

Replies

Fallacies are Common

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Professor Secor recently has replied to an article of mine in which I argued that fallacies are common in ordinary discourse.¹

Given what I believe is the importance of the specific issue (whether fallacies are common) as well as the more general issue (how relevant logic is as a discipline for assessing ordinary discourse), I feel that a reply is in order. Since I believe that many of her specific criticisms involve some general confusions about what I was doing, I will begin by making four general points, and then turn to the specifics of her reply.

To begin with, let me remind the reader that to show that fallacies are common in structured political discourse (debates, news conferences, position papers and other campaign literature, interviews and so on) is of course not to show conclusively that fallacies are common in all ordinary discourse. It is merely to give some evidence to that effect. The examination of structured political discourse should be viewed as only the first step in a small but not uninteresting research program of examining large areas of ordinary discourse to see whether fallacies are common. Other steps in the program (if I may be permitted to foreshadow) might be to examine sales pitches, product guarantees, letters to the

editor, newspaper editorials, and such like.

Second, we ought to be clear on what the claim that such-and-such is "common" means. When I claim that (say) ravens are common in my part of the country, I am not claiming that all other species of birds are uncommon, i.e., that only ravens are common. Much less am I claiming that the majority of birds are ravens, i.e., that ravens predominate. I am merely claiming that in my area of the country, one often sees ravens. Similarly, when I claim that fallacies are common in structured political discourse, I am not claiming that most things politicians say are fallacious, only that in such discourse one often hears fallacies.

Third, we ought to distinguish two principals of charity, the interpretive and the motivational. Roughly put, the interpretive principal of charity is that, before assessing someone's argument, we ought to state it in its strongest form. Under this principle of charity, we should try to fill in omitted premises that would make the argument strong, spell out key terms so as to make the argument clear, and so on. (Specifying exactly what interpretive charity amounts to is, however, not a trivial matter). Again, roughly put, the motivational principle of charity is that we ought to assume that the person putting forward an argument is doing so in good faith, i.e., is motivated by a sincere desire to communicate with his audience by logically decent rhetorical standards.

It seems to me that the interpretive prin-

¹ See my "Are fallacies common? A look at two debates," *Informal Logic*, vol. 8 (1986) pp. 81-92, and Marie J. Secor, "How common are fallacies?" *Informal Logic*, vol. 9 (1987) pp. 41-48. All page references in the present reply are to Secor's paper.

cial of charity, for all the unclarity about its application in particular instances, should be adopted by the logician. But the motivational principle of charity should not be adopted by the logician, for two reasons. First, it is dubious. People are quite often motivated by the desire to mislead their audiences, and use any rhetorical technique fair or foul to achieve their goals (sell a product, win an election, gain converts to a cult, or whatever). Second, it is irrelevant to the task of the logician. The logician is interested in the logical correctness of an argument, not the motives of the arguer who puts it forward. The fact that the arguer may be sincere, or under pressure, or that his audience may be satisfied with what he says, is irrelevant to the logical merits of what he says.

The last general point regards the definition of a fallacy, and the difference between the disciplines of rhetoric and logic. A fallacy is a logically incorrect (invalid or weak) argument. Whether a given type of fallacy is persuasive to a given group of people is an interesting rhetorical question, but is not strictly speaking a logical one. Very roughly, logic is the study of correct argumentation, while rhetoric is the study of persuasive communication. The two disciplines traditionally have had and continue to have a different foci. It should be kept in mind that my focus is that of the logician.

Now, Secor's argument against my view seems to have three parts. First, the cases of ignoring the issue I cited are not in fact such. Second, the cases of false cause I cited are fallacious only by unreasonably high scholarly standards. Third, the cases of *ad populum* or *ad hominem* I cited are not fallacies at all, but are instead legitimate rhetoric. More globally, she argues that my occasional charitableness towards the participants undermines my concept of a fallacy, and that I have attempted to apply culturally universal ideals to public argumentation where no such ideals truly apply.

Let me begin with ignoring the issue.

Let's be clear first on what counts as answering a question (i.e., addressing an issue), and what counts as evading it. Consider an example:

Have you stopped beating your wife?

This admits of a number of responsive answers: "I don't know" (direct declaration of ignorance on the issue); "I've never beaten my wife" (a correction of a false presupposition); "Yes, I have," or "No, I haven't" (both direct answers). But the following are non-responsive answers: "You know, I think violence is a real problem in today's world" (a general discussion of a topic, not a specific answer to a question); "Well, look at Fred—he's a bigamist, and he beats both his wives!" (the introduction of an irrelevant specific issue); "ask me some other time" or "Oh, get lost" (simply deferring or dismissing the issue). One can ignore a question/issue by talking in generalities, raising "red herrings" (irrelevant issues), or simply pooh-poohing it (deferring or dismissing it). My contention is that, in debates, news conferences, interviews and such like, it is common for politicians to ignore by those various means questions put to them.

My examples reflected that contention. For example, I cited the case where Nixon was asked whether new laws were needed to protect the public against excessive use of power by the labor unions (which he had indicated he favored earlier in his campaign), and what those laws would be. What would have been a logically responsive answer from Nixon? On analogy with our earlier simple case, here are a few examples:

- a) I have not yet thought of any specific laws.
- b) Your question is based on a false presupposition—I have never suggested in my campaign that we need any new laws.
- c) I have issued a position paper outlining my proposals in detail. Let me just mention one such law: in any strike

shutting down a plant vital to national security, give the President power to order a 30 day “cooling-off” period.

Nixon did not answer in any of those ways. Instead, he said:

Mr. Nixon: Mr. McGee, I am planning a speech on that subject next week. Also, so that we can get the opportunity for the questioners to question me, it will be before the next television debate. I will say simply, in advance of it, that I believe that in this area, the laws which should be passed, as far as the big national emergency strikes are concerned, are ones that will give the President more weapons with which to deal with those strikes. Now I have a big disagreement with Senator Kennedy, though, on this point. He has taken the position, when he first indicated on October of last year, that he would even favor compulsory arbitration as one of the weapons a president might have to stop a national emergency strike. I understand in his last speech before the Steelworkers Union, that he changed that position and indicated that he felt that government seizure might be the best way to stop a strike which could not be settled by collective bargaining. I do not believe we should have either collective bargaining or seizure. I think the moment that you give to the union, on one side, and to management, on the other side, the escape hatch of eventually going to the government to get it settled, that most of these great strikes will end up being settled by the government, and that will be in the end, in my opinion, wage control; it would mean price control—all the things that we do not want. I do believe, however, that we can give to the President of the United States powers, in addition to what he presently has in the fact-finding area, which would enable him to be more effective than we have been in handling these strikes.

