For a Realistic Logic

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I. The Criteria of the Logical

WHAT SORT of a logic is appropriate to, or perhaps is demanded by, a realistic philosophy of the sort advocated in this volume?

At first, such a question may seem impertinent and even preposterous. For most of us simply are not accustomed to thinking of logic as being the sort of thing that is cut to the pattern of anything so insignificant as a mere philosophy. Much rather would logic seem to be something autonomous and independent: Logic is logic, no matter what may be one's philosophy. Indeed, so far from philosophy's determining the nature and character of logic, it would nowadays seem much rather to be a case of mathematical or symbolic logic's determining the nature and character of philosophy. For it is as if logic were simply a fact and philosophy could do little more than make the most of it. For that matter, need one add that many contemporary philosophers actually do seem to do little more than make the most of logic?

Nor would the case seem to be otherwise with what throughout the last few centuries has usually been called Aristotelian logic. Thus one hardly needs to be reminded of Kant's celebrated pronouncement concerning this sort of logic, namely, that "since Aristotle it has not required to retrace a single step"; indeed, "to the present day this logic has not been able to advance a single step, and is thus to all appearance a closed and completed body of doctrine."[1] True, Kant continues, although "some of the moderns have thought to enlarge it by introducing *psychological ..., metaphysical ...,*

[1] *Critique of Pure Reason,* trans. by Norman K. Smith (London, Macmillan, 1929), Preface to 2nd ed., B viii.

or *anthropological* chapters ..., this could only arise from their ignorance of the peculiar nature of logical science." For "the sole concern" of logic being "to give an exhaustive exposition and a strict proof of the formal rules of all thought,"[2] it makes no difference, presumably, what one's psychology or metaphysics or anthropology may be; logic must perforce be always the same and invariant.

In other words, on Kant's account, Aristotelian logic is not something that is in any way adapted or appropriate to a peculiar kind of philosophy. On the contrary, it is a wholly independent formal science.[3] And such, too, is the way most logicians today would regard logic, Aristotelian or otherwise. To be sure, we have all doubtless heard of the expression "idealistic logic," but since it is now the fashion simply to sneer at anything of the sort, it is not surprising that very few should have stopped to consider that the very name "idealistic logic" suggests that logic may not be so independent of philosophy after all.

But be that as it may, we propose in this present paper to run directly counter to the prevailing habits of regarding logic as somehow autonomous and sufficient unto itself. Instead, we are going to suggest that on the basis of the realist platform appended to this volume, we can show both what sort of logic it is that is appropriate to such a realistic philosophy, and also that such a realistic logic is radically different both from mathematical logic and from Aristotelian logic as this is ordinarily conceived.[4]

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[2] *Ibid.*

[3] We do not mean to imply that this interpretation of Aristotelian logic is necessarily the correct one; all we mean is that it is the current and common one. Indeed, for the last three centuries or so, the term "Aristotelian logic" has tended to signify a purely formal logic, these "forms" being considered quite apart from any intentional function which they might happen to have. Rather than attempt to revise this conception of Aristotelian logic or to consider whether it is just either to Aristotle or to the Aristotelian tradition, we propose simply to accept it at its face value. For whether genuinely Aristotelian or not, such a logic, we think, is quite ill-adapted to the purposes of a genuinely realistic philosophy.

[4] It is well known that mathematical logicians do not consider that the new logic is in any way contradictory to Aristotelian logic. Quite the contrary. it is merely more extensive and comprehensive, with the result that the older logic can be simply taken up into and absorbed by, the new. Again (see the preceding note), we do not in this paper wish to challenge this view of the relation between mathematical logic and so-called Aristotelian logic. On the contrary, as the latter has generally come to be conceived and understood,

Thus consider the two basic realistic theses:

1. There are beings that are and are what they are independently of their being known.
2. Human beings are able to acquire some knowledge of such beings as they really are in themselves and not merely as they are relatively to their being known.

Now granting these two theses, the nature and function of logic would therewith seem determined and defined. For as to its function, logic on such a basis would be regarded simply as the tool or instrument through which human beings could acquire precisely this sort of realistic knowledge of things as they are really and in themselves. And such being the function of logic, the nature of the logical tools and instruments that are requisite for the performance of such a function can also be determined.

Thus for one thing, such logical entities as propositions, argument forms, predicate terms, and so forth would not be ordinary real beings but rather the sorts of things through which such real beings could come to be known. That is to say, one would hardly expect that a proposition, for instance, would exist or would ever be encountered *in rerum natura* in quite the same manner as an electron or a jellyfish. No, propositions just do not have that kind of existence. Instead, they are unmistakably *intellectual* tools and hence are quite incapable of existing apart from psychological processes of cognition or out of the context of human cognitive behavior. In this sense, indeed, they might be said to be mere beings of reason, or *entia rationis,* to use a Scholastic term.

At the same time, they are not mere fictions arbitrarily invented or conjured up at will. Instead, they have to be wholly fitted and adapted to their function of disclosing or representing things other than themselves, precisely as these latter are really and in themselves. Consequently, such logical entities may be said to have a foundation in reality in the sense that they cannot be rightly understood save with reference to the real which they are thus designed to represent.

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the mathematical logician is quite correct in supposing that Aristotelian formal logic represents but an insignificant part of mathematical logic. Our point is rather that a realistic logic must differ radically from both mathematical logic and Aristotelian logic *as so understood.*

And this brings us to a third feature of these logical instruments of a realistic philosophy. Thus on the one hand, being only beings of reason, these logical entities are not to be confounded with the real beings which they are supposed to represent. On the other hand, being wholly ordered to the representation of the real, these beings of reason can only be understood with reference to what they are thus fitted to disclose. But now on the basis of these two determinations we can recognize the third feature, and that is that these logical entities must needs have a peculiarly neutral or almost transparent character about them; for only so could they serve to represent or signify what is other than themselves as it is in itself.

