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THE JOURNAL OF PHILOSOPHY

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ESSENTIAL ATTRIBUTION *

I

A SORTING of attributes (or properties) as essential or inessential to an object or objects is not wholly a fabrication of metaphysicians. The distinction is frequently *used* by philosophers and nonphilosophers alike without untoward perplexity. Given their vocation, philosophers have also elaborated such use in prolix ways. But to proclaim that any such classification of properties is "senseless," "indefensible," and leads into the "metaphysical jungle of Aristotelian essentialism"[1] is impetuous. It supposes that cases of use that appear coherent can be shown not to be so or, alternatively, that there is an analysis that dispels the distinction and does not rely on equally odious notions. It further supposes that taking the distinction seriously inevitably leads to what Quine calls "Aristotelian essentialism." The latter claim is a nest of presumptions, two of which are that "Aristotelian essentialism," as characterized by Quine, is a characterization of Aristotelian essentialism, and that any theories that countenance the distinction are versions of "Aristotelian essentialism."

On the occasion where Quine seems to propose an argument against a genuine mode of essentialism, i.e., the case of the mathematical cyclist,[2] it is seen on alternative interpretations that either the argument is invalid or there is no ground for supposing that anyone would accept its premises.[3] Friendly critics suggest that it was not

* Presented in an APA symposium on Essentialism, December 29, 1970; other symposiasts were David Kaplan and Saul Kripke.

My thanks to Terence Parsons for his comments on an earlier version.

[1] W. V. Quine, *Word and Object* (Cambridge, Mass.: MIT Press, 1960), pp. 199–200; "Three Grades of Modal Involvement," in *The Ways of Paradox* (New York: Random House, 1966), p. 174.

[2] *Word and Object*, p. 199.

[3] First shown in my "Modalities and Intensional Languages," *Synthese*, XIII, 4 (December 1961): 303–322, pp. 317–319; reprinted in Marx Wartofsky, ed.,

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intended as an argument. It was supposed to bewilder us, and it does. But Quine acknowledges that it was never his purpose to address himself seriously to essentialist claims. Raising specters of essentialism was ancillary to the grander purpose of rallying further reasons for rejecting quantified modal logic. The latter, he says, is "committed to essentialism," which in turn is, on the face of it, senseless.

I[4] and Terence Parsons[5] have argued—persuasively I believe—that Quine's casual characterization of essentialism is inadequate. It misses the point of what seems to be presupposed in coherent cases of use or in Aristotelian essentialism. Furthermore, since the characterization does not take us beyond the distinction between necessary and contingent propositions (which Quine accepts), there is no cause for perplexity. What *is* perplexing is that his characterization doesn't fit his case of the mathematical cyclist.

On a more adequate characterization, which in the present paper is taken to be minimal, Parsons[6] showed that quantified modal logic (QML) is not committed to essentialism (E) in the following sense: in the range of modal systems for which Saul Kripke[7] has provided a semantics, no essentialist sentence is a theorem. Furthermore, there are models for which such sentences are demonstrably false.

Modal logic accommodates essentialist talk. But such talk is commonplace in and out of philosophy.[8] It is surely dubious whether essentialist talk can be replaced by nonessentialist, less "problematic" discourse. The offhand remark that "some attributes count as important and unimportant, ... some as enduring and others as fleeting; but none as necessary or contingent"[9] (which Quine takes as synonymous with 'essential or accidental') suggests that such

Boston Studies in the Philosophy of Science (Dordrecht, Holland: Reidel, 1963). Also in my "Essentialism in Modal Logic," *Noûs*, I, 1 (March 1967): 91–96. See also Parsons, Plantinga, and Cartwright, fns 5 and 13 below.

[4] In Marcus, Quine, S. Kripke, J. McCarty, and D. Føllesdal, "Discussion on the Paper of R. B. Marcus," *Synthese*, XIV, 2/3 (September 1962): 132–143; reprinted in *Boston Studies, op. cit.* Also, "Essentialism in Modal Logic."

[5] "Grades of Essentialism in Quantified Modal Logic," *Noûs*, 1, 2 (May 1967): 181–191. Also, "Essentialism and Quantified Modal Logic," *Philosophical Review*, LXXVIII, 1 (January 1969): 35–52. For Quine's attempt at formal characterization, see fn 22.

[6] "Essentialism in Quantified Modal Logic."

[7] "Semantic Considerations on Modal Logic," *Acta Philosophica Fennica*, fasc. 16 (1963): 83–94.

[8] If the reader is in doubt, he is urged to check the claim against his own reading. Quine himself does not shun such use. It ranges from the metaphorical "Nominalism is in essence perhaps a protest against the transcendent universe" to a precise sorting of a certain property of expressions, the property of occurring in a sentence, as between essential and inessential occurrences. See *The Ways of Paradox, op. cit.* p. 69, p. 73, p. 103.