Nixon in effect answers the question by saying a) ask me again later, b) here are a couple of laws I don't like, and c) generally I really do think we need those laws! Nixon, it is clear, ignored the question. Indeed, even Secor seems to see that something is inadequate about the reply:

In referring to his forthcoming speech Nixon

might be criticized for being unspecific but not, I think, for being irrelevant. If the public can be protected from excessive union power either by directly restricting the unions or by increasing presidential power to intervene, Nixon clearly advocates the latter course of action. It may, of course, be in his political interest to withhold details until a future speech, but he is not really guilty of ignoring the issue. (p. 43)

But answering the question about which new laws the President should have to deal with strikes by saying he should have more laws to deal with strikes is a hopelessly general answer.

Let me digress a moment to talk about Nixon's motivation—not a logical matter, as I indicated earlier. But since the motivationally charitable remarks I made in my first article were used against me (as I shall explain shortly), let me make some uncharitable remarks now. I suspect that Nixon did not want to admit that after urging new laws against labor activity, he hadn't thought of any. This would have made him look ignorant to the voters. Moreover, he did not support the most obvious candidates for such laws (vis., laws that would allow the President to seize plants or at least force the parties into arbitration) because that would cost him votes in organized labor. So he talked around the question. But whether we are motivationally charitable and assume he was not clear on the question he was asked, or motivationally uncharitable, and assume that he was being evasive to avoid looking stupid or alienating labor, is irrelevant to the assessment of his response.

Let's re-examine another example. Consider next the example I cited in which Kennedy was asked whether he considered the oil depletion allowance of twenty-seven and a half percent inequitable and whether he would lower it. He replied,

Mr. Kennedy: Mr. McGee, there are about a hundred and four commodities that have some kind of depletion allowance—different kinds of minerals, including oil. I believe all of those should be gone over in detail to

make sure that no one is getting a tax break; to make sure that no one is getting away from paying the taxes he ought to pay. That includes oil; it includes all kinds of minerals; it includes everything within the range of taxation. We want to be sure it's fair and equitable. It includes oil abroad. Perhaps that oil abroad should be treated differently than the oil here at home. Now the oil industry recently has had hard times. Particularly some of the smaller producers. They're moving about eight or nine days in Texas. But I can assure you that if I'm elected president, the whole spectrum of taxes will be gone through carefully, and if there is any inequities in oil or any other commodity, then I would vote to close that loophole. I have voted in the past to reduce the depletion allowance for the largest producers; for those from five million dollars down, to maintain it at twenty-seven and a half percent. I believe we should study this and other allowances; tax expense, dividend expenses and all the rest, and make a determination of how we can stimulate growth; how we can provide the revenues needed to move our country forward.

Secor finds his reply perfectly fine:

Jason comments that Kennedy "never specifically answered the questions." I would argue that although he says a great deal besides answering the questions, he does answer them. Kennedy says that in the past he voted to maintain the twenty-seven and a half percent allowance for smaller producers; we must therefore assume that he thought the allowance fair and reasonable at the time. Political wisdom being subject to change and development, he says that we "should continue to study this and other allowances." That is, he makes no guarantee that he would continue to support this specific tax provision in the future. The answer may not be equivocal, but it is not an ascent to generality that ignores the issue at hand. The questions, in this case and many others, are complex and often loaded, and the candidates need to answer them carefully. It would be misleading as well as politically imprudent for Kennedy to call the allowance unfair, especially when he voted for it, or fair, if he might withdraw his approval in the future. (p. 43)

But I stick by my original assertion that

Kennedy's reply was evasive. To the conjunctive question "is the depletion allowance unfair, and will you lower it from its current twenty-seven and a half percent?", the following replies are responsive:

- a) It is not unfair, and I will not lower it.
- b) It is unfair, and I will lower it.
- c) It is not unfair, but I will lower it.
- d) It is unfair, but I will not lower it.
- e) I honestly don't know.
- f) You falsely presuppose that the allowance is twenty-seven and a half percent; actually it is only ten percent.

Kennedy could have given one of these basic responsive replies, embellished with all the rhetorical bells and whistles Secor could desire. But he chose not to. He instead ignored the issue by saying a series of nonresponsive things: there are a lot of things that also have depletion allowances (So what? maybe all depletion allowances are unfair); all depletion allowances should be examined to see whether they are fair (fine, pal, but is the oil depletion allowance—supported by your Vice Presidential nominee—unfair?); perhaps oil abroad should be treated differently from oil here at home (irrelevant); the oil industry is going through tough times (yeah, so what—does this mean the allowance is fair?); ask me again later after I'm President because, hey, I'll look into it (sure—trust you, right?); I voted to lower it to its present level (yes, *but is that present level unfair and will you lower it?*).

I will again digress into motivational inquiry. Is Secor right to view Kennedy here as sincerely trying to answer a question which is "complex and loaded"? Of course not. First of all, the question, while being compound, was not at all loaded, since its presuppositions—that the allowance existed and was twenty-seven and a half percent—were true. Second, it is clear that Kennedy was deliberately evasive because it was politically expedient to do so: if he said he would lower the allowance, he would win support among many taxpayers but lose

support in the oil-producing states; if he said he would not lower the allowance, he would lose taxpayer support (and lose the issue of unfair taxation with which he was tarring Nixon and the Republicans) although he would gain support in the oil-producing states. He chose the easy way out, and did "the old ignoratio shuffle." But whether Secor or I am right about Kennedy's motivations, clearly he ignored the issue.

I won't rehash the other examples I cited. Time and again, the politicians did not address the given issue squarely by either conceding ignorance, showing the question to have a false presupposition, or answering it directly and specifically. Instead, they either raised irrelevant issues, talked in generalities, or deferred/dismissed the question.