Or to put the same thing a little differently, we might say that logical entities are peculiar precisely in that they are nothing but "intentions," their whole nature and structure being that of a thing which "tends toward" something else or which is wholly and completely of or about something else. It is in this sense that we say they must have such a character as will render them completely transparent or wholly representative of that which is other than themselves, or, to use the technical term, will render them completely intentional.[5]

Very well, but if such be the criteria of the logical, considered from the point of view of philosophical realism, can we produce any examples of such peculiarly logical or intentional entities? We think we can. Indeed, we think that those very entities — concepts, propositions, and arguments — which have always been thought to be in some sense or other the proper concern of logic — these very entities, we think, may be shown to be capable of functioning as intentions and to meet, when viewed in a certain way, all the requirements that a realistic philosophy lays down for logical tools and instruments.

Thus we have already intimated how such things as concepts, propositions, and arguments are mere beings of reason rather than real beings. That is to say, such things as syllogisms or universal concepts certainly do not have an existence *in rerum natura* comparable to that of ordinary natural objects. Instead, such being or existence as they have would seem inseparable from the context of knowing and of human cognitive

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[5] On this notion of intentionality, see Francis Parker, "Realistic Epistemology" (thornwalker.com/recoveries/epistemology.pdf), pp. 8 ff.; in *The Return to Reason,* John Wild, ed. (hereafter "in Wild") (Chicago, Henry Regnery Company, 1953), pp. 158 ff.; also the essay by Harmon Chapman, "Realism and Phenomenology," in Wild, pp. 22 ff.

operations. But further, concepts, propositions, and arguments are certainly intentions, in the sense in which we are using that term. Thus a concept, for example, is necessarily the concept *of* something; a proposition is perforce *about* something; an argument is always *in demonstration of* something. Indeed, if a concept were not thus of something — that is, if in a concept nothing were conceived — one simply would not have a concept. Or likewise, a proposition which was not about anything, or which propounded nothing, would not be a proposition.

In this respect, indeed, these peculiarly intentional or logical entities are quite different from ordinary real beings. Thus a tree or a jellyfish or the color yellow or the relation "greater than" are none of them of or about anything else. They are just themselves. For instance, what is it that a jellyfish is about anyway? To be sure, the concept of a jellyfish is of or about it; but it itself is not of or about anything else. And likewise with the relation "greater than." When one thing is greater than another, one certainly does not consider that such a relation of one thing to another is of or about something else. No, as a real fact in nature, it is wholly nonrepresentative or nonintentional. Of course, it may be represented or be intended — for instance in a concept of it or in a proposition about it — but it itself is not a representation or an intention at all.

Moreover, having this peculiar character of intentionality, it would follow that intentional entities like concepts, propositions, and arguments, considered precisely as intentions, would have a very different nature and structure from the ordinary real (and hence nonintentional) beings which they are designed to represent. Nevertheless, such a contention, however plausible it might seem to be just in itself, has implications which, as we shall see presently, run directly counter to some of the most fundamental presuppositions of modern logic. Thus how often are we told, for example, that logical forms and structures must somehow reflect or resemble or be "isomorphic with" the forms and structures of the corresponding real facts? Particularly with respect to relational patterns and structures, it is often urged that the relational structures of things must somehow be mirrored by the relational structures of logic.

And yet if logical entities are simply intentions, and if intentionality is a peculiar and distinctive property of logical entities just as such, then it would seem that the nature and character of an intention would have to be very different from that of its intended object. In fact, if by way of example we

consider the concept "greater than," anyone would readily recognize that it is a concept of a certain relation; and yet he would also recognize just as readily that its own character and structure, just as a concept, is certainly not one of being greater than something else.

So also as regards propositions and arguments, we shall seek to maintain that as intentions these logical instruments must be able to represent certain features of reality as they are in reality. And yet for the very reason that they are thus representative, we shall also insist that their nature and structure as thus representative must needs be quite different from the nature and structure of what they serve to represent.

Of course, it remains for us to show just what this peculiar structure is that intentional entities have and that nonintentional entities do not have. But this is something we must consider later. For the present we merely hope that we have been able to make our main thesis at least in part plausible, namely, that logical entities like concepts, propositions, and arguments are (1) beings of reason rather than real beings and (2) intentional beings rather than nonintentional beings, with the result that their structure as intent ions is presumably quite different from the structure of that which is intended in and through them.

Nevertheless, there is still a third criterion of the logical which, as we said, would seem to be demanded by a realistic philosophy and which still needs to be exhibited with respect to the three varieties of logical entities, namely, concepts, propositions, and arguments. Now by this third criterion, logical entities, although, as intentions and mere beings of reason, they are quite different from real beings, still as beings whose whole being is designed and adapted for the disclosure and representation of the real, they cannot well be understood without reference to the real which they are thus ordered to intend or represent. In this sense, as we remarked, logical entities are different from mere fictions in that they have a certain foundation in the real.

Very well, turning then to these specific logical entities, concepts, propositions, and arguments, we must address ourselves to the question of how they are ordered or adapted to the disclosure of the real. And we might do well to begin by considering just why there should be these three different types of entities. In other words, each presumably has a different

intentional function to perform, so far as disclosing the real is concerned. What, then, is it?

First, with respect to concepts, we may answer briefly that the function of the concept is to disclose or signify the "what" of things. That is to say, anything that is or is real in any sense may be presumed to have some sort of determinate nature or character — an "essence," in the very broadest sense of that much abused and misunderstood term. Thus anything whatever, be it a relation, an event, a quality, a size, an activity, a substance, a sense datum, or what not, will be or have a certain "what" or essence; it will be something rather than nothing. Nor can there be any knowledge or understanding of things, save in so far as we get at their "what's" or essences.