[9] *Word and Object*, p. 199.

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talk is dispensable through some uniform substitution of words that are clearer and untainted by metaphysics. But if Socrates was born and died snubnosed, then that property and his being a man are equally durable. Are we helped by the further assertion that his being a man is more important? In what way? Is it more important than his being a philosopher? And what are we to make of cases where it is claimed of a certain attribute that it is important but inessential?[10] Is 'important' less problematic than 'essential'?

Given the apparent coherence of some essentialist talk, interpreted systems ($\mathcal{I}$) of QML are appropriate vehicles for analysis. The present paper continues with the account of modes of E within the framework of QML. In particular, it is suggested that *Aristotelian* essentialism may best be understood on a "natural," or "causal," interpretation of the modal operators. But first a few historical remarks.

The taxonomy of pre-formal logic distinguished *pure* and *modal* propositions. According to W. S. Jevons,

> The pure proposition simply asserts that the predicate does or does not belong to the subject, while the modal proposition states this *cum modo*, or with an intimation of the mode or manner in which the predicate belongs to the subject. The presence of any adverb of time, place, manner, degree, etc., or any expression equivalent to an adverb, confers modality on a proposition. "Error is always in haste," "justice is ever equal," ... are examples of modal propositions.[11]

Further on he mentions that some logicians have adopted a special view with respect to 'necessarily', 'possibly', and the like, as in "an equilateral triangle is *necessarily* equiangular," "men are *generally* trustworthy," where the "modality does not affect the copula of the proposition" but "consists in the degree of certainty with which a judgment is made or asserted" (70).

With formalization came the faith that standard functional logic (SFL), appropriately interpreted, would yield an analysis and disambiguation of modal propositions. Logical grammar would replace surface grammer, yet the *sense* (if it had one at all) of the original would be *captured* by its formal, nonmodal counterpart. The faith was not ungrounded. Jevons used 'always' and 'ever' as examples.

[10] The first chapter of M. B. Hesse, *Models and Analogies in Science* (Notre Dame, Ind.: University Press, 1966) begins with a discussion between a Campbellian and a Duhemist about whether it is essential to (or an essential property of) a scientific theory that it have a model. The Campbellian claims it is essential. The Duhemist claims it may be important or useful but not essential. Nor is the discussion "without semblance of sense." We recognize in it the same conceptual scheme implicit in such distinctions with respect to properties of more mundane objects.

[11] *Lessons in Logic* (London and New York: Macmillan, 1884), p. 69.

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Interpretations ($\mathscr{I}$) of SFC take us a long way. The adverb is detached from the predicate. The nontemporal 'always' and 'sometimes' go into quantification. The temporal cases go into $\mathscr{I}$ of SFC which includes temporal moments in the domain of $\mathscr{I}$. Similarly for the nonspatial (rare) and spatial 'everywhere' and 'somewhere'. But even in the temporal cases the success is incomplete. The modalities proved recalcitrant, and extensions of SFL proved useful. Those who frown on such extensions as deviant should remember Rudolf Carnap's admonition: "In logic there are no morals."[12]

II

I should like to focus on two modes of essentialism which I will distinguish as *individuating* and *Aristotelian*. Consider some cases. We say of Moby Dick that although he lives in the sea he is essentially a mammal, and of Socrates that he is essentially a man and accidentally snubnosed. We point to a sample of mercury at room temperature and say that, although it is a liquid, it is essentially a metal, suggesting that solidity at room temperature is an accidental property of metals. These are cases that fit Aristotle's account of essences. What is implicit here? The objects are actual objects, and the properties that are being *sorted* as essential or inessential correspond to direct, nonvacuous, "natural" predicates. (A more formal and inevitably approximate characterization of such predicates is deferred for subsequent discussion.) For Aristotelian essentialism, an essential property is a property that an object *must* have. It answers to the question "What is it?" in a strong sense; if it ceased to have that property it would cease to exist. It is a property such that, if anything has it at all, it has it necessarily. The latter condition is what distinguishes Aristotelian from what I call "individuating" essentialism.

Consider, for example, Winston[13] the mathematical cyclist. Suppose he is an avid cycling enthusiast. It is an overriding preoccupation. Although he holds a position on a mathematics faculty, his interest in that subject is at best desultory. Arguing against a renewal of Winston's contract, a colleague says "Unlike the rest of us, Winston is essentially a cyclist, not a mathematician." Analogously, Protagoras might have said of Socrates, "He's essentially a philosopher, not a politician." The social worker says of a client, "He's essentially a good boy; just fell in with bad company," which is after all not too distant from distinguishing, as philosophers sometimes do,

[12] *The Logical Syntax of Language* (New York: Springer, 1937), p. 52.