I turn next to the fallacies of false cause. I cited a number of cases in which a politician attempted to show that his opponent was responsible for some bad situation that occurred while his opponent was in office merely on the basis that it occurred while that opponent was in office. Secor doesn't even try to show my examples fail to fit the traditional *post hoc ergo propter hoc* mold. Instead, she replies

But once again, we might ask "false" or "inadequate" from what point of view? We all know that military strategists, economists, and historians make very elaborate causal arguments, constructing intricate models that take whole books to explain, work out, and verify. But the voter's perspective is not the same as the scholar's. It is reasonable to expect that there be some difference between arguing for causes in the forums of scholarly disciplines, where one's causal model must be very precise and anticipate the efforts of other scholars to refute it, and arguing for causes in the public forums of presidential debate, where notions of responsibility are much more diffuse. As Aristotle says, we can only ask of a subject the degree of precision that is appropriate to it. Politicians are not economists, and voters act on causal assumptions different from those of scholars. Thus fallacies of false cause may be obvious from the van-

tage of the academic critic, whose standard of evidence for causality may be very high, but such analysis tells us very little about the way voters make or even should make decisions. Perhaps that is just another way of saying that the rhetorical context of political discourse differs from that of scholarly discourse. (pp. 46-7)

Her reply is very weak, for several reasons. First, it is simply not true that even the politicians involved accept *post hoc* reasoning as logical even in "the rhetorical context of political discourse," much less that the hapless voters do. This is obvious from the fact that the politicians do *not* accept responsibility for every bad thing which occurs when *they* are in office. And certainly the voters do not accept responsibility for every bad thing which happens in the country while *they* reside in it! As C.S. Peirce noted, the ethics of belief requires that an argument I apply to others I should equally be willing to accept applied to myself. No principle of charity should stop us from calling a spade a spade: if a politician applies a form of argument to his opponent but rejects it for himself, then it is clear that even he does not think it a logically strong argument technique.

Second, there *are* ways a politician can establish a better logical case for social, political, or economic causal claims. One obvious way is to cite from scholarly works that truly establish such claims—something that politicians often do. (Remember, my point is that politicians *often* commit false cause fallacies, not that they *always* or even *typically* commit them.) Another way is to sketch out the premises of a full argument for a causal claim, and tell the audience how they may obtain a position paper in which the full details are spelled out. Again, politicians often do this.

The upshot is that to demand that our would-be leaders do more to establish their causal claims than merely cite temporal connections (especially in a highly selective and self-serving way!) is not to impose impractical elitist standards, but rather to request

something which politicians can and often do provide. We just need to see more of it.

Secor's third point is not clear to me. I had pointed out that the politicians in the debates engaged in a number of *ad populum* and *ad hominem* appeals. I charitably added that in some cases *ad populum* appeals could be condoned, though not so with *ad hominem* appeals. Secor seems to think that this undercuts my view that those appeals are fallacies:

...If we condone rather than condemn the use of such tactics, what is the use of talking about the *ad populum* as a fallacy? If fallacies are not the product of deceitful intent, as we saw earlier, and if they are used by quite decent politicians, and if we can condone their usage in the context of debate, there seems to be little reason to consider them errors. They are errors only if we hold political discourse to a purely rational ideal according to which candidates are asked perfectly straight-forward questions which they are expected to answer without any tint of emotion or bias toward their own candidacy. (p. 47)

But her line of argument here is muddled. To condone is to forgive, not approve. We can condone an act of petty jealousy without approving petty jealousy as a general lifestyle. My point is a simple one: a fallacy is a logically bad argument. A person may commit a fallacy (i.e., put forward a logically bad argument) out of sincere ignorance, or deliberate and unpardonable deceit, or even deliberate yet pardonable deceit, but a fallacy is still committed.

Whether we condemn the person is quite a different question from whether we condemn the argument form. One is a question of motivational (*not* interpretive) charity, the other of logic.

Let me conclude with a note on the question whether those of us who teach logic with the belief that we can at least to a small degree improve the level of intellectual taste if not the reasoning ability of our students are merely elitists with an "unrealistically superior and judgmental attitude toward ordinary discourse." Really, the amount of illogic which pervades our public and private lives is considerable. This would not be so bad, I suppose, if all public and private decisions concerning our lives were made by governmental or other institutions, and the leaders of those institutions reasoned well—i.e., if we were totally ruled by philosopher-kings. But true philosopher-kings are not as plentiful as blackberries, and, in any case, the global trend seems to be toward increasing democratization. It seems imperative, then, that all students need their reasoning skills improved. We—teachers—cannot improve those skills unless we point to rigorous standards of argumentation, and demand that our students adhere to those standards, and create in our students an expectation that those who seek to govern also adhere to these standards.

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Professor Kasachkoff on Explaining and Justifying

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Tziporah Kasachkoff, in "Explaining and Justifying" (*Informal Logic*, Vol. x, No. 1 [Winter 1988], pp. 21-30), addresses two questions concerning the relation between explanations and justificatory arguments: first, Are all explanations arguments? and second, Is our critical assessment of a discourse indifferent to whether that discourse is an explanation or a justificatory argument? I shall accept her negative answer to the first question but explain briefly why I am not convinced by the arguments from theoretical considerations and from examples that she offers for her negative answer to the second question.

Argument from theoretical considerations. On pages 26-27 the author argues that whether a discourse is an explanation or a justificatory argument makes a difference to its evaluation because the background assumptions of a discourse partly determine the conditions under which it succeeds, and the background assumptions of explanations, as a class, differ from those of justificatory arguments, as a class. For every explanation, in order to make any sense at all, assumes an audience that initially accepts its explanandum (*i.e.*, that which is to be explained), whereas every justificatory argument, in order to have any point at all, assumes an audience that does not initially accept its conclusion.

This description of the different background assumptions of explanations and justifications is erroneous. For some explanations can make sense although given to an audience that knows the explanandum to be false but supposes it for the moment to be true. For instance, to an audience that knows there is no large crater in Kansas,

one might say, "Suppose there were a large crater in Kansas. That would be explained by the impact of a meteorite." Such an explanation would at least make sense. Consequently, it is false that in order to make any sense at all, every explanation assumes an audience that initially accepts its explanandum. Similarly, some justifications can have some point although given to an audience that already believes the conclusion. For example, a theologian might offer to fellow believers a proof of God's existence not to change their minds about the conclusion but to show how reason can demonstrate a proposition already accepted on faith. Likewise, a mathematical logician might publish a proof that $1 + 1 = 2$ not to convince his audience of its truth but to show how it is provable from specified premises or by means of specified inference rules. As far as I can see, these proofs would be what the author calls 'justificatory arguments', and they would have some point; yet they would not be addressed to an audience that initially doubted or disbelieved their conclusions. Consequently, it is false that in order to have any point every justificatory argument assumes an audience that does not accept its conclusion. Thus, if there is any difference in background assumptions between explanations and justificatory arguments, it is not as described here.

Moreover, even if the background assumptions of explanations, as a class, did differ from those of justificatory arguments, as a class, that difference would make a difference to the evaluation of explanations and justificatory arguments only if the measure of their success or failure were the rhetorical

one of their effect on an audience rather than the logical one of the relation of support between either their explanans (*i.e.*, that which does the explaining) and explanandum or their premises and conclusion. But in the paper's remaining four arguments the evaluative criterion employed is not the rhetorical but the logical one. Why is the evaluative criterion required by this first argument not used in the remaining four? Why is the evaluative criterion employed in those other arguments not used in this first one also, where it would not lead to the desired conclusion?