But clearly, however indispensable to knowledge may be such concepts through which the "what's" of things may be apprehended, they at the same time are by no means sufficient for knowledge. "Tree," "space-time," "equal to," "commander in chief" may be altogether meaningful and important as concepts in knowledge. And yet they hardly constitute knowledge just in themselves. And the reason is that essences need to be recognized not just as such but rather as being and as existing. The "what" must be seen to be a "what is" or a "what that is." And this, we suggest, is precisely the function of the proposition — to get at and recognize the being or existence of essences, that is, to disclose either that a certain "what" is or what a certain "that" is. Indeed, this would seem to be the reason that only propositions and not concepts are susceptible of truth or falsity.[6]

And finally, since a "what" only comes *to be* what a thing is, or an essence only comes to exist, through the operation of causes, it would seem that in addition to instruments for getting at the "what" and the "that," a realistic logic also must needs have an instrument for getting at the "why." And this, as we have already suggested, is the function of argument[7] as a logical tool or instrument of knowledge.

In other words, considered in the context of realistic philosophy, logical entities like concepts, propositions, and arguments are to be regarded as intentional beings of reason, whose whole being and nature and structure are adapted simply to the intention and disclosure of the real as it is in itself.

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[6] Again, see Parker's essay, pp. 19 ff. [in Wild, pp. 168 ff.].
[7] In this brief essay, we are considering only deductive argument, not induction.

II. Realistic Logic As Contrasted with a Logic of Real Forms

LET THIS, THEN, suffice for a very cursory explanation and defense of our first thesis,[8] namely, that there is, or at least can be or should be, such a thing as a realistic logic; and that the hallmark of such a logic must needs be its radical and thorough intentionality. But now let us turn to our second thesis. According to it, it must be recognized that the current types of logic with which we are particularly familiar nowadays — namely, mathematical logic and Aristotelian logic as that is ordinarily understood — such types of logic are not in the nature of a realistic or intentional logic at all. Why not? Well, we venture to suggest that the reason is that developments in modern mathematical logic have tended to introduce into logic a type of formalism which is radically and completely nonintentional.

Indeed, to bring the issue to a head, let us quote a rather striking passage from Ludwig Wittgenstein: "We make to ourselves pictures of facts. The picture presents the facts in logical space, the existence and non-existence of atomic facts. The picture is a model of reality. To the objects correspond in the picture the elements of the picture. The elements of the picture stand, in the picture, for the objects. The picture consists in the fact that its elements are combined with one another in a definite way. The picture is a fact. That the elements of the picture are combined with one another in a definite way, represents that the things are so combined with one another. This connexion of the elements of the picture is called its structure, and the possibility of this structure is called the form of representation of the picture."[9]

Now without in any way pretending to understand the precise esoteric interpretation that a thorough Wittgensteinian would want to place upon this passage, or without pretending that all modern mathematical logicians would agree to the statements of this passage in their every detail, we nevertheless make bold to suggest that such a quotation serves to point up in a peculiarly vivid way what we should like to call the thoroughly nonintentional direction that nearly all modern logic has taken. Thus on the one hand, so far as "reality"[10] is concerned, what seems to impress so many mathematical logicians about it is its structured, relational character. And on the other

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[8] See above, p. 3 [in Wild, p. 178].
[9] *Tractatus Logico-Philosophicus* (London, K. Paul, Trench, Trubner, 1922), p. 39.
[10] This word has often been taken in a Pickwickian sense in the context of modern logic.

hand, so far as logic is concerned, what it would seem to be is primarily a picturing or a mapping of the corresponding real structures.

Immediately, from the point of view of an intentional or realistic logic, a number of objections suggest themselves. For one thing, even though it be quite true that one could, and even must, *use* logic in order to come to an understanding of the possible structures and types of order and forms of connection that pertain to things in the real world, still it is not *in* logic that one learns about such things. Or better, while a knowledge of such relational patterns and forms of connection may well come about through logic, still such knowledge does not in any way constitute a knowledge of logic. For logic does not concern itself with the study of real forms and relations; rather its concern is solely and exclusively with the purely intentional forms and relations, through which real relations — and for that matter any other real beings — can come to be known. In other words, the first objection that an intentional logician must raise to such a conception of logic is that it involves a serious confusion of real forms and relations with properly logical forms and relations.

And yet a mathematical logician might well make the rejoinder that in the passage quoted, Wittgenstein does seem to ascribe a definite representative function to logic, in so far as it is supposed to "picture" the facts. And in this sense, it might well be asked whether for Wittgenstein, quite as much as for us, logic might not be said to be an affair of intentions. In other words, is not mathematical logic an intentional logic after all?

In reply to this, we might note that by our account a logic can be intentional only in so far as the nature and structure of logical entities is different from the nature and structure of the objects intended. On the other hand, by Wittgenstein's account, it would seem that a logic could be representative or intentional only in so far as logical forms and structures were somehow like or similar to or isomorphic with, the and structures which they were supposed to represent or intend. In fact, as Bertrand Russell has remarked in another connection, "in a logically correct symbolism there will always be a certain fundamental identity of structure between a fact and

the symbol for it; and that complexity of the symbol corresponds very closely with the complexity of the fact symbolized by it."[11]

Now from the point of view of a thoroughly realistic logic of the sort we are defending, what precisely is the import of this basic presupposition of so many mathematical logicians, that in order for logical relations and structures to represent real relations, there must be an isomorphism or structural identity between them?

For one thing, such a view of the nature of representation would seem to come very close to the discredited "copy theory" of knowledge, according to which there must always be a correspondence between the thing known and what is in the mind of the knower. Moreover, quite apart from the usual difficulties of such a theory according to which it would be impossible for one ever actually to tell whether there was in fact such a correspondence between knower and known, there is another difficulty that is somewhat more immediately germane to our present discussion. For if it be maintained that in order for one to know a given complex structure, the complexity of the symbol must correspond to the complexity of the fact symbolized, the presupposition would seem to be that one can know the fact only by first knowing the symbol.[12]

But then the problem of logical intentions has merely been pushed back one step further. For how, and through what intentional instruments, does one know the symbol? If the only possible intentional instruments are symbols which are isomorphic with the thing symbolized, then a regress to infinity would seem inescapable. And rather than accept this consequence, it would seem necessary to recognize that representation may well involve

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[11] *The Philosophy of Logical Atomism* (lectures delivered in 1918 and published in the *Monist,* 1918–19; republished by the Department of Philosophy, Minneapolis, University of Minnesota, no date), p. 12. See also Russell's comments on Wittgenstein in his Introduction to the *Tractatus, op. cit.,* especially pp. 8–11.