[13] So named by R. Cartwright in "Some Remarks on Essentialism," this JOURNAL, LXV, 20 (October 24, 1968): 615–626, p. 619. Also called "Squiers" by Alvin Plantinga in "*De Re* and *De Dicto*," *Noûs*, III, 3 (September 1969): 235–258.

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those who are disposed to act rightly from those who merely act rightly out of expediency or the like. Nor is the context of such examples primarily colloquial. Consider the following: "In the last century, Dedekind, Frege, and Peano asked themselves: what is essential about the series of natural numbers (for pure arithmetic)? If one thinks of this structure as an object at all, the following properties are clear: ..." or "what properties of an object in mathematical experience are essential? This is well illustrated by Souslin's problem on the continuum. ... How *essential* are the rationals to the intuitive continuum?"[14]

Implicit in such examples is that among the attributes an object must have are not only those which it shares with objects of its kind (Aristotelian essentialism), but those which are *partially* definitive of the special character of the individual and distinguish it from some objects of the same kind. But must there be some set of individuating essential attributes that *wholly* distinguish an object from those of its kind? (For present purposes, we need not go into the question of the uniqueness of proximate kinds, the hierarchy of kinds, and the like.)

Being a snubnosed, henpecked, hemlock-drinking philosopher[15] wholly individuates Socrates without the addition of a uniqueness condition, but although being a philosopher may be essential to his nature, presumably being snubnosed is not. Perhaps complete individuation is always a matter of what are generally taken to be inessential properties, accidents of circumstance. If we encountered a winged horse, we could not determine that it was Pegasus unless we knew the circumstances of his birth and the like. But then, those circumstances would be inessential to Pegasus as well.

Numbers, as contrasted with empirical objects, are supposed to be objects that can be wholly individuated by their essential properties, without tacking on a uniqueness condition. But the matter is by no means clear. Consider, for example, the counterclaim that numbers have no essential properties at all, for if they did "it would conflict with the idea that number theory can be reduced to set theory in various ways."[16] One possible resolution to this disagreement is that,

[14] G. Kreisel, "Mathematical Logic: What Has It Done for the Philosophy of Mathematics?" in Ralph Schoenman, ed., *Bertrand Russell: Philosopher of the Century* (London: Allen & Unwin, 1967), pp. 213–216.

[15] The example is from Daniel Bennett, "Essential Properties," this JOURNAL, LXVI, 15 (Aug. 7, 1969): 487–499, p. 487.

[16] Gilbert H. Harman, "A Nonessential Property," this JOURNAL, LXVII, 6 (March 26, 1970): 183–185. Harman's claim raises interesting questions. If one supposes that numbers are first-order objects, that there is at most one of each, and that there are nevertheless equally acceptable alternative choices for the natural-number structure, then any "world" *W* that includes natural numbers in its do-

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if something counts as a number, it has essential numerical properties, but they do not wholly individuate.

Perhaps with respect to inquiries like "Who is Sylvia, what is she?" the latter question can be answered in terms of essences (Aristotelian), but individuating essences can never *wholly* answer the former. This leads some philosophers to make a metaphysical shift. They invent *objects* (individual concepts, forms, substances) called "essences," which have only essential properties, and then worry when they can't locate those objects by rummaging around in other possible worlds. It does not seem to me that an account of essential attribution compels us, even with respect to abstract objects, to shift our ontology to individual essences. The usefulness of talk about possible worlds is not for purposes of individuating the object—that can be done in this world; such talk is a way of sorting its properties.

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main D does so by *specifying* which object it identifies with 0, which with 1, ... Although there may be other subsets of D with structures (N_1,S_1,d_1) isomorphic to the given choice for (N,s,d), where N is the set of number elements, S the successor relation, and d the distinguished element, elements of N_1 that are isomorphic to elements of N will not be *the* numbers in that world W.

The truth of Harman's claim, i.e., that numbers have no essential properties at all, revolves about what is meant by "reducing number theory to set theory." If it means that there is no such thing as *the* natural-number structure but only some set of alternative isomorphic structures (N′,S′,d′), one for each W′, each of which represents some alternative set-theoretic reduction, then his claim is correct. And, as Parsons has shown in "Essentialism and Quantified Modal Logic," pp. 44–46, QML may be extended to include arithmetic truths without the consequence that numbers have any essential properties at all. '9 is necessarily greater than 7,' for example, comes to: 'In each possible world there is something that is 9 and something that is 7 such that the first is greater than the second'. Furthermore, 'is the number of planets' is not substitutable for 'is 9' in accordance with principles of substitution in modal contexts.

