

RELATIONS: TURNING RUSSELL'S OTHER FLANK

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In the mid-nineteenth century De Morgan made his famous complaint that neo-Aristotelian syllogistic, as he knew it, could not handle inferences like "This is the head of a horse and a horse is an animal, so this is the head of an animal". At the turn of this century in France we find the noted Idealist Jules Lachelier emphasising De Morgan's point in his logical writings, and there carefully distinguishing relational from predicative judgments, but completely muffling this sort of logical voice when he does his ontological work on the Absolute.¹ At the turn of the century in Britain we find Bertrand Russell—(inspired by De Morgan and a long chain of logicians, culminating in Frege, to doubt the adequacy of syllogistic)—putting forward two extraordinarily influential theses. Many of us do philosophy the way we do because (in good part) of Russell's success with those theses in routing Absolute Idealism. They are:

(*Thesis I*) The terms which we use to express transitive and irreflexive, or intransitive and asymmetrical relations, cannot be represented in a logically satisfying manner by one-place predicates or by concatenations of them. (*The dogma of the indispensability of polyadic predicates*).

(*Thesis II*) The assertion of a true proposition involving a transitive and irreflexive relation, or an asymmetrical relation cannot be correctly cast or recast in a proposition which only commits us to the existence of one individual. (*The dogma of the indispensability of ontological pluralism*).²

Recently in a short paper of much beauty and power, "Plato's 'Phaedo' Theory of Relations" (henceforth PPTR), Hector-Neri Castañeda has set out to show with formal rigour that Russell's first thesis, or dogma, is false.³ We shall touch briefly on certain aspects of Castañeda's strategy, draw out some perennial implications that his

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degree of historical focus on the *Phaedo* leaves unclarified, then try to show that the other dogma may be dispatched with similar formal rigour. On this latter point we acknowledge our indebtedness to comments and advice both from Castañeda himself and from our colleague Charles Grady Morgan.

Since Russell's contribution to the modern 'Revolution in Philosophy' was based considerably on his apparent ability to make Absolute Idealism and any other form of Monism or Monadology appear irreconcilable with the claims of logic (of deductive inference in science, mathematics or ordinary life)⁴, we take the refutation of the second dogma to be no shorter on contemporary relevance and no less historically important.

Castañeda illustrates what he is up to at the level of ordinary speech in the following way. He considers the examples "Simmias is taller than Socrates" and "Mary gave John the first copy of *Noûs*". Such examples are held by Russell to require logical explications of the form "Ra,b" and "Rc,d,e". Castañeda invites us to imagine a natural language somewhat like English in which the same 'facts' are expressed by "Tallness (Simmias)—Shortness (Socrates)" and "Givership (Mary)—Giveship (John)—Givenesship (the first copy of *Noûs*)" (PPTR, 471-472). In somewhat more Russellian-looking terms the neo-Phaedonian analyses would be of the form " $\Phi^1(a)-\Phi^2(b)$ " and " $\Phi^3(c)-\Phi^4(d)-\Phi^5(e)$ ". The ontological doctrines which Castañeda claims to explicate on Plato's behalf are stated thus:

P1: Ordinary particulars have the properties they have by participation in Forms. *P2*: All forms are monadic, *i.e.*, each Form is instantiated only by one particular in each fact it is involved in; no Form is ever instantiated by pairs or *n*-tuples whether ordered or not. *P3*: Some facts consist of a particular instantiating, or participating in, a Form: they are *single-pronged*. Other facts are *multiple-pronged*; they consist of an array of Forms each instantiated by one particular, where these instantiations do not by themselves constitute facts. *P4*: Forms that can enter into multiple-pronged facts cannot enter into single-pronged facts. This is *the law of factual enchainment*. Forms governed by the law constitute Form-chains or *relations*. (PPTR, 471).

The logical machinery for articulating these metaphysical doctrines is discussed in detail by Castañeda at PPTR, 472-6. We shall note a few of his key formal moves before both looking at what such machinery's employment and such moves presuppose if his procedures are to be accepted as *intelligible* procedures. We then pass along to our related attack on Russell's second dogma. Castañeda begins by having one consider sequences of the type $A^{n,j}(x_1, \dots, x_n)$ where " $A^{n,j}$ " designates the *j*th predicate of degree *n* and " x_1 ", \dots , " x_n " are all individual signs. (The usual Russellian formation rule for atomic wffs). By the introduction of a new formation rule Castañeda ingeniously shows that even a relatively trivial notational variant can damage Russell's first dogma as to how relational facts must be expressed from a logical point of view. According to his new formation rule, sequences of the previous type are simply replaced by ones like " $A^{1,n,j}(x_1)-A^{2,n,j}(x_2) - \dots - A^{h,n,j}(x_n)$ ". (PPTR