[12] Otherwise, there would be no point in insisting on the likeness of the symbol to the thing symbolized. That is to say, on this view it is only through recognizing the likeness that one comes to recognize that which it is like. Hence one must first come to know the symbol, and only then does one come to know what is symbolized, on the ground that the former is like or similar to the latter.

some other principle than that of isomorphism between symbol and symbolized, or between intention and intended.[13]

Of course, what we have just said must not be interpreted as meaning that the likeness or resemblance of one thing to another can never provide a basis for the one's representing or signifying that other. On the contrary, representation through likeness is not only possible but common.[14] Instead, the only point we were trying to make was that isomorphism cannot well be the only, or even the most fundamental, means of representation or intention, for the reason that in order to recognize a thing through its likeness, it is first necessary to recognize the likeness, and this already presupposes intention and cognition.

And in any case, so far as our earlier contention is concerned to the effect that in mathematical logic there would seem to be a confusion of real forms and relations with properly logical or intentional forms, this contention is simply borne out by the view so current among mathematical logicians that logical forms and structures are isomorphic with real forms and structures. For on such a basis the logician would not be concerned with anything peculiarly and exclusively in the nature of beings of reason and intentions. Rather, his undertaking would amount to no less than a Leibnizian *speciosa generalis,* having a veritable ontological or metaphysical objective of determining all the possible types of order and forms of connection in general.

Indeed, this same point is even more strikingly borne out when one considers the theories of those mathematical logicians who would simply reject the notion that logical forms and structure must somehow correspond to real forms and structures. Instead, accepting a more Kantian or even idealistic epistemology, they would question the necessity or even the meaningfulness of talking about a real to which the logical is somehow supposed to correspond. And in place of such a correspondence theory, they would make logic and/or mathematics actually constitutive of reality as known. Or to put the thing a little differently, logic and mathematics on such

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[13] On the difficulties of a correspondence theory see Parker's essay, pp. 5 ff. [in Wild, pp. 156 ff.].

[14] To use more technical language, one might say that white instrumental (in this case. iconic) signs are entirely proper, one cannot expect them to displace or substitute for so-called formal signs. See John Wild's article, "An Introduction to the Phenomenology of Signs," *Philosophy and Phenomenological Research,* VIII, (Dec. 1947), 217 ff.

a view become actually legislative[15] with respect to the phenomenal world of experience. In other words, such a world is what it is and presents itself to us as it does because of the ordering constructs or logico-mathematical systems which we use in our efforts to deal with it.

But clearly here, more than ever, supposedly logical forms and relations have ceased to be mere intentions through which the real comes to be known; instead, they are the actual form and relations of the real itself. Or better, instead of being intentional structures through which the order of nature comes to be known, these so-called logical structures actually determine the order of nature as it is for us.

III. The Intentional Relation of Identity

NEVERTHELESS, our second thesis still lacks much in the way of confirmation. For if we are to be convincing in our insistence that mathematical logic is not an intentional or realistic logic at all, it remains for us to do at least two things. In the first place, having declared repeatedly that intentional relations and structures must be other than the real relations and structures which they intend or represent, we must now try to show just what such an intentional or properly logical relation is. And in the second place, having shown what such a relation is, we must then try to show how, in their treatment of concepts, propositions, and arguments, the mathematical logicians consistently fail to recognize the intentional structure of such entities, even confounding them with various types of real forms and structures.

Coming, then, directly to the first question: What precisely is the nature of an intentional relation? The answer we should like to suggest, albeit with some diffidence,[16] is that this relation is always a relation of identity. Thus,

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[15] See Professor Lewis's use of this adjective in *Mind and the World-Order.* (New York, Scribner 1929), p. 27.

[16] This diffidence proceeds from many sources. In the first place, there are various current senses of "identity" with which identity in our sense must not be confused, but almost inevitably will be confused. For instance, the idealistic logicians speak of identity, apparently thinking of it as connected with the Absolute which absorbs all differences within itself. Also, the mathematical logicians speak of identity after the analogy of equality, as if there could be a relation of identity between individuals or classes of individuals. But clearly, the intentional identity of which we are speaking is of neither of these two types.

But in the second place, even within the context of realism it would seem necessary to

we have already argued that logical entities, on a realistic basis, are ordered to a disclosure of the "what," the "that," and the "why" of things. And such intentional functions, we think, can only be effected through this peculiar relation of logical identity.

For instance, consider concepts. It is through these, as we have said, that one apprehends the "what's" or essences of things. But what is a concept? Of course, it is a product of abstraction and is characterized by universality. But what exactly is a universal? Our answer is that it is simply a relation of identity between an abstracted essence and the individuals from which that essence has been abstracted and to which it is applicable.[17] Of course, in fact and in reality, no essence ever exists in a state of abstraction from the individuals which have such an essence; nor is it ever related back to them by a relation of identity. But for this very reason, the relation of identity is purely and simply a relation of reason, with no existence *in rerum natura*. In other words, it is the intellect which, in order to acquire a knowledge or understanding of what a thing is, separates the "what" from the thing itself and then reidentifies the former with the latter, thereby recognizing the thing to be what it is. It is in this sense, then, that we say that a universal concept is nothing but such an intentional relation of identity.