But if one takes it that there is something that is *the* natural-number structure, as Kreisel suggests in "Mathematical Logic: What Has It Done for the Philosophy of Mathematics?" then alternative reductions are isomorphic to but not identical with *the* series of natural numbers. In a world with a von Neumann specification of the series of natural numbers, being a member of 1 will be an inessential property of 0, but being less than 1 will be an essential property. Here, as in the case of the number of planets, etc., the theory of descriptions—or taking singular descriptions ('the empty set') as singular predicates—will be required in the analysis of sentences like 'the empty set is necessarily less than 1'. Harman, in exposing what he takes to be the foibles of essentialists, fails to note that nonessentialists also rely, in their antiessentialist arguments, on the presumption that there are objects of reference, i.e., the series of natural numbers, which are independent of any mode of specification. In that respect taking 9 as the referent of 'the number of planets' is no different from taking 0 as the referent of 'the empty set'.

There is of course a deficiency in the way Harman presents his thesis, of a serious kind. He seems to suggest that one can talk of the properties of numbers, independent of their being part of the structure that makes them eligible for numberhood. This is analogous to the specious arguments that might develop about whether some small carved piece of wood was the queen in a chess game.

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Within the possible world view of QML the matter may be put as follows: among all the direct, nonvacuous, "natural" properties[17] an object has in this world (W), there are those it must have. Among those it must have are those it has in common with objects of some proximate kind (Aristotelian essentialism) and those which partially individuate it from objects of the same kind (individuating essentialism). We see that to say of an object x and an object y that they have all essential properties in common is weaker than claiming identity. But this reflects common speech. To say of x and y that they are essentially the same (the same in essential respects) is a weaker claim than saying they are identical.

What has gone wrong in recent discussions of essentialism[18] is the assumption of surface synonymy between 'is essentially' and *de re* occurrences of 'is necessarily'. But intersubstitution often fails to preserve sense. Would Winston's colleague have been understood if he had said "Winston is necessarily a cyclist?" And would we ever be inclined to use 'is essentially' instead of 'is necessarily' where vacuous properties are concerned, as in 'Socrates is essentially snubnosed or not snubnosed' or 'Socrates is essentially Socrates'? If higher-order objects are candidates for essential attribution (as Cartwright freely allows) then substitution will sometimes take us from truth to falsity, as in 'p is essentially true' or 'p is essentially correct'. The connection between the two locutions is not a surface matter. It is best analyzed within some model of QML.

Which of the Kripke model structures (W,K,R) are suitable for our analysis? Parson's results clearly exclude maximal models (where R is symmetric and transitive as well as reflexive). Intuitive considerations suggest that, so far as Aristotelian essentialism is con-

[17] In what follows, by indicating how we "give" an interpretation for purposes of paraphrase (as distinguished from specifying how we make truth assignments to sentences of our language) and by placing certain restrictions on predicates, we have excluded many predicates that Hume and others would have called nonnatural. See Hilary Putnam, "The Thesis that Mathematics Is Logic," in Schoenman, *op. cit.*, pp. 299–301, for a brief discussion of the "natural" and "philosophical" notion of a predicate or property.

Carnap, in *The Logical Syntax of Language*, pp. 308–309, recommends exclusion from the class of property-words of those which correspond to what he calls "transposed properties." From his examples we see that his "transposed properties" overlaps the loose traditional characterization of "nonnatural properties." Among his examples are the property a city has if its name is the alphabetical predecessor of the name of a city with more than 10,000 inhabitants; given of course a complete list of names of cities. He also includes properties like being famous, or being discussed in a certain lecture, as not being "qualities in the ordinary sense."

[18] See for example, Plantinga, "*De Dicto* and *De Re*"; also "World and Essence," *Philosophical Review*, LXXIX, 4 (October 1970): 461–492.

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cerned, the chosen system should perhaps satisfy the converse of the Barcan formula (the domain of this world W is included in the domain of each K′ possible relative to W) and R should be transitive (i.e., quantified S4). But that is merely a suggestion. Nothing we are claiming in this paper rests on that particular choice of a system.

Whenever our purpose is to use an interpreted formal language for paraphrase and analysis of an ordinary sentence, how we specify the interpretation $\mathcal{I}$ is crucial, if, in addition to preserving truth in translation, we want somehow to preserve meaning to the maximum extent. It is perhaps gratuitous to emphasize that this is as true of interpretations of SFL as of MFL. We would not, in an $\mathcal{I}$ of SFL (which includes numbers in its domain), choose, from among all possible names for 9, 'the number of planets'; for then the ordinary sentence 'the number of planets is (identically) 9' goes into $\mathcal{I}$ as 'the number of planets is the number of planets'. We would not make that choice because we are not inclined to obliterate meanings unnecessarily. Nor would we choose 'the henpecked, snubnosed, hemlock-drinking philosopher' over 'Socrates' as the name we associate with some constant for designating that individual.