472-473). To make this replacement non-trivial Castañeda introduces a distinct formation rule to the effect that such sequences of the type " $A^{h_1, n_1}(x_1) - A^{h_2, n_2}(x_2) \dots A^{h_n, n_n}(x_n)$ " are wffs. "where: (a) $h_s = t$; (b) $h_1 + h_2 + \dots + h_n = 1 + 2 + \dots + n$; and (c) each of $x_1, x_2 \dots x_n$ is an individual sign." (PPTR, 474). This rule allows each predicate " A^{i, h_j} " enough individuality and mobility to become ontologically interesting for many philosophers, not least those who insist on finding the roots of philosophical problems in natural language. Just as "Socrates is shorter than Simmias" and "Simmias is taller than Socrates" may be used to state the same fact in ordinary English, so may "Tallness (Simmias)—Shortness (Socrates)" and "Shortness (Socrates)—Tallness (Simmias)" be used in Castaphaedonish. (But note that their representations in Russellian are *not* the same unless by special *ad hoc* decree).

If we are to clarify *how* the difference between Castañeda and Russell can be ontological and not merely inscriptional, then a certain type of explanation seems to be required. This explanation will suggest that Transcendental Arguments about human modes of cognition are shown (by humans' historically regular disputes over ontological or categorial interpretations of commonly known 'facts') to be both partly right and partly wrong. Castañeda leaves us in no doubt that he wants to consider truly ontological or categorial, and not mere inscriptional, differences when he writes: "in the *Phaedo* Plato does adumbrate a reduction of relations to monadic forms, but he does not propose a reduction of relational facts to monadic ones". (PPTR, 472). The Monist who spurns Russell's second dogma also wants to achieve this second kind of reduction. But can we even make sense of such a difference between Castañeda, Russell and the Monist about the logical form of the familiar 'facts'? The same phenomenon, used by each to *verify* his own statement about Socrates and Simmias, is grist for the different categorial mills of each: There must be some accessible, acceptable posit of common experience concerning the facts if our ontologists are able to disagree or at least go their own categorial ways about the same 'subject matter'. We shall thus say that all are confronted, as humans with sufficiently similar genetic, sensory and cultural endowments, by the same Phenomenal Truth-Checking conditions (PT-CC's). Because of cultural background a Castañeda will timelessly tend to have rather more PT-CC's in common at a poker game with a Russell than with a Plato, even if Castañeda and Plato are closer with regard to certain categorial or transcendental truths. But it would be hard to imagine two healthy and linguistic humans, whatever their cultural differences, who did not share across time a vast horde of PT-CC's.⁵ These common PT-CC's enable each to verify, according to his own competitive (or alternative) set of ontological tenets and associated categorial-cum-semantic rules, the proposition "TALLER-THANS (simmias, socrates)" [Russell]; "Tallness (Simmias)—Shortness (Socrates)" [Castañeda's Plato]; "Whereto It simmias¹

and It socratises² Thereto It tallers^{1,2}" [Monist]. Or, again, a Monist moved by Castañeda could competitively interpret the situation as calling for the expressively still superior articulation: "Where to It simmiases¹ and socratises², Thereto It talls¹ - and - It shorts²".

We shall say that sense is made out of Castañeda's differences between Russellians and Monists and his Plato because we can intelligibly distinguish between the coinciding *Phenomenal Truth-Checking Conditions*, which supply a common point of argumentative reference, and their differing *Transcendental Truth Conditions*, which they take to be the basic structure of reality, a structure that language should reflect or exhibit.

In a formalized language, the Transcendental Truth Conditions are determined by the semantics for the language. Just *how* the semantics determine *what* is not now of importance. What *is* important for the present discussion is the recognition that two languages which we might be inclined to say are radically different - (for example, Russellian and Castaphaedonnish) - could turn out to be expressively and deductively equivalent. This would imply that a semantical account of one could serve as a semantical account for the other, preserving soundness, completeness, consistency, *etc.* So how are we to explain our (and also Castañeda's) belief that such languages *do* provide us with distinct Transcendental Truth Conditions? Here it seems we should call upon the venerable concept of a *logically perfect language*. We do not propose to accept all the traditional views on this concept; rather we focus on the portion explicated by David Kaplan.⁶ A logically perfect language incorporates the feature that its semantics exactly recapitulates its syntax. That is, for each primitive (syntactic) formation rule there is an irreplaceable (semantic) evaluation rule. Following this we can say that a given semantics may, or may not, be *logically perfect for* a given language. Take for example, the Castaphaedonnish language. The semantics that Castañeda gives for it is logically perfect, since to each (primitive) formation rule there corresponds an evaluation rule which is not reduced to any other rule. Of course, the classical (Russellian) evaluation rules *could* be pressed into service (because the two languages are expressively equivalent). One need merely (a) translate any Castaphaedonnish sentence into its Russellian counterpart, and (b) evaluate this counterpart by the classical evaluation rules, which are logically perfect for Russellian. But the detour involved in (a) makes this semantics logically *imperfect* for Castaphaedonnish. So a semantics which is logically perfect for a language either will be sufficient for, or will represent a good part of what is sufficient for, telling us what the Transcendental Truth Conditions of a language are. On the other hand, suppose that there is a one-one function which correlates sentences of one language with those of the other. Suppose next that a sentence of one language is satisfied (under an interpretation in a logically perfect semantics for that language) if and only if the corresponding sentence is