For these reasons, the argument from theoretical considerations fails.

First argument from example. On page 27 appears the argument that since the discourse—

Everybody has needs. You don't fill mine.
So, I'm splittin'.

—would be an “acceptable” or “good” explanation but only a “weak” or “moderate” justificatory argument, whether a discourse is an explanation or a justificatory argument makes a difference to its evaluation. The discourse would be at best a “moderate” justificatory argument, according to the author, because “we all know that human beings are pretty much unwilling to dissolve relationships despite not having their needs met”; but it would be at worst an “acceptable” explanation because “despite the fact that, as a general rule, we don't readily dissolve relations for the reason given here, in any particular case, the failure to have one's needs met *may* in fact be the operative reason for one's calling it quits.”

In other words, the difference between the speaker on this occasion and people generally is that he (or she?) is acting on some such principle as ‘I do not remain with anyone who does not fill my needs’ or ‘I do not remain with you unless you fill my needs’. Accordingly, we include this unexpressed proposition in the explanans, whereupon the explanation succeeds. But

if we may include such a proposition in the explanation's explanans, we may evenhandedly add it to the justificatory argument's premises as well. And if we do, the degree of support which the justificatory argument's premises afford its conclusion is the same as that which the explanation's explanans affords its explanandum; for the premises comprise the same propositions as the explanans, and the explanandum is the same proposition as the conclusion. So, since the author is now evaluating explanations and justificatory arguments by reference to the degree of support the explanans or premises afford the explanandum or conclusion, the justificatory argument becomes as good as the explanation, undercutting the first argument from example.

Second argument from example. On the same page appears the similar argument that the discourse—

Of the four blouses hanging in my closet,
each of a different color—blue, red, white, and
green—, I am wearing the white blouse be-
cause I pulled one out indifferently at random.

—would be a good explanation (or “at least as good as any explanation that can be given, given the facts”) but not a good justificatory argument, since the premises do not support the conclusion. So, whether a discourse is an explanation or a justificatory argument makes a difference to its evaluation.

But the explanation would fail for the same two reasons the justificatory argument fails. First, the explanans does not say that the blouse the speaker indifferently pulled from the closet was the white one. Only if it was can the explanans ‘I pulled one blouse out indifferently at random’ have any relevance to the explanandum ‘Of the four blouses hanging in my closet, each of a different color—blue, red, white, and green—, I am wearing the white blouse’. And second, the explanans provides no connection between the speaker's pulling a blouse from the closet and her wearing that blouse. There are many possible connections (perhaps she is wearing whatever she pull-

ed from her closet, perhaps she only sometimes wears the first blouse she takes from her closet, perhaps she always wears the first blouse she takes from her closet, perhaps she always wears the second blouse she takes from her closet, and so on), and the explanation's success depends on some rather than others of these connections' being assumed.

We could save the explanation by adding two such unexpressed propositions as 'It was the white blouse that was taken from the closet' and 'The speaker is wearing whatever she pulled from her closet'. But evenhandedly adding the same two propositions to the justificatory argument would save it as well, so that this second argument from example also fails because of the false premise that the explanation would be better than its corresponding justificatory argument.

Third argument from example. On pages 27-28 appears the argument that since the discourse—

My brother became a priest because he attended Catholic school, took pleasure and comfort in reading the Bible, and had warm and loving relationships with the priests he knew.

—would be "a fairly good explanation" but not a good justificatory argument, whether a discourse is an explanation or a justificatory argument makes a difference to how we evaluate it.

But again the explanation is no better than the justificatory argument. For other males attended Catholic school, took pleasure and comfort in reading the Bible, had warm and loving relationships with the priests they knew, but did not become priests. So why was it different with the speaker's brother? Why did he become a priest rather than any of the things that other males with his background became? An explanation fails if its explanans does not explain why its explanandum is true rather than false, and that is why this explanation fails. If the explanation were strengthened by the addition of other propositions, the same propositions could be added to the corresponding justificatory argument, probably

strengthening it equally. So, the third argument from example contains the false premise that the explanation would be better than its corresponding justificatory argument.

Fourth argument from example. Finally, on page 28 appears the argument that if explanations were justificatory arguments, some discourses that otherwise would be strong justificatory arguments might have to be so analyzed that they become weak justificatory arguments, contrary to the principle of charity. For instance, if in the discourse—

(1) (a) There has been a resurgence of German measles lately, because (b) parents have become more lax about having their children vaccinated. Therefore, (2) the incidence of measles can be reduced by making sure that children get their vaccinations.

—the whole first sentence (1) were interpreted not only as expressing a reason for the conclusion (2) but also as being an explanation (in which (b) explains (a)), rather than a justificatory argument, then the proper analysis of the reasoning in the whole discourse would be—

ANALYSIS 1

Premise. There has been a resurgence of German measles lately, because parents have become more lax about having their children vaccinated.

Conclusion. The incidence of measles can be reduced by making sure that children get their vaccinations.

—, which would be a strong justificatory argument. But if that first sentence were interpreted as expressing a justificatory argument whose premise is (b) and whose conclusion is (a), then the proper analysis of the reasoning in the whole discourse might be—

ANALYSIS 2

Argument 1

Premise. Parents have become more lax about having their children vaccinated.

Conclusion. There has been a resurgence of German measles lately.

Argument 2

Premise. There has been a resurgence of German measles lately.

Conclusion. The incidence of measles can be reduced by making sure that children get their vaccinations.

—, which would be a chain of weak justificatory arguments, because the conclusion of neither argument is made even probable by its premise. Therefore, an explanation is not a justificatory argument, and it makes a difference to the evaluation of the whole discourse whether its first sentence is an explanation or a justificatory argument.

Although it must be conceded that the supposition that explanations are justificatory arguments does not justify the correct choice of Analysis 1 over Analysis 2, this concession does not discredit the supposition. For the reason for preferring Analysis 1 to Analysis 2 is independent of whether explanations are justificatory arguments. To see that this is so, consider a similar choice confined to justificatory arguments.

Let the discourse be:

The fact that Socrates was a philosopher proves that someone was a philosopher. It follows that some fact concerning Socrates proves that someone was a philosopher.

If the whole first sentence were interpreted as expressing a reason for the conclusion, then the proper analysis of the reasoning in the whole discourse would be:

ANALYSIS 1'

Premise. The fact that Socrates was a philosopher proves that someone was a philosopher.

Conclusion. Some fact concerning Socrates proves that someone was a philosopher.

—which would be a conclusive justificatory argument. But if that first sentence were in-

terpreted as expressing an argument, with a premise and conclusion of its own, then the proper analysis of the reasoning in the whole discourse might be—

ANALYSIS 2'

Argument 1

Premise. Socrates was a philosopher.