Such considerations are crucial for translatability into QML. For the strategem of talk about possible worlds is that truth assignments of sentences and extensions of predicates may vary, but individual names don't alter their reference, except to the extent that in some worlds they may not refer at all. If, therefore, we take as Socrates's name a singular description that picks him out in this world only, our purpose is defeated at the outset. What we want is that neutral peg on which to hang descriptions across possible worlds. Similarly, the "sense" of sentences and predicates is preserved across possible worlds. For those who are quick to argue that ordinary names cannot always be used in such a purely referential way, we can, in giving the interpretation, expand our lexicon to provide neutral names where necessary.

Given some choice of an appropriate system, we specify as follows: Associated with sentence symbols are ordinary sentences (not descriptions of sentences). Associated with individual symbols are ordinary names, not singular descriptions. Where ordinary names are lacking, such nameless objects are first given "ordinary" names by a suitable convention for avoiding duplication of names. (A lexicon is kept.) Where more than one object has the same name, we distinguish them by a suitable convention. For symmetry we might add that, when one object has several names, we choose one as its standard name. This would be required for contexts that have

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greater obliquity than those here considered. We are restricting indirect occurrences of variables to those which occur within the scope of a modal operator so interpreted as to permit intersubstitutability *salve veritate* of names (not descriptions) of the same object.

Associated with predicate symbols are standardized predicates. A standardized predicate is like an ordinary sentence modified as follows: Disambiguate names of multiple reference. Replace one or more occurrences of names by place markers. Quine's "standard English predicate" for example, with the following extension: the only indirect occurrences of names replaceable by place markers are those which fall within the scope of a modality translatable into QML. For example, suppose, as Leonard Linsky claims, that "the statements 'I did not miss this morning's lecture, but I might have' and 'I did not miss this morning's lecture, but there is a possible world in which I did' are full paraphrases of each other."[19] Then, since 'might' goes into '$\Diamond$', the predicate formed from Linsky's sentence is indirect, i.e., contains an indirect occurrence of a place marker.

There remains the representation of singular descriptions. If our choice of (W,K,R) contains identity, then the theory of descriptions with attention to scope will work. An alternative, with or without identity, is taking singular descriptions (not names) as uniquely satisfiable predicates.[20]

A word of caution here. In specifying how we paraphrase, we hope to avoid a few muddles. Plantinga, for example, has staked several arguments on the claim that being snubnosed in W is a property Socrates has in all possible worlds that contain him and is, therefore, essential. Are we to suppose that 'Socrates is snubnosed in W' like 'Socrates was born in Athens', is one of those ordinary sentences we associate with sentence symbols of our interpreted QML, that in the domain of our interpretation there are places, one of which is Athens and the other the world, which would put W in the domain of W?

[19] "Reference, Essentialism, and Modality," this JOURNAL, LXVI, 20 (October 16, 1969): 687–700. We are excluding here epistemic contexts along with stronger obliquity in the formation of predicates. For example 'John' and 'Jill' may both be replaced in 'John might have married Jill', but only 'John' may be replaced in 'John knew Jill left town' or 'John wished Jill would marry him'.

[20] In my "Modalities and Intensional Languages," Russell's theory, or alternatively, taking descriptions as unit attributes or unit properties was proposed. In either case extensionally equivalent expressions (sentences in the theory of descriptions, predicates in the other) are not intersubstitutable in modal contexts.

I have omitted here any proposals for reinterpretation of quantification, along substitutional lines. It is important to separate the grounds for such a view of quantification from its usefulness in connection with substitution in indirect contexts. We are, however, presuming a difference between names and descriptions.

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All that Plantinga's funny sentence (P) might come to is that, in our choice of (W,K,R), its truth assignment is T in W and so, therefore, must be the assignment to $\Diamond P$. If we should also choose QS4 as our basis, it will not follow that $\Box\Diamond P$ is assigned T.[21] Furthermore if we are to conform to coherent cases, we will argue below that indirect predicates are excluded from the characterization of essentialism; for would anybody, including essentialists, ever say that Socrates is essentially possibly snubnosed?

Implicit in essentialism is that an object has attributes necessarily that are not necessary to other objects. To say that Socrates is essentially a man is to take as true

$$\Box F(s) \cdot (\exists x) \sim \Box F(x) \tag{1}$$

from which it follows that

$$(\exists x)\Box F(x) \cdot (\exists x) \sim \Box F(x) \tag{2} \qquad (E_M)$$

Indeed, (2) may be taken as minimal essentialism, where F is any monadic predicate that contains no constants. (2) excludes such tautological predicates as $F(x) \vee \sim F(x)$. There is another kind of vacuous predicate, the partial instantiation of a tautological predicate, which the essentialist does not count as designating essential attributes; e.g., $F(s) \sim F(x)$ is necessarily true of s but not of anything else. In order to exclude such cases, as well as for extending our characterization to relational attributes, Parsons has generalized (2) to F^n in such a way as to sort out those identities which hold between free variables in F^n. For simplicity of presentation I will restrict the discussion to monadic predicates that are general (i.e., contain no constants).