satisfied (under the corresponding interpretation in a logically perfect semantics for that language). In cases where these two suppositions hold, we shall say the two languages have the same PT-CC's. Castañeda has shown that Russellian and Castaphaedonnish have the same PT-CC's, and so are equally able to 'capture the facts', yet he has also shown that they have differing Transcendental Truth Conditions, hence that they legitimately express different conceptual or categorial schemes.

Wilfrid Sellars has argued against us in another context that acceptance of PT-CC's as a common element would be a sell-out to the Myth of the Given in its subtlest form.⁷ But rejecting the notion of humans' shared posits of PT-CC's involves rejecting commitment to that which seems to be required to make sense of ontological disagreements among humans—to make sense, that is, of disagreements about what is commonly considered. It is our contention that if, but only if, the PT-CC/TTC distinction makes sense, then Castañeda's defense of the *Phaedo* makes sense. And if his account of relations in terms of one-place predicates (or chains of them) makes sense in the light of this distinction, then the use of the following Monistic language would make quite enough sense to undermine Russell's second dogma. (Elsewhere we have sketched certain Meditation Techniques for helping to understanding what it might be like to 'see' the world through Monist spectacles or with a Monist's TTC's).⁸

We now proceed to the formal details of a Monistic Predicate Logic and its semantics. This account provides the formal foundation for earlier, more intuitive discussions of Monism. (See footnotes 4, 5, 7, and 12.) If Castañeda is right and we are right, then it follows that Russell's contributions to the analytical 'Revolution in Philosophy' are radically unsound, however great the philosophical ingenuity and benefits that may have attended his attacks on Monism, Monadology, and Absolute Idealism. We close with this formal exposé and leave the reader to judge for himself. For our part, we believe that Castañeda has turned one of Russell's flanks with his brilliant defence of the *Phaedo* doctrine of relations as he sees it. Our undertaking here is to show that, just as relational facts *can* further be reduced to monadic facts, so the other flank is no less decisively turned. Analysts should once again take Monism to be a live option. And if Monism can be made articulate, Monadology and Leibnizian talk of mirroring can be made articulate (as the thesis that a complete description of the world requires as many languages with a single subject term as there are entities). Thus each entity may take its referent in turn as the unique subject of which everything else is a predicate or meta-predicate.

A Monist wishing to regiment his language will, of course, not have in this regimentation any symbols which (as we would say) appear to refer to separate, individuated entities. This Monist also will want his semantics to be logically perfect for this regimented language. On the other hand, the natural language of the Monist which is being

regimented must be adequate to describe the (observable) world—just as adequate as the Pluralistic language as regimented by Russell or Quine. Therefore, the Phenomenal Truth-Checking Conditions of the two must be identical. This condition does not tell us *what* the PTCC's of any sentence are, but it does tell us that whatever they are, they are the same for the two languages.

Since the Monist cannot admit symbols which appear to refer to what we would call objects, he is not able to use what we would call individual constants. Nor should he be allowed to use our common nouns (since, as we would say, these are true of distinct objects). Nor can he use our adjectives, since these “modify” common nouns. Nor finally can he use our quantification, which, it seems to us, implies the existence of a certain domain of entities. What then can he use? Well, he can use 1-place verbs, whose subject is the one thing a Monist will admit: It. For example, he might say *It rains* or *It houses*, where these are all to be understood as being actions It performs, or aspects of It. Relationships among aspects of It can be indicated by the Monist with judicious use of ‘Where-to—thereto’ (or perhaps ‘Whereby—thereby-’). For instance, he might say *Where-to It houses thereto It reds*. The PT-CC's of these three italicized sentences are precisely what they are of these three (in the pluralist's jargon): *It is raining*, *There is a house*, and *Some house is red*. We will also want quantifiers to be treated as verbs (or, perhaps, as relations between verbs). Thus the Monistic sentence with the same PT-CC's as the Pluralist's *Some men are mortal* might be *Where-to It mans and It mortals, thereto It co-instantiates/ It sometimes/ It at-least-onces*. (We shall regiment the ‘thereto’ clause as *It soms*.) The sentence *a is bigger than b* would become *Where-to It a's¹ and It b's², thereto It bigs¹—and—It smalls²*.⁹

The Monist's penchant for using verbs (and perhaps adverbs) is not merely syntactical in character. The Monist must give a semantics which recapitulates this. It is this feature of the Monist's language which justifies our saying that the truth-conditions in this semantics gives the Monist's *Transcendental Truth-Conditions* what the language is ontologically committed to.¹⁰ (Or if you prefer, what a user of the language ontologically commits himself to.)