Conclusion. Someone was a philosopher.

Argument 2

Premise. Someone was a philosopher.

Conclusion. Some fact concerning Socrates proves that someone was a philosopher.

In Analysis 2', Argument 2 would be weak, because its premise is irrelevant to its conclusion. Since no explanations are involved here, whether explanations are justificatory arguments can have no bearing on the choice between Analyses 1' and 2'. To choose between these rival analyses we must ascertain which analysis the arguer is more likely to have had in mind, and to that question the greater logical strength of Analysis 1' is relevant. The similar choice between Analyses 1 and 2 is made on similar grounds: whether explanations are justificatory arguments has nothing to do with it. Consequently, the supposition that explanations are justificatory arguments is not discredited by its failure to justify the correct choice of Analysis 1 over Analysis 2. This undermines the fourth and last argument from example.

I conclude that none of Professor Kasachkoff's arguments shows that the evaluation of a discourse is affected by whether the discourse is an explanation or a justificatory argument.

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Who Needs a Theory of Informal Logic?

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Aside from the word “philosophy” itself, there are surely no other terms in a philosopher’s lexicon richer in connotation and (therefore) more perilous to work with than the three words “logic”, “theory”, and “truth.” Knowing “logic” can be made to fit both Hegel’s exposition of the Absolute (as in the *Wissenschaft der Logik*) and a textbook tabulation of $(P \rightarrow Q)$, one ought to be forewarned that the topic of logic is an invitation to crossed purposes. Knowing “theory” has been used to categorize such diverse schemes as Plato’s ideal forms and Frege’s treatment of arithmetic, one should be doubly cautious when it comes to talking about theories of logic. But though “truth” is no less treacherous, the truth at least appears to be that something has, indeed, gone wrong with logic and the way we theorize about it. Truth beckons, as it were, and what it seems to call for is, at that, an adequate theory of logic—however perilous the undertaking.

I do not have one. What I have to offer is, instead, only something in the way of insight as to what the issues are, and why an adequate theory of logic is imperative, and why the three terms “logic”, “theory”, and “truth” are worthy of further reflection. As to what an adequate theory of logic might even look like, I do not know. (Who does?) For the reasons I proposed in an earlier bit of speculation, I think it will require concern for subject matter that formal logic does not exhibit.¹ I also think it will require a different way of dealing with the verbal patterns of ordinary language, for the kind of reasons Roderic Girle set forth in his reaction to my earlier claims.² But most of all I now think that it

will require addressing a serious problem about truth—a problem I shall sketch in dealing with what Girle has written and in trying to advance the issues one step further.

Girle has claimed that what I wrote amounted to the following challenge: “it is not possible to teach both informal and formal logic and to be theoretically consistent.” I don’t think that is the challenge, at least not yet. And, alas, it is certainly not the one which I intended. What I claimed (and still claim) is that the theory of formal logic does not fit the way we actually reason, and that seeing why it doesn’t may lead to a theory which does. As a matter of contrast, an alternative theory would no doubt be thought of as informal. Such a theory has not yet emerged. Nor is it clear yet what informal logic as a whole amounts to, and thus not clear how it will or will not intersect with formal logic. Until a comprehensive theory of informal logic has been put together, it would be premature to see the challenge as Girle sees it.

In fact, it may well be that teaching informal logic and formal logic together is the surest way to bring about an adequate theory of logic, for that may be the best way to see what is wrong with formal logic. In physics, after all, we introduce a student to Newtonian mechanics as a prelude to the understanding of (and as a way of seeing the need for) relativistic mechanics. That is only a pedagogical point, however, and a tedious one at that. The real issue here is more philosophical: how are those of us who think about logic (as well as teach it) to make sense of the role it plays in actual reasoning? I have claimed that the *theory* of formal logic fails us in this effort. In

defending formal logic, Girle evidently wishes to interpret it not as a theory at all, but something else. The subject is, indeed, an invitation to crossed purposes.

Still, the claims Girle makes are provocative. And our disagreement may cast light on what an adequate theory of logic would involve. For it turns on the three key terms in question—to start with, on the notion of what a theory is *for*.

In its evolution from the Greek *theoria*, “theory” still retains at least a hint of what the Greeks evidently had in mind: a way of seeing things, not just in the manner of visual perception but in terms of understanding things, of making sense of things. Given the way Greek drama served to educate, it is hardly a coincidence that the word “theater” thus evolved out of the same idea that led to “theory”. Equally telling is the fact that in the earliest stages of their search for wisdom, Greek philosophers (trying to understand the world, and thus theorizing, in the original sense of what that meant) were evidently not yet conscious of some underlying sense of logic, and certainly not yet aware of any rules of logical inference. First *theoria*, and only later *logos*; and only later still, a theory of logic.

To see how theorizing (in the Greek sense) can precede the awareness of any logical methodology whatsoever, one need only reflect on a matter the ancient Hebrews treated as a bit of wisdom: the tale told in the Book of Job. A brief reconstruction of that tale may also help to clarify what Girle and I evidently disagree about concerning the need for (and the nature of) a theory of logic and the usefulness of formal symbolism. For, ironically, the reconstruction of Job’s plight is best accommodated by such symbolism, even though the theory from which it comes could not have been, by any means, a factor in Job’s own attempt to understand his plight. This pre-theoretical usefulness of symbols is more than just ironic; it can be instructive as well.

Job, as we are told in the prologue to his book, has been chosen for a bit of divine

testing. Despite his sinless, truly virtuous behavior, he is abruptly made to suffer (his fortune is destroyed, his children are killed, his health is ruined, etc.) merely to prove that good men don’t love God just for the benefits that brings. Job, who does not know that he is being tested, endures all this in silence—until his neighbors, equally pious and equally uninformed, come to comfort Job and wind up nagging him into a quarrel about the reasons *why* he has been made to suffer. He must have done *something* truly evil, they insist; why else would God cause such terrible things to happen to him? Why else would God punish him so? Job is thus drawn into a lengthy argument (an early excursion into critical thinking, actually) which slowly reveals what he believes about himself, and God, and so on. The dialogue makes it clear he is himself bewildered. What has happened makes no sense to Job. And no wonder; the things which he believes are logically inconsistent.