To those who argue that the exclusion of vacuous predicates is arbitrary and *post hoc* we need only point out that Aristotle excluded them, for such philosophers also claim that they have in mind some version of Aristotelian essentialism. Bennett (*op. cit.*) sums up the Aristotelian view as follows:

> Being an entity is a necessary property of everything, i.e., a transcendental property.... Essential properties sort the entities of which they are true in some fashion (487).
>
> Being an entity, like being self-identical and being a unity, failed to sort Socrates from anything. Everything is an entity, self-identical, a unity. Being identical with Socrates, on the other hand, sorted Socrates from everything. Nothing but Socrates is identical with Socrates. Essential properties are not transcendental, and they are not ... individuative (494).

[21] We have not presumed symmetry of the alternativeness relation.

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As we noted above, an extension of QML that includes truths like (2) supposes that there are necessities other than logical. But this conforms to cases. Aristotle, in his theory of essences, was after all concerned with some kind of natural necessity. Indeed, if it is true, as some claim, that numbers have essential properties (that meet the condition of minimal essentialism), did not Kant classify such truths as synthetic, although a priori?

We now see that, although Quine is mistaken in claiming that "*any* quantified modal logic is bound to show favoritism among the traits of an object" and "must settle for essentialism,"[22] it *is* true of a QML that imports even minimal essentialism, for (2) *does* show favoritism among the traits of an object. Surely if I were to say of Quine that he was necessarily either snubnosed or not snubnosed, he could not accuse me of playing favorites among *his* traits. But if I were to say that he is essentially a man or essentially a philosopher, that *is* playing favorites; but is it on the face of it, senseless? If he still finds it so, he is not compelled to reject QML altogether. He can restrict himself to maximal models of QML, in which essentialist statements are demonstrably false. The ontology of such models is one of bare particulars.

III

In the present section I will discuss extensions of (2), which fit some modes of essentialism.

(A) Where an object has essential attributes it is implicit that it has attributes that are not necessary.[22] This could be represented as

$$(3) \qquad (\exists x)(\Box F(x)\cdot G(x)\cdot \sim \Box G(x))\cdot(\exists x)\sim \Box F(x) \qquad (\mathrm{E}^*)$$

One might want to weaken E* by substituting '$\Diamond G(x)$' for '$G(x)$' or further strengthen the second conjunct. But our interest is not in spinning out alternatives. What is worth indicating is that, if E* is presumed, we see why statements like '9 is essentially composite' may strike us as odd if we believe that all the attributes of a number are necessary. However, against a background of set-theoretic reductions, one might want to claim (for a world with a von Neumann reduction) that being less than its successor is an essential property of numbers and being a member of its successor is not.

But, as Harman (*op. cit.*) has pointed out, there are difficulties here. On a Russellian account, E* has greater plausibility. If our

[22] *From a Logical Point of View*, rev. ed. (Cambridge, Mass.: Harvard, 1961; New York: Harper & Row, 1963), p. 155.

[23] On the one occasion where Quine attempts a formal characterization, he chooses for "Aristotelian essentialism," the first conjunct of (3); see "Three Grades of Modal Involvement," p. 174.

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characterization is extended to higher-order objects, then it is a nonnecessary property of 9 that it is a property of the set of planets. The number of planets might be 8 in some world that is possible relative to W.

(B) Individuating essentialism. An extension of E_M that conforms to cases of what I have called "individuating essentialism" is

$$(4) \qquad (\exists x)\Box F(x) \cdot (\exists x)(F(x) \cdot \sim \Box F(x)) \qquad (E_I)$$

E_I may be extended to include E* by appropriate strengthening of the first conjunct. This yields (E^*_I).

(C) Aristotelian essentialism. In contrast with E_I, Aristotelian essentialism takes it that, if anything is a man or a mammal, it is so necessarily. These are not properties that *anything* can have *per accidens*. The same strong condition extends to properties (e.g., rational-animal) which are definitive of a kind (e.g., man). Versions of this condition are:

$$(5) \qquad (x)(F(x) \supset \Box F(x))$$

$$(6) \qquad (x)\Box(F(x) \supset \Box F(x))$$

$$(7) \qquad \Box(x)(F(x) \supset \Box F(x))$$

Conjunction of one of (5)–(6) with E_M or E* will give us some mode of Aristotelian essentialism. Since Aristotle did seem to presume accidental attributes, conjunction with E* is plausible, as in

$$(8) \quad (x)(F(x) \supset \Box F(x)) \cdot (\exists x)(\Box F(x) \cdot G(x) \sim \Box G(x)) \cdot (\exists x) \sim \Box F(x) \quad (E^*_A)$$

Attributes satisfying some mode of Aristotelian essentialism are seen to be disjoint with what we call individuating essences. E_I is a perplexing thesis, although suggested by use. However, unless we have reason to suppose that E_I is false, we can take (4) and (8) [or one of the alternatives to (8)] as sorting essential attributes.