Similarly with a proposition. For as we have seen, it is through a proposition that one comes to recognize what a given thing *is*, or *that* a certain thing is its own "what." But what is this relation of x to y in "x is y," if not a relation of identity? Thus the y, having been abstracted from the x, is

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distinguish between the purely logical relation of identity, with which we are here concerned, and that real relation of cognitive identity which is basic to any realistic epistemology (see Parker's essay, especially pp. 13 ff. [in Wild, pp. 163 ff.]). The latter is a real relation, the former only a relation of reason. Also, the latter is the end, the former only the means to the end. For instance, the logical relation of identity between subject and predicate is a means or instrument of the real relation of cognitive identity between knower and known.

[17] Incidentally, it might be remarked that both nominalism and extreme realism seem to overlook the relational character of universals. The former sticks simply to the individuals and refuses to recognize that intellectually it is impossible to abstract their essence from them and so relate it back to them. On the other hand, extreme realism fixes upon the abstracted essence but forgets that, as thus abstract, the essence or "what" is wholly and completely in relation to the individuals from which it has been abstracted.

actually reidentified with it in the proposition in which x is said to be its own "what" — that is, a certain "that" is said to be what it is.[18]

Likewise in the syllogism, where one seeks to get at the "why" of x's being y. Thus, in fact and in reality there would certainly have to be some real cause or real reason *why* x should be, or should be y. Hence any sort of knowledge or understanding of *why* x is, or is y, would seem to require some insight into, or recognition of, the *cause* of this fact. Presumably, then, so-called logical argument is nothing but a device or instrument for getting at the causes of things, just as the concept is an instrument for getting at essences and the proposition an instrument for getting at existence.

Nevertheless, in just what sense and on what grounds are we able to maintain that such a syllogistic instrument must be simply a relation of identity? One obvious reason is this. If the task be one of explaining why x is y, it is quite apparent that x cannot be y in virtue of what it is not; instead, it can only be so in virtue of what x is. Besides, if what x is thus said to be is not also y, then one can hardly use such a third concept as a medium for explaining why x is y. In short, the syllogism with its middle term would appear to involve a relation of triple identity.

And yet such an apparent explanation seems, on a little reflection, to be much more apparent than real. For, one might argue, if the syllogism is supposed to be an instrument for the intention of causes, then it could not possibly involve a relation of identity, since a cause is hardly identical with its effect. Clearly, however, such an objection derives all of its force from the very common confusion of the structure of the intended object with the structure of the intending instrument. After all, the mere fact that a cause is not identical with its effect certainly does not mean that the intentional relation by which such a cause comes to be known or recognized cannot be a relation of identity. Quite the contrary, as we have already seen, the relation of subject and predicate in a proposition is one of identity, and yet what is intended by such a relation is certainly not necessarily a relation of identity. For example, there is a sense in which the proposition intends the existence of an essence; and yet in fact, no finite essence ever is its existence. Or

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[18] As thus described, the relation of predicate to subject in a proposition would seem to be no different from the relation of abstracted essence to individuals in a concept. Nor is it to be denied that a concept, by the very fact that it is abstract and universal, is necessarily predicable of the individuals to which it is related by a relation of identity. Still, the concept as such as predicable and identifiable, not actually predicated and identified.

again, in the proposition "Socrates is bald," what is intended is the real presence of a property in a thing (of an accident in a substance); and yet as we shall see later,[19] the intentional relation of predicate to subject, in contrast to the relation intended, is certainly not a relation between a thing and its property but rather a relation of identity.

So also with the syllogism. What it intends may be the real cause of a certain fact;[20] and yet its own structure as an intending relation is not one of cause-effect but rather one of triple identity. Thus, for instance, we may say that the reason towels dry our hands is because of their capillary structure. In other words, it is because towels *are* of such a structure, and things of such a structure *are* absorbent, that we can say that towels *are* absorbent. That is to say, the only way we can understand why x is y is in virtue of something else that x is. Thus a real causal transaction certainly does not involve any real relation of identity; and yet it would seem that it can only be intended by such a relation of identity.

But now let us turn to the mathematical logicians. If we are right in our view of a realistic logic, concepts, propositions, and arguments are nothing but relations of identity, through which we are able to get at the "what," the "that," and the "why" of things. Also if we are right, the mathematical logicians, through their confusion of real forms and relations with properly logical or intentional forms, are bound to misconstrue such things as concepts, propositions, and arguments, not recognizing the distinctively intentional nature of such entities. But is this in fact the case?

First as to concepts. Do the mathematical logicians recognize these as the means or instruments for apprehending the "what's" of things? Presumably not. Indeed, nothing is more striking about the ordinary textbook in mathematical logic than the total absence of any treatment of such things as concepts.

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[19] See below, pp. 17–19 [in Wild, pp. 190–92].

[20] It should be apparent that this notion of a syllogism as being an instrument for the intention of causes presupposes the realistic view of causal transaction (see John Wild, "Phenomenology and Metaphysics," in *The Return to Reason,* op. cit., pp. 36 ff.); see also his "A Realistic Defense of Causal Efficacy," *Review of Metaphvsics,* II, No. 8 (June 1949), 1–14, in contrast to a Humean view of a cause as an atomic event prior in time to its effect.

And yet it might well be urged that what the modern logician calls "propositional functions" are quite adequate to perform all the functions of concepts. Indeed, propositional functions, it might be argued, are really much more adequate than concepts for the very reason that whereas concepts never can represent anything more than mere properties of things,[21] propositional functions are able to represent relations between things. Thus one can have a function with one argument, and that will represent the relation of a thing to its property or a substance to its accident; or one can have a function with two arguments, representing a relation between two things; or a function of three arguments, representing a relation between three things; and so forth.