Extracted from the dialogue, and then rephrased and simplified as true/false propositions, what Job believes can best be shown to be self-contradictory by introducing elementary symbolism. For he evidently believes that:

1. God causes everything that happens: G
2. He, Job, is suffering: S
3. If God causes everything that happens and Job is suffering, then God is causing Job to suffer: (G&S) → C
4. God is just: J
5. If God is just, then God causes only the wicked to suffer: (J → O)
6. If God is causing Job to suffer and God causes only the wicked to suffer, then Job must be wicked: (C&O) → W

7. Job has done nothing
sinful: -D
8. If Job has done
nothing sinful, then
Job must not be
wicked: (-D \rightarrow -W)

Now, with his different beliefs arranged in such a manner, it can be seen quite clearly how the first six would lead Job to realize that he must be wicked (W), while the last two would lead with equal force to -W, he is *not* wicked. These two conflicting paths of reasoning on his part can be displayed as follows:

- (i) $(G \ \& \ S \ \& \ ((G \ \& \ S) \ \rightarrow \ C) \ \& \ J \ \& \ (J \ \rightarrow \ O) \ \& \ ((C \ \& \ O) \ \rightarrow \ W)) \ \rightarrow \ W$
- (ii) $(-D \ \& \ (-D \ \rightarrow \ -W)) \ \rightarrow \ -W$

Now it can be seen why Job is so bewildered: the things which he believes are true cannot *be* true, not all of them. For, in terms of formal logic, both arguments are valid (if their premises are true, their conclusions must be true). But the two conclusions cannot both be true (they are contradictory). So one of the arguments must be unsound (must contain a false premise). And so one or more of Job's beliefs must not be true. Formal logic can, indeed, be useful. Moreover, formal logic of this sort can both illuminate the way Job wrestled with this contradiction *and* the way in which the puzzle here was dealt with by the introduction of a theory in the Book of Job.

In arguing with his so-called "comforters" (Bildad, Eliphaz, and Zophar), Job tries to find an explanation for his plight. So do the comforters. They claim he must have sinned; in effect, they argue that -D is false. He toys with the thought that God may not be just—in effect, that J is false. Having boiled the matter down to basic propositions, one can see by way of formal logic that *any* explanation will require denying one of Job's presuppositions. But nothing works for Job; the argument rages on; after all, Job really does *believe* -D, and J, and all these other things. In anger, Job

cries out to God for an explanation, is chastised by The Voice in the Whirlwind for this bold presumption on his part, and so repents the sin he has thus now committed (to seek to understand God's work is vanity, i.e., the sin of pride). In the end, exhausted and repentant, Job turns away from any further effort to make sense of things.

But that is not the end of his book. In its evolution, someone evidently *did* tack on an explanation: the theory—for that is what it is—that Job is being tested. It is in the prologue and the epilogue (written in a style quite different from the dialogue itself³) that we are told the story which explains away the proposition symbolized as $(J \rightarrow O)$. God *is* just. (As we are told in the epilogue, Job's fortune is restored, etc.) But God does *not* cause only the wicked to suffer; to test their faith, God will allow the innocent to suffer, too. And then, if they pass the test, will reward them.

Theology aside for the moment, it should be obvious that the story told in the prologue to the Book of Job is, at that, a theory—at least in the sense of what the Greeks meant by *theoria*. It is an effort to see something clearly, to make sense of something, to understand it, to explain it—the something no doubt being, in this case, the prolonged suffering of the Hebrew people as a whole. Given the logical reconstruction of the beliefs involved, it should be equally obvious why a theory was needed. When one is in the grips of a puzzle brought about by inconsistent beliefs, beliefs which are indeed self-contradictory, things won't *make* sense until a theory is worked out, until an explanation can be found which will resolve the contradiction. Someone among the ancient Hebrews evidently sensed this.

The fact that the puzzle embedded in Job's tale was taken seriously is surely testimony to a primitive awareness, on the part of the ancient Hebrews, of what we now call "the law of contradiction"—the law we now set forth as simply $-(P \ \& \ -P)$. One might claim that the treatment of this

puzzle in the Book of Job is also evidence of some fundamental, intuitive sense of rationality shared by all human beings. I won't. But I do submit that the Book of Job has something to tell us about such rationality—namely, that its goal is not just the resolution of such puzzles, but the uncovering of *truth*. Whoever wrote the prologue to the Book of Job was certainly reasoning and, for better or for worse, was trying to solve a puzzle; he (or she) was also trying to figure out *the* reason why the innocent suffer.

Looking back, with a theory of logic now at hand, we can see that. It is a genuine virtue of the theory of elementary formal logic that it can help us to see that. Using symbols we can understand more clearly what Job's puzzle was. But we should be cautious about the theory behind the symbols. We may prefer to think that humans suffer for rather different reasons, and that the story told in the Book of Job is only a matter of mythology. But we are not likely to concede that it is, indeed, *just* a matter of preference as to whether or not the explanation which it offers is true. The trouble with theory of formal logic is that it leaves us more or less in that position.

In the more secular world of modern academia, when faced with puzzles we, too, set out to theorize and work out explanations. The puzzles are not always easy to articulate, much less resolve. For example, the special theory of relativity resolved a contradiction which had, in turn, emerged (by way of Maxwell's four equations) inside still another theory, the theory of electromagnetism—and even then the original puzzle was not easy to identify.⁴ And so it goes with theorizing. Our many ways of understanding and explaining things overlap and intertwine, so much so that it is not easy to see, sometimes, whether a given claim is or isn't the outcome of a theory. Or how the theories we inherit are themselves the source of much that puzzle us. Or even what it *is* that really puzzles us.

What is it that disturbs us about moral

relativism, for example? Or about the perception of material objects? Or about formal logic, in particular? Whatever it is, if there *is* a contradiction in the things we believe about such logic, it is certainly not available in some compact tale like Job's. Nor, evidently, can it be set forth in such a compact way, at least not without disagreement. The things which we believe about formal logic are too entangled with other matters—the way a natural language works, for example, as well as the nature of human reasoning—and the many things our different theories have led us to believe about *those* matters. These things cannot be neatly separated, either. Girle and I do not even agree, for instance, about the way in which formal logic is related to the study of reasoning—much less the way in which a problem about reasoning has emerged. It is no wonder that we disagree, then, about the need for (and the nature of) some alternative theory.