(D) Further modifications. As we noted above, a further restriction on eligible predicates, in addition to generality, is that they be nonmodal; i.e., direct predicates. Paraphrasing Jevons, the essentialist is not intimating the mode or manner of the mode or manner in which the predicate belongs to the subject. Indeed iterated adverbs, modification of modifiers rarely occur sensibly in ordinary discourse, although within the semantics of QML we can make sense of iterated modalities.

If, in addition to generality and directness, which are required for conformity to cases of essential attribution, we further restrict our predicates with some loose approximation of "natural" predication

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in mind, an interesting result follows with respect to the relation between *de re* and *de dicto* modalities. In our formal language we can form "artificial" predicates[25] in the very imprecise sense that translation back into colloquial speech ranges from extremely awkward to impossible. Consider the predicate formed from so simple a sentence as 'Someone offered Socrates poison.' which goes into '$(\exists x)P(xy)$'. To what property of Socrates does it correspond? Is it the property of being offered the hemlock by someone? Yes; but we can also see that predicates that contain quantifiers even when they are just beyond minimal complexity border on the inexpressible. The same is true of predicates that contain sentence parts. What property does an object have if it satisfies 'All ravens are black. $x = x$'? If we take as our stock of eligible E-predicates those which have no quantifiers and no sentence parts, and are direct and general (N-predicates), then, as Parsons[27] has shown, if E_M is true where F is as above, then, for any nonmodal sentences S, if S is not already a theorem, $\Box S$ is not entailed by E_M. Those, like Plantinga, who imagine that with sufficient cunning they can "reduce" the essentialist's *de re* truths to *de dicto* truths have not been sufficiently attentive to these results.

In our specification of N-predicates we could of course simply have required that they be built up out of atomic predicates and truth-functional sentential connectives. But that *would* have appeared *post hoc*. Our purpose was to frame these restrictions within the context of reasons for accepting them.

Here, as elsewhere in the paper, when we say we are "characterizing" Aristotelian essentialism and the like, we are not suggesting that such characterizations are complete. There is good reason to believe that a complete characterization of Aristotelian essentialism (if it is possible) would further require the introduction of temporal modalities. For otherwise, how would we say of an object that when it ceased to have its Aristotelian essence it would cease to exist altogether? Similarly, we are not supposing that our N-properties fully correspond to natural properties (if there is such a characterization).

[24] Since only the converse of the Barcan formula holds, (7) is stronger. We have omitted discussion of an important question as to how, if we were to import such truths, to apply the rule of necessitation.

[25] Parsons' requirement of generality simplified the characterization of essentialism for *n*th-degree cases. With an abstraction operator (as in my "Essentialism in Modal logic," and his "Grades of Essentialism in Quantified Modal Logic,") the ultimate generality of the predicate can be preserved; e.g., '$a \epsilon x/x = a$' can be transformed into '$\langle a,a\rangle \epsilon xy/x = y$'. The generality requirement in addition fits some loose notion of "natural" predicate.

[26] See footnote 17.

[27] "Essentialism in Quantified Modal Logic," pp. 47–48.

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For, 'being a number or else a philosopher and a cow' would count as an N-predicate. Further specification would require, perhaps among extensions of QML with meaning postulates, something like a theory of categories. Still, the predicate 'being a number . . .' is at least intelligibly expressible.

Let us return now to the question of the "commitment" of QML to essentialism. For Kripke it was sufficient to define a model in terms of a set of assignments of truth values to sentences, extensions to predicates, along with specification of the domain (a subset of the union of domains of members of K) for each K′ or K. For any model short of a maximal model, there will be some object and some P-assignment such that, in any K in which the object exists, it will be in the extension of P. In this sense, we might say that, for non-maximal models, QML is committed to essentialism, although no instance of minimal essentialism is a theorem. But, as I have suggested, essentialist talk is frequently unproblematic. With careful specification of how we paraphrase such talk in QML, we can characterize some modes of essentialism. And, as I will claim for at least one mode, Aristotelian essentialism as here characterized, it is firmly entrenched in the logic of causal statements.[28]

IV

Consider some familiar examples. I say of a sample (s) that if I put it in aqua regia (R) it would dissolve (D). We do not take such a claim to be unintelligible. Suppose we interpret '$\Box$' of our QML as causal or natural necessity. Then our example may be represented as

$$\Box(R(s) \supset D(s)) \tag{9}$$

Suppose I say of another sample of some different material (u) that if I immersed u it wouldn't dissolve, from which it would follow that

$$\sim \Box(R(u) \supset D(u)) \tag{10}$$

and, therefore, that

$$(\exists x)\Box(R(x) \supset D(x)) \cdot (\exists x) \sim \Box(R(x) \supset D(x)) \tag{11}$$

which is an instance of minimal essentialism.