But here, surely, there is a very patent confusion of real relations with logical relations. For must not such a thing as a propositional function be regarded as a sort of schema for various types of real relations? Thus, for instance, let us suppose that John is the brother of Joe. Now quite apart from the conceptual or propositional form through which this relationship is intended, the fact simply is that there is in reality a real relationship of John to Joe. Accordingly, the function f(x,y) would seem to be simply the form of this real relation, not necessarily the form of the intention in and through which this relation is apprehended. Or if one wants to say that the function f(x,y) *represents* the form of the relation rather than simply *is* the form of the relation, then it does so after the manner of an iconic sign — that is, by being like the relation or by corresponding to it or by being isomorphic with it.

But a concept is not this sort of thing at all, and functions quite differently. True, a concept can perfectly well be a concept *of* a certain relation — of a many-termed relation, in fact. And yet in such a case the structure of the concept just as such will not be the same as the structure of what is thus conceived or intended. For what is conceived will be a many-termed relation; but the relation through which it is conceived will be a relation of identity, that is, a concept which is precisely such a relation of identity between the real relation that is intended and its "what" or essence. Indeed, any relation whatever, be it one between a thing and its property or between two things or between three things — any such relation, or for that

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[21] The distinction between "thing" and "property" here may be taken to be synonymous with the distinction between substance and accidents. See the essay by Manley H. Hopkins, Jr., [in Wild], pp. 125 ff.

matter any being of any kind, relational or otherwise, must necessarily be what it is. Nor can it be known, save through a recognition or apprehension of its "what." But such an apprehension comes about in and through a concept which is simply an intentional relation of identity between such a "what" and that which is such a "what."

Accordingly, if one insists on substituting propositional functions for concepts, he is really only deceiving himself, for such a substitution is not a substitution at all. Instead, it simply means that one is shifting his attention from the structure of the intending relation to the structure of the relation intended. Of course, there is no reason why the structure of real relations should not be considered, and considered in the greatest detail. The only point is that such a concern with the structure of real relations as represented iconically in so-called propositional functions has nothing to do with logic. For there still remains the question of what the peculiar intending relation is through which the "what" of a given real relation (as schematizcd in a propositional function)[22] is apprehended.

Turning, then, to propositions, we find on the part of mathematical logicians the same tendency to confuse the relational structure of the real fact that may happen to be intended by a given proposition with the relational structure of the proposition itself. Thus on our view, a proposition is simply an instrument for intending what something is, or better, *that* something is what it is. Accordingly, in a proposition the concept of what the thing is (the predicate) is identified with the thing itself (the subject) — x is y. Indeed, unless the predicate concept were the concept of what the thing is, one could never say of the subject that it *is* so and so, that is, one could never identify the predicate with the subject.

Now in opposition to all this, the mathematical logician would no doubt protest that the function of the proposition is not to be confined to intending only the relation between a thing and its property (substance and accident); instead, through propositions we must be able to intend as well all the manifold relations that hold between things. Accordingly, the old subject-predicate form of the proposition is completely inadequate; instead, the

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[22] In other words, there is no reason why a concept of a relation or relational complex could not be represented more or less iconically through the symbolic device of the propositional function. The point would be that the relation of the concept to what it was a concept of would be a relation of identity, for all that.

proposition must have a relational form corresponding to the form of the relation which it is supposed to represent.

Unhappily, however, such a criticism of the subject-predicate structure of the proposition rests on a serious misconception; and in consequence, the resultant theory of propositional structure falls afoul of the familiar confusion of real structures with logical structures. Thus to begin with, it should be noted that as we have explained it, the logical relation of subject to predicate is not the same as the real relation of substance to accident. Indeed, it could not be the same, because the former is a relation of identity, whereas the latter is not. After all, no substance is formally its accident just as such; otherwise, it would not be a substance. On the other hand, any and every predicate concept in an affirmative proposition is identified with its subject — x *is* y.

In short, the error of the mathematical logician is to assume that the relation of subject to predicate is isomorphic with the relation of substance to accident; and then, on the basis of this assumption, he points out, quite rightly, that since there are innumerable other relations besides that between substance and accident, the relation of subject to predicate is wholly inadequate. However, as we have just pointed out, the relation of subject to predicate is not this kind of a relation at all; indeed, it is not isomorphic with any real relation, being only an intentional relation of identity; and no real relation is ever such a relation of identity.

No, the relation of subject to predicate is a relation between a thing[23] and what it is: and through such a relation of identity we come to know that a thing is thus and so (that is, what it is) in fact and in reality. Not only that, but in order to know that anything, no matter what it may be — a relation, a substance, a quantity, an activity — in order to know that a thing *is* thus and so, one has to employ the intentional relation of identity between subject and predicate.

Nor will any relational form such as x R y suffice for this purpose. Thus if it is concerning x that one wishes to recognize that it is thus and so, the only propositional form that will serve is the subject-predicate form: x *is* in relation R to y. Or if it is the relation itself that one wishes to say something

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[23] Here we are using "thing" not in the narrower sense of substance (see above Note 21) but rather in the broadest sense possible, as synonymous with being itself.

about, again the subject-predicate relation of identity is the only one that will perform the requisite intentional function: "The relation x R y *is* symmetrical." Or if one's concern be to state something (a "what it is") about the whole relational complex, x R y, once more, the only intentional instrument is that of subject-predicate — "A situation in which a given thing, x, stands in relation R to y, *is* also one which involves a counter relation of y to x."

In other words, the relational propositional forms of the mathematical logicians turn out not to be propositional forms at all. Instead, they are the forms and structures of real relations but not the forms and structures by which such real relations may be intended. Indeed, we might even bring out the point this way. The relation of subject to predicate — x is y — is necessarily a relation that intends something else. That is to say, any relation of the form "x is y" is intentional: It is *about* something else. On the other hand, the relation "greater than" is not about anything; it does not intend anything. True, it may be the object of an intention: but it itself is completely nonintentional. Consequently, to try to make propositional structures isomorphic with real structures is simply to shift one's attention away from the peculiarly intentional relations of logic to the wholly nonintentionl relations of mathematics and the other sciences.