To wit: in writing about the need for an alternative theory, I claimed earlier that what we now call “formal logic” is, indeed, a theory of reasoning—specifically the theory that “correct reasoning is (reasoning) in accordance with a demonstrably valid inference pattern”—and, moreover, that it is, as a theory of reasoning, fundamentally wrong. Girle claims that my characterization of formal logic is misleading, and also doubts that “many formal logicians would hold to such a narrow view” of what formal logic is. In separate correspondence, Harvey Siegel tells me that he thinks my notion of formal logic is simply mistaken. “Formal logic is not an incorrect theory of reasoning”, Siegel tells me, “because it is not a theory of reasoning at all.” (Like Job, I too have my comforters.) I take it that their joint denial (of the way in which I characterized formal logic) is a sign that we are entangled in a problem that has been, so far, too deep to be identified. For:

Not to quarrel, but the evidence *does* seem otherwise. Copi's text begins, for

instance, with the claim that "Logic is the study of the methods and principles used to distinguish good (correct) from bad (incorrect) reasoning."⁵ Suppes tells us that "A correct piece of reasoning, whether in mathematics, physics, or casual conversation, is valid by virtue of its logical form."⁶ And in the text by Kalish, Montague, and Mar we are told that "an English argument is valid... if and only if it has... a valid symbolization."⁷ These quotes have been assembled more or less at random. Admittedly, "theory" is a treacherous term, but insofar as a theory is a way of understanding and explaining something (in this case, how reasoning is related to logic), such textbook claims surely illustrate a widespread acceptance of the characterization which I started with. To deny that characterization is, I think, to avoid a genuine problem. For there is something amiss in formal logic—something which not only impinges on our grasp of reasoning, but also generates a serious contradiction in our reasoning.

As Girle correctly isolates it, the flaw in the theory of formal logic is embedded in the structural treatment of conditionals—and thus in the transformation rules for arriving at the denial of a conditional. The rules themselves grow out of the tabular treatment of conditionals. It is also in such tables that we see the sense in which formal logic does involve a theory of reasoning. Resting as it does on an assumption that the truth of an "if...then" statement is determined wholly by the truth value of the separate propositions which make up its antecedent and its consequent, the table for $(P \rightarrow Q)$ tells us quite precisely, even if erroneously, the conditions under which an "if...then" statement will and won't be true. Since it does not matter what actual propositions are represented by the symbols P and Q, the table thus explains what makes any given case of "if...then" reasoning logically correct. It also explains, once we learn how to read it, what we have to do to deny any given "if...then" claim. Hence

the transformation rules which follow, and also the sense in which there appears to be a theory at work here: a systematic explanation of what it is to reason logically and correctly. As well as a source of anomalies.

I argued earlier that the rules which call for turning $-(P \rightarrow Q)$ into $(P \& \neg Q)$ result in English language transformations that run counter to linguistic meaning and result in factual absurdities. Since denying a conditional would require the affirmation of its antecedent, to deny the claim that "If the South had won the Civil War, then slavery would have been abolished, anyway" would require asserting that the South *did* win the war, etc. It is to save it from anomalies of this sort that Girle has argued in reply that formal logic is not a theory of reasoning at all, but something rather different:

(1) Girle claims formal logic, which he calls PL (i.e., propositional logic) is just an "artificial" language, governed by its own semantic rules, separate from a natural language such as English.

(2) He proposes that the symbolizing of an English language argument be thought of as a process of "translating" into PL, *not* as a way of exhibiting some underlying form or pattern inherent in the English language argument itself.

(3) He argues that in PL "there is no sentence of the form $-(p * q)$ which is equivalent to 'it's not the case that if p then q'" and means, I take it (quite aside from my amusement at such pidgin PL talk) that whatever logic is involved in the English language denial of an "if...then" claim, that logic is not replicated in PL.

Moreover, Girle adds, "There is no remedy in classical logic for this lack of equivalence." If so, so be it, but if formal logic (or PL, or whatever it is to be called) cannot accommodate this business of denying conditionals, that is hardly a trivial matter. Were it not so crucial I might claim, in English, that "If Girle is right about PL, then PL is a language for the logically retarded" and let *him* fret about the logic he might call on in denying *that*; by his own

admission, PL could not rescue him. But that would be to tease, and the fact is that in natural language argumentation the denial of conditionals is no joking matter. “If...then” claims are fundamental to the way we argue and support conclusions. Their denial is a crucial factor in avoiding false conclusions. Without some way of understanding how to manage these denials, we would be at the mercy of illicit reasoning.

That this is serious business can be seen by looking at the way an attorney proceeds in defending a client against conviction.⁸ It is also obvious in the way the problem of suffering was dealt with in the Book of Job. As reconstructed earlier, that problem (no laughing matter for the faithful, to be sure) grew out of inconsistent beliefs, and was resolved by way of a theory which did away with one of those beliefs—a belief which was in fact set forth as a conditional, the “if...then” proposition symbolized as ($J \rightarrow O$).

That reconstruction showed how useful it can be to symbolize an argument. Such symbolizing often helps to clarify the premises from which we draw conclusions, and thus can help to clarify our thinking. That reconstruction also showed, implicitly, a worthwhile fact about the formal logic which has come to be associated with such symbols: it grows out of a legitimate insight into “if...then” claims and their negations. The theory which denied ($J \rightarrow O$) both affirmed J (by proclaiming that the faithful are rewarded) and denied O (by explaining why the innocent are made to suffer) and *of course* if J is true and O is false then ($J \rightarrow O$) itself is false. That much is inherent in the English language meaning of such “if...then” claims. But the theory of formal logic then distorts such insight, commencing with the truth-table treatment of conditionals.

That table forces us to attribute truth to propositional combinations which may not even be intelligible, much less true. The presuppositions it is based on lead to rules

which do not fit the way we reason in the confines of a natural language. Girle is willing to treat PL as an artificial language which obeys its own inherent rules, and so avoids what I take to be a serious problem. For I do, indeed, take formal logic to involve a theory of reasoning—a systematic effort to make sense of what it is to reason logically, as well as an explanation for a puzzle we have now forgotten.⁹ I also think it is, as a theory of reasoning, quite misleading. Perhaps it is not wrong in the way I earlier claimed, or seemed to claim, in writing the things to which Girle responded. But wrong, even so, and in a far more serious manner than what Girle and I have so far argued about; it is wrong in the way it can mislead us in the search for truth.

If Girle is right that PL is just another language, then it is not wrong in any serious sense at all, any more than the German language is wrong. Still, in the same sense that it would be wrong to believe we must speak German if we are to speak correctly (and must understand the rules of German grammar if we are to understand what it is to speak correctly, etc.) it would be wrong to believe that we must reason in the manner PL dictates if we are to reason correctly. But, once again, and as tedious as it may be to repeat it, that is what formal logic as a theory of reasoning calls for. That is why it can mislead us in the effort to arrive at truth by means of reasoning, and why I take it that the status of formal logic is a serious matter. For I also take it that our concern for logical reasoning is, at bottom, a concern for nothing *less* than truth.

In the quest for truth, our reasoning has unfortunately drawn us into a problem which now undermines our confidence in reasoning itself. We still think of truth as something independent of the way we reason in the effort to discover it (the truth about the structure of the atom, for example). But more and more, we have been led to fear that what we think is true is only relative to the assumptions which we make in reasoning (the presuppositions which

pervade the theory of atomic structure, for example). Hence the modern problem of relativism: on one hand truth is independent of our reasoning, on the other hand it isn't. Like Job, we have become entangled in a contradiction.