We may think of s as having the essential attribute of either not being immersed in aqua regia or dissolving, in all worlds causally possible relative to W.

[28] Recent discussions of essentialism have focused on numerical statement and the like. Parsons showed that in QML, extended to include meaning postulates and arithmetic truths, it can be done in such a way as wholly to avoid any essentialist consequence. Furthermore, there is an intuitive plausibility to these nonessentialist alternatives for construing analytic statements in the broad sense of 'analytic'. On a "natural" interpretation of the modalities, essentialism does not appear to be avoidable.

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Another example. Shylock tells us that if you prick him he will bleed and if you tickled him he would laugh, and if you poisoned him he would die and if you wronged him he would revenge. Each of Shylock's assertions could be represented as in (9). If he had added, the same is not true of a stone, then we have essentialism, and it is all perfectly coherent. Let us suppose (9) is true and someone were to ask "Why?" Why would s dissolve if it was immersed in aqua regia? Why would Shylock bleed if pricked, die if poisoned, laugh if tickled? An appropriate answer to the first question is "Because s is gold." To the second, if the question is not divided, "Because Shylock is a man." The answers to these questions begin with 'because', but what follows is not an event description but a statement that attributes a kind property to the object. How is it that an object's being of a certain *kind* is a ground (and apparently causal) for its having some essential property, or for there being some causal or necessary connection between its nonessential properties, e.g., between the pairs (being immersed in R, dissolving), (being tickled, laughing), (being pricked, bleeding) etc.?

Define the corresponding causal conditional as follows:

$$S \rightarrow_c P =_{df} \Box(S \supset P) \tag{12}$$

then it must be that (9) follows from

$$(G(s) \cdot R(s)) \rightarrow_c D(s) \tag{13}$$

which in turn instantiates some general law. But which one?

There are alternatives, since the modal operator may be inside or outside the quantifier. If our QML choice is QS4 with the converse of the Barcan formula, then the weaker alternative is

$$(x)((G(x) \cdot R(x)) \rightarrow_c D(x)) \tag{14}$$

The difference between (14) and other versions is illuminating with respect to questions of invariance of laws, but we will defer such considerations. Our question now is, how do we get from (13) to (9), which we can rewrite as

$$R(x) \rightarrow_c D(s) \tag{15}$$

since only weakened exportation holds[29] in QML? Restricted exportation on (13) gives us

$$G(s) \rightarrow_c (R(s) \supset D(s)) \tag{16}$$

[29] Failure of unrestricted exportation is a characteristic of conditionals such as strict implication and Anderson and Belnap's entailment, which are stronger than the material conditional. The causal analogue of an unrestricted deduction theorem is surely counterintuitive.

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This is where Aristotelian essentialism comes in. Being gold or being a man is not accidental. Then they must conform to one of (5)–(7). Therefore, from $G(s)$ we get $\Box G(s)$, which, together with the modal principle $(P \rightarrow Q) \rightarrow (\Box P \rightarrow \Box Q)$ and (16), gives us (15).

No metaphysical mysteries. Such essences are dispositional properties of a very special kind: if an object had such a property and ceased to have it, it would have ceased to exist or it would have changed into something else. If by bombardment a sample of gold was transmuted into lead, its structure would have been so altered, and the causal connections between its transient properties that had previously obtained would so have changed that we do not reidentify it as the same thing.

Suppose for comparison, $G(s)$ had been exported in (13) instead of $R(s)$,

$$(17) \qquad R(s) \rightarrow_c (G(s) \supset D(s))$$

Since R(s) is not one of those special dispositional properties, no causal connection obtains between being gold and dissolving; simply being gold would not count as a cause of dissolution any more than simply being a man would alone be a cause of bleeding. On the other hand, although immersion in aqua regia ($R(s)$) is an accidental property, *being* aqua regia is not. The general law would be instantiated as

$$(18) \qquad (A(a) \cdot G(s) \cdot R(sa)) \rightarrow_c D(s)$$

and if a were a sample of aqua regia and s a sample of gold, then it would follow that if s were immersed in a, then s would dissolve. Given that there are objects that do not dissolve when they are immersed, we have

$$(19) \quad (\exists x)(\exists y)\Box(R(x,y) \supset D(x)) \cdot (\exists x)(\exists y) \sim \Box(R(x,y) \supset D(x))$$

which, in a perfectly intelligible way, commits us to essential relations.

Rather than leading into a metaphysical jungle, it seems to me that formulating our analysis within QML is suggestive and illuminating. Different modes of essentialism will place different interpretations on the modalities. But so far as the causal interpretation goes, it suggests interesting relations between laws like (14) and the paradox of confirmation. It allows for solutions to problems about substitution in causal contexts. It raises interesting questions about the generality of laws.

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