Moreover, precisely similar considerations would appear to apply in the domain of argument, quite as much as in that of the concept or of the proposition. For once more the mathematical logician apparently thinks that in investigating purely nonintentional structures he is somehow dealing with logic. Specifically with respect to argument, the mathematical logician and also many contemporary Aristotelian logicians seem fascinated by the idea of a purely formal argument or *"argument en forme,"* as Leibniz called it.[24] Thus take the syllogism, for example. This is held to be an argument that is valid solely by virtue of its form.

All M is P
All S is M
All S is P

Here, obviously, it makes no difference what the M and S and P symbols stand for or what they mean. The argument is nonetheless formally cogent.

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[24] *Nouveaux essais sur l'entendent humain* (Paris, Flammarion, n. d.), Liv. IV, Chap. 17, §4, p. 248.

Or again , to use an example borrowed from Alfred Tarski,[25] suppose we are dealing with the relation of congruence between line segments, and suppose we adopt as axioms the assertion that every such segment is congruent to itself and also the assertion that two segments congruent to the same segment are congruent to each other. From this it can then be proved that if any segment x is congruent to y, and y to z, then x is congruent to z.

But, as Tarski points out, the cogency of this argument is in so wise dependent on the nature and meaning of line segments or even on that of the relation of congruence. On the contrary, the proof would be equally valid even if one supposed that one was talking not about line segments particularly but simply about anything whatever; and not about the relation of congruence in particular but about any relation. In other words, conclusions must be regarded as following from premises simply in virtue of certain purely formal and completely abstract structures. Accordingly, one of the tasks of logic would presumably be to work out various uninterpreted formal systems, which could then be given interpretations and so serve as a pattern of inference for any number of different possible subject matters.

For that matter even the form of the syllogistic argument given above could be still further formalized and so shown to be structurally or formally the same as the transitivity of the relation of congruence. One could then set up the completely general statement: if x R y and y R z, then x R z. And this completely general theorem could be proved on the basis of the two axioms about congruence, provided they also be completely generalized. In fact, the principle underlying all relations of this general type — identity in the syllogism, congruence in line segments, and so forth — could be summed up thus: Any relation that is reflexive and that also has the property P[26] will necessarily be a transitive relation.

Accordingly, the syllogism with its relation of triple identity is by no means the only form of inference. On the contrary, there are a whole host of other such forms as well. Not only that, but all these alternative forms can be generalized so as to yield a completely uninterpreted pattern of inference that will function equally well whether one is dealing with line segments in a

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[25] *Introduction to Logic and to the Methodology of Deductive Sciences* (2nd rev. ed., New York, Oxford University Press, 1946), pp. 121 ff.

[26] This is the way Tarski chooses to symbolize that general relational property exemplified in the relation of equality: Things equal to the same are equal to each other.

relation of congruence or concepts in a relation of identity or qualities in a relation of similarity or classes in a relation of inclusion or what not.

However, unless we are very much mistaken, this whole notion of *argument en forme* involves a simple confusion of the structure of certain relations that may be intended by an argument with the intentional structure of that argument itself. For, from the realistic point of view argument is simply an intentional instrument for demonstrating *why* something is what it is. Nor can a thing be what it is in virtue of what it is not; rather this can only be in virtue of what it is — that is, in virtue of something else, or some other "what," that it is. Accordingly, all demonstration must be through a third or mediating concept.

Thus suppose one wants to demonstrate that a given type of relation is transitive. Presumably this can only be in virtue of some other "what" or "what's" that that relation is, namely, that it is reflexive and that it has the property P. In short, various types of relation have various properties and characteristics, just like other things. And if one wants to know why a certain type of relational structure is what it is and has the characteristics which it does have, he will use the ordinary intentional relation of triple identity as his instrument of demonstration. And yet, clearly, the structure of the relation that is thus intended must not be confused with the structure of the intending relation.

Nor does the so-called generalization or formalization of proof make any difference in this regard. For what is thus formalized or generalized would seem to be the relation that is intended, not the intending relation. Indeed, if one is investigating relations, there is no reason why he should not consider them with respect to their most general and universal features. In this sense, one need not confine his investigation, for example, simply to the relation of congruence. Instead, he might consider any relation having certain structural features, such as, say, reflexivity and symmetry. But such a generalization or formalization would be a generalization or formalization of the structures intended by an argument, not of the intentional structure of the argument itself.

Of course, as we have seen, since the syllogistic structure of argument is itself a certain kind of structure, one might make that particular structure the object of his intention and might show it to be isomorphic with certain other types of structure. And yet the point is that however one may generalize or

formalize the relation of triple identity, once he has made it the object of his intention, still when it functions as an intention, such a relation is radically and thoroughly intentional: It is simply of or about or discloses something other than itself. In this respect, it is quite different from all other relations, even though these may in certain cases appear to be isomorphic with it.

Thus, for example, the nonintentional relation of congruence is transitive, just as is the intentional relation of identity. And yet the important thing is that the transitivity of the relation of congruence does not signify or intend anything else; it is just a fact, but it is not a demonstration of anything else. On the other hand, the transitivity of the logical relation of identity can serve to demonstrate something about an intended object other than itself. Hence, whereas the transitivity of the relation of congruence may be an object of demonstration, it itself demonstrates nothing. On the other hand, the transitivity of the relation of identity not only may be an object of demonstration but can also itself be demonstrative: Through it we are able to demonstrate the why of things wholly other than the relation of identity; indeed, even to demonstrate why that relation itself is as it is — say, transitive — we have to use it as our demonstrative instrument.