Unlike Job's dilemma, however, our problem can't be dealt with by the mere invention of a theory. For, as much as anything else, the problem of relativism is a problem *about* theories. That is something else the reconstruction of Job's contradiction brings to light. It is easy to see how Job's dilemma is resolved by denying one of the premises in the two conflicting lines of reasoning which engrossed him; it is also easy to see that the theory which achieved that end, and which solved the ancient Hebrew problem of suffering, could itself be reconstructed as a valid argument; if we add to the earlier symbols two more new ones (T for "God tests the faith of innocent humans by causing them to suffer" and R for "God rewards those who remain faithful in the midst of suffering") we can even put it together:

$$(T \ \& \ (T \rightarrow -O) \ \& \\ R \ \& \ (R \rightarrow J)) \rightarrow (J \ \& \ -O)$$

Having done so, we can see exactly how Job's problem could be resolved by proving (J & -O). But seeing that would hardly amount to a revelation. It would hardly lead a sceptic to have second thoughts about religion. It should, however, lead to a bit of insight into how the problem of relativism has something to do with the theory of formal logic.

Job's dilemma (along with the testing theory that resolved it, along with the whole conceptual scheme behind it) can be dismissed as fable, as sheer mythology. It can also be embraced as truth—the Gospel truth, as some would have it. Still, we *don't* want to say that truth is a matter of faith. Or that what J and -O represent may be true for some and false for others, depending on the way they see things. We don't want to say that truth is a matter of opinion, or that

the way we understand things is relative to some set of presuppositions. We want the way we understand things and explain things to be *true*, period.

It would be excessive to attribute what disturbs us solely to the effect which the theory of formal logic has had upon our reasoning. The problem of relativism grows out of far too many other interrelated matters, not the least of which is a concern for whether scientific methods can uncover truth. Still, formal logic has been a major factor in the emergence of the problem of relativism. For *as a theory of reasoning*, the theory of formal logic is far more than just a matter of imposing symbols and constructing truth-tables.

It tells us if we are to reason we must put together structured arguments; it shows us that we can't be sure of a conclusion unless sure of all the premises behind it; it forces us to realize that such premises therefore require still other arguments; and so on, until sooner or later, caught in what appears to be an infinite regression, we are also led to fear our reasoning cannot ever end in certainty.¹⁰ It is no wonder that in using formal logic to account for scientific method. Popper thus proposed that scientific laws and theories can't be verified, that scientific truth is therefore only an illusion. Nor any wonder Kuhn proposed that science rests, instead, on "paradigms"—thus fueling the bizarre temptation to see *science itself* as proof that truth is only relative.

Nor is it any wonder, finally, that we need a theory of logic which will help us solve the problem of relativism. A theory which will provide a different and more accurate way of making sense of what it is to reason. A theory which does justice to the search for truth. In short, a theory quite unlike the one we have by way of formal logic: a theory which would be non-formal. What has been accomplished so far in the exploration of informal logic points in this direction. What is needed, I propose, is further insight into how the problem of relativism can be met by means of such

informal logic. The issues Girle and I have been entangled in are but a prelude to the recognition that this problem, which is a puzzle about truth, is embedded in a theory of logic which has failed us.

Logos is, of course, a Greek conception, an innovation in the search for truth and wisdom—and in reaction to an earlier problem about reasoning, a matter of *theoria*, to be sure. The underlying problem for the Greeks runs like a thread through Plato's work: it was the reasoning of the sophists. The way the sophists reasoned *appeared* to lead to wisdom, but what it led to could not

really *be* wisdom. As Aristotle put it, "the art of the sophist is the semblance of wisdom without the reality". Hence the effort to encompass *logos* in the theory of the syllogism. *Logos* may seem rather mystical in retrospect, and the theory of the syllogism quite misleading. There is nothing mystical about the way our own attempt to reason has resulted in a problem, nor about the modern need for making better sense of logic. Nor in the claim that in the search for truth and wisdom, the theory of formal logic has been quite misleading also.

Notes

- ¹ See my "Three Steps Toward A Theory of Informal Logic", *Informal Logic*, vii, 1985, p. 127-135.
- ² See his "Reasoning With Both Informal And Formal Logic", *Informal Logic*, x, 1988, pp. 50-54.
- ³ See Bernard Anderson, *Understanding The Old Testament*, Prentice Hall, 2nd. ed., 1966, pp. 506-521.
- ⁴ Physics textbooks typically characterize the special theory of relativity as Einstein's response to the outcome of the Michelson-Morley experiment, rather than a resolution of the problems which grew out of Maxwell's equations; I think similar distortions in the writing of the history of philosophy have blurred our understanding of the theory of formal logic. See Gerald Holton, *Thematic Origins of Scientific Thought*, Harvard, 1973, pp. 272-286.
- ⁵ Irving M. Copi, *Introduction to Logic*, MacMillan, 7th ed., 1986, p. 3.
- ⁶ Patrick Suppes, *Introduction to Logic*, D. Van Nostrand, 1957, p. xvi.
- ⁷ Donald Kalish, *et al.*, *Logic: Techniques of Formal Reasoning*, Harcourt, Brace Janovich, 1980, p. xiii.
- ⁸ Suppose, for the sake of simplicity, E represents the composite statement of all the evidence relevant to some given crime, and that G stands for "Smith is guilty"; both prosecution and defense agree concerning E; the prosecution sets out to prove (E \rightarrow G); the defense sets out to prove \neg (E \rightarrow G); given that Smith is innocent until proven guilty, the defense does *not* have to prove \neg G in order to deny (E \rightarrow G) and save Smith from conviction—a point which illustrates, again, the failure of the rules of informal logic to match real-world reasoning.
- ⁹ I have in mind the kind of puzzle which emerged in early 19th Century mathematics with regard to proof theory, and which led by way of Boole to "mathematical logic", "symbolic logic", etc.; *of course* Girle's version of PL can be applied to the subject matter of mathematics, as he points out, since it grows out of the effort to theorize about the logical foundations of mathematics in the first place; that philosophers have been so entranced by such formal systems is further evidence of how theories overlap and intertwine—and also, I think, evidence that the history of philosophy is not altogether rational.
- ¹⁰ At some point or other, two difficulties stand in the way of bringing this regression to a halt: scepticism with regard to sense-perception and the problem of induction. While formal logic may not be the source of either of these difficulties, the reasoning structure which it calls for is what forces us to take them seriously.

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