the conduct of different sorts of cases. As at earlier stages in the field of rhetoric and practical reasoning, lawyers today continue to pay more explicit attention to their methods of arguing than professionals in many other fields; so they have much clearer ideas than (say) scientists or physicians about the substantive tests which must be satisfied, if legal arguments are to serve the goals of the legal enterprise.

Does this mean that the "topical" aspects of legal reasoning can be understood only by trained lawyers? The answer to that question is not entirely obvious. We might equally ask, Can the corresponding aspects of medical and scientific reasoning be understood only by trained physicians and scientists? Just so long as such issues are treated as extensions of formal logic, it can be argued that they are philosophical not professional; but, if we view them rather as matters of substance, it is less clear that philosophers can monopolize them. Indeed, there has been a lively debate between those philosophers of science such as Popper and Lakatos, who still insist on the right to lay down methodological "statute law" to working scientists, and those others, like Polanyi and myself, who see scientific methods of argumentation as requiring more of a "common law" analysis.

While some detailed points of method in both law and science may be too refined for any but professionals, the *general pattern* of reasoning in both fields is quite intelligible to lay people as well. Logicians and philosophers also have something of their own to contribute, to the extent that the substantive merits and defects of disciplinary reasoning is discussed (as in Aristotle's *Topics*) on a *comparative* basis. In what respects, for instance, do "theories" play the same kinds of part in law as in science? To what extent are appeals to authority admissible or fallacious in different fields of reasoning on the same occasions, and for the same reasons? And on what conditions can arguments about questions of "causation" in medicine be assimilated to those about "causality" in pure science?

None of those questions is "proper to" law or science or medicine taken alone: still, none of them can be answered by someone who has no knowledge whatever (however general) of how people in fact think, argue and resolve problems in those fields. In short, the topical criticism of legal, scientific, and other technical arguments can become the substantive mode of inquiry it needs to be, only if the discussion of practical reasoning is made into a *collaborative* debate: one in which philosophers are prepared to listen to lawyers, scientists, and others, instead of merely lecturing them! Parts of the resulting debate may be somewhat technical: e.g., statistical analyses of the design of experiments, or jurisprudential discussions of the minuter rules of evidence. But a common framework of analysis, at least, covers the whole territory of practical argumentation; and the outcome of such a collaborative analysis would do for us, in our own day, just the kinds of things that Aristotle, Hermagoras and the medieval rhetoricians aimed at in earlier times.

To close, let me speak briefly about the philosophical and educational implications of the positions for which I have been arguing here. First, let me say something about the current controversy over the *rationality* of scientific argument, between Karl Popper and Paul Feyerabend.

1. I hinted earlier that, since the seventeenth century, a revival of the Platonist approach to argumentation has led professional philosophers to expel all the functional aspects of "rationality" from consideration; to equate "rationality" with "logicality"; and to look for *formal* criteria to judge the "rationality" of all arguments.

One glance at the Popper-Feyerabend dispute confirms this reading of the matter. Both men assume that the arguments by which scientists arrive at novel discoveries can be genuinely "rational," only if they satisfy certain formal conditions, at least of a weak enough kind. Otherwise, such discoveries will merely be the products of good fortune, chance, irrational speculation, or pure intuition. Popper, for his part, still assumes that we can state such formal conditions in ad-

vance; and that scientific knowledge can thus be elevated—however hypothetically and fallibly—to the status of *episteme:* only so can he be satisfied that the procedures of science are truly "rational."

Underlining the Platonist element in his position, Popper asserts that scientific knowledge is essentially concerned with a Third World of *eternal entities,* which are neither "physical objects," nor "psychological thoughts" in the scientists' heads. By contrast, Feyerabend believes that no such conditions can be found, still less imposed on the work of actual scientists; while Popper's "Third World" is for him a reactionary myth. But, instead of arguing that it was a mistake to look for such formal conditions of rationality, Feyerabend strikes a disillusioned pose, and concludes (in the spirit of Nietzsche) that science can make progress, only if scientists deliberately reject all *method* in favor of an *ir*rational "Scientific anarchism."

Here, Karl Popper once again plays the part of the Utopian: to be a scientist one must believe in the invisible Third World, and only a scientist who shares that belief is truly "rational." Paul Feyerabend defines a counter-position, but states it in the same terms: only, because (in his eyes) the Third World can have no practical relevance to the actual work of science, he calls on us to give up the idea that science is rational as a comfortable illusion. Both men take it for granted that we know what demands "rationality" makes of science, *in advance of* looking to see how the arguments of science function in actual practice. Neither of them has the patience to wait for a first-hand examination of "the nature of the case" to clarify our ideas about what kind of thing "scientific rationality" could in prac-

tice be. For both of them, Aristotle, Hermagoras and the rhetoricians wrote in vain.

2. Finally, let me turn to the educational implications of my argument. Any revival of "substantive logic," "rhetoric," "practical reasoning," or "theory of argumentation" (call it what you will) requires both philosophers, and those whose work the philosophers reflect on—lawyers and physicians, scientists and critics—to modify their present claims to full disciplinary autonomy. The substantive analysis of practical argumentation is worthwhile only if it is *collaborative,* with philosophers and practitioners working together to establish, firstly, how reasons function in all these different fields of work, secondly, what are the accepted procedures and forums for the resulting arguments and, lastly, what standards are available for judging the "success" and "failure" of work in one field or another.

The differences between the ways we interpret issues, in one field or another, are *ineliminable,* and also *functional.* They cannot be explained away by formal devices: e.g., by inventing separate formal systems of alethic, deontic, or epistemic logic for every purpose and field. Practical argumentation has both field invariant and field dependent features. Some topical terms (e.g., "grounds" and "warrants") have a use in most fields of argument; more specialized terms (e.g., numerical "probability") are relevant only in very few fields. In between, a middle category of terms of topical analysis—"kind" and "degree," "fallacy" and "analogy," "cause" and "definition"—apply in varying ways as we move from one field to another. These are the notions which philosophers and practitioners can master fully only by pooling their efforts.

[handwritten margin notes:] wow · this w be goo for the grids · discip anit · are this some Latour connections here? · some strong connections to AIME!