In other words, for a realistic logic the instrument of demonstration is not an uninterpreted formal system which can then be given various interpretations. On the contrary, such systems would seem to be nothing but exhibits of various types of real or nonintentional relations considered in their widest generality. And of course, such relations have their characteristic properties and attributes. However, to demonstrate or show why these very general relational patterns and structures are as they are requires the peculiarly demonstrative relation of triple identity. Furthermore, in so far as these general patterns or systems come to be interpreted for various possible contents, one can only proceed by showing that a certain specific relational structure is as it is, and has the characteristics which it does have, because it *is* an instance of a certain more general type of structure. Once again, the instrument of demonstration would seem to be simply the relation of triple identity, even though that which thereby comes to be demonstrated may be the characteristics of a wholly different sort of relation.

IV. Logic and the Mathematizing of the Sciences

LET US CONSIDER, then, that our second thesis has been sustained and that modern mathematical logic has been shown to involve a systematic confusion of real relations with logical relations and hence not to be a properly realistic or intentional logic at all. Now if this be true, then it would seem possible for us to provide an explanation of two more or less unexplained features that would seem to characterize so many current theories regarding the logic or philosophy of science. For one thing, we refer to that feature according to which formal logic is held to be something totally different from, and in a sense only accidentally relevant to, what is sometimes called the logic of discovery or scientific method. And for another thing, we have in mind that feature of so many contemporary philosophies of science according to which no science is considered a really advanced and developed science unless it be, so to speak, mathematized — as if the perfect form of a science were presumably a mathematical form.

To take the second feature first, we think that this can be accounted for as being a direct consequence of the confusion in modern logic of real relations with properly logical and intentional relations. For supposing that logic is what so many mathematical logicians seem to think it is, namely, an investigation of all possible types of order, relation, structure, and forms of connection in general, then logic itself will be precisely a mathematics and not a logic (that is, not in our sense of an intentional logic). As a matter of fact, we do not see why mathematics might not be defined as being simply a science of relations, these relations being considered not as actually existing *in rerum natura* but rather as abstracted from all content and all conditions of actual concrete existence. In contrast, logic, on our view, is not a science of relations in this sense at all; rather it is a science only of relations of a very peculiar sort and kind — namely, the purely intentional relations of identity.

Very well. Supposing, though, that one does turn logic into mathematics, and supposing one disregards any properly logical and intentional forms altogether, then obviously any science which is not fully mathematical in form and structure will not be fully logical in form and structure either; and to this extent it will not be logically precise and rigorous. On this basis, then, sciences other than physics — biology, anthropology, history, economics, philosophy, and so forth — must be put down as being comparatively crude and undeveloped sciences.

Now all this, of course, is not to be taken as implying that from the point of view of what we have chosen to call a realistic or intentional logic mathematics is to be regarded as unimportant and the use of so-called mathematical methods in the sciences to be discouraged. Quite the contrary, we should insist that there is nothing wrong with mathematics, our only contention being that it must not be confused with logic. Nor could there be any possible objection to introducing mathematics into any and all the various natural sciences — physiology, archaeology, economics, even ethics. After all, relations are to be found everywhere in nature. Hence if one wants to consider particularly the relational aspects of, say, physiological phenomena, it is only appropriate that he should proceed mathematically.

No, the point is not to decry mathematics but rather to distinguish logic from it. For the minute one recognizes the intentional character of logic, he will see that logical forms are in no sense isomorphic with the real forms and patterns of relation in mathematics. On the contrary, as we suggested earlier, being purely intentional, logical forms will be purely neutral and transparent: Through them one can intend anything: mathematical relationships, organic functions, natural substances, act and potency — anything. For this reason an intentional and realistic logic, unlike a mathematical logic, never prejudges the issue as to the kinds of realities there are in the natural world. Hence, so far from insisting that there can be only one natural science, namely physics, the realistic logician recognizes that there may be, and presumably are, many sciences and many "knowledges" — just as many, in fact, as there are kinds of things to be known.

And now for that other feature of the present intellectual situation that we proposed to comment upon, namely, that whereas formal logic seems to be productive of vast systems and a priori constructions, the so-called logic of discovery or induction or scientific method or what you will seems to be something entirely different and almost unrelated. But again, we think that this curious situation is the direct result of the neglect of an intentional logic and the attempt to replace it by a logic or mathematics of real forms and relations. For, after all, concepts and propositions and arguments, as we have described them, are entirely oriented toward the intention of the real world, and of the real world as that is given in experience. Indeed, the intention of the empirically given could only be an intention in terms of the "what," the "that," and the "why."

On the other hand, with a logic that concerns itself with nonintentional forms, the situation would perforce be entirely different. For such forms do not intend anything else. Hence they are not forms through which the given comes to be known for what it is in itself. Instead, these are forms which come to be known purely a priori and without the slightest reference to any given reality which they might supposedly be designed to intend. Not only that, but these mathematical structures and types of order having almost endless properties and ramifications, they can be exhibited a priori in vast and elaborate systems.

Accordingly, the question then becomes one of how these a priori constructions are relevant to what is given in experience. They cannot be relevant in the manner of intentional forms — that is, as intending the given in terms of what it is in itself. Instead, they might perhaps be relevant as somehow corresponding, through some mysterious pre-established harmony,[27] with the order of things as given. Or perhaps they are relevant, not as corresponding to the order of the given, but as somehow imposing an order on the given or actually constituting the order of the given, as if the mind were somehow legislative and determinative of the relational pattern of our experience.

Needless to say, however, all such idealistic tendencies[28] are quite alien to any sort of genuine realism in philosophy. Accordingly, it certainly behooves realistic philosophers to take logic seriously and to realize that the development of a genuine realistic or intentional logic is not an accomplished fact but a crying need, since the sort of mathematical logic that is prevalent today would seem to be not so much an instrument of realism as a serious source of confusion and embarrassment. ⁋

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[27] This would actually seem to be Einstein's view. See the article by Professor A. Ushenko in *Albert Einstein: Philosopher-Scientist* ("The Library of Living Philosophers," VIII [New York, Tudor, 1949]), p. 636.

[28] On these, see again John Wild, "Phenomenology and Metaphysics," *op. cit.,* pp. 38 ff.