Formula:

1. $F_n^{a,b,\dots,i}$ (where a, b, \dots, i, n are numerals)
2. If Φ and Ψ are formulae, so are
 - a. $\sim\Phi$
 - b. $(\Phi \vee \Psi)$
 - c. $WT(\Phi, SOM^i)$ (where i is a numeral)

To get a model structure for such a language, the Monist will have to consider certain things we might describe as sets. The Monist, of course, will not call them sets, but perhaps *modes of It*. The members of these

sets are not entities, but rather the aforementioned *aspects of It*. The first mode we consider is the set expressing all possible aspects of It. What are the possible aspects of It? They are what is indicated by the elementary things which can be said about It. (Call this set **P**. **P** contains all expressions of the form $F_n^{a,b,\dots,i}$). Since **P** is denumerably infinite, we can give an ordering to the members of **P**. Now let us consider the subset of **P** expressing all the things which *are* said of It. Call this set **U**. Now, a Monist cannot have **U** be empty, since he believes that there is at least one thing which can be said: *It is*. So a monistic model structure will be

$$\mathbf{M} = \langle \mathbf{P}, \mathbf{U} \rangle$$

where **P** is as defined above, $\mathbf{U} \subseteq \mathbf{P}$, and $\mathbf{U} \neq \Lambda$ (empty set).

For a Monist, an interpretation **V** will be a function which relates his language to the aspects of It.

$$\mathbf{V}(\text{SOM}^i) = (g: \mathbf{P} \rightarrow \mathbf{U})$$

$$\mathbf{V}(F_n^{a,b,\dots,i}) \subseteq \mathbf{U}^k \text{ (where } k \text{ is the number of numerals in the superscript)}$$

More informally, $\mathbf{V}(\text{SOM}^i)$ is a set of mappings from possible aspects of It into actual ones; and the interpretation of the other elementary formulae are certain subsets of the k th cartesian product of the things which *are* aspects of It. (This last is rather like subsets of the relationships that *could* hold among the *actual* aspects of It).

All formulae of the Monist's language pick out certain subsets of the functions which map what could be said into what is said, that is, certain subsets of $\mathbf{V}(\text{SOM}^i)$. And the subsets picked out by complex formulae are determined by those picked out by their simpler components, as urged by Frege, Tarski, and many others. Let's indicate the set "picked out" by a formulae Φ , by $v(\Phi)$

$f(i)$ = the i th formula of **P**

$$h \in v(F_n^{a,b,\dots,i}) \text{ iff } \langle f(a), f(b), \dots, f(i) \rangle \in \mathbf{V}(F_n^{a,b,\dots,i})$$

$$h \in v(\sim\Phi) \text{ iff } h \in [\mathbf{V}(\text{SOM}^i) \sim v(\Phi)] \text{ (set-theoretic difference)}$$

$$h \in v((\Phi \vee \Psi)) \text{ iff } h \in [v(\Phi) \cup v(\Psi)] \text{ (set-theoretic union)}$$

$$h \in v(\text{WT}(\Phi, \text{SOM}^k)) \text{ iff there is a } j \in \mathbf{V}(\text{SOM}^i) \text{ which differs from } h \text{ in at most their value of } k, \text{ and } j \in v(\Phi)$$

As for the matter of truth: Φ is (logically) true iff $v(\Phi) = \mathbf{V}(\text{SOM}^i)$ for every interpretation **V**; Φ is (logically) false iff $v(\Phi) = \Lambda$ for every interpretation **V**; otherwise Φ is contingent.

The following definition of a syntactical function c shows how to convert any sentence of the Monist's language into the corresponding one of classical quantification theory.

$$c[F_n^{a,b,\dots,i}] = F_n(x_a, x_b, \dots, x_i) \text{ where } x_i = x_g \text{ iff } f = g$$

$$c[\sim\Phi] = \sim c[\Phi]$$

$$c[(\Phi \vee \Psi)] = (c[\Phi] \vee c[\Psi])$$

$$c[\text{WT}(\Phi, \text{SOM}^i)] = (\exists x_i) c[\Phi]$$

It is similarly obvious that the Monistic model structure **M** can be converted into a classical model structure **M*** such that the classical notions of interpretation **V*** and v^* can be defined exactly as they are in **M** and such that $h \in v(\Phi)$ iff $h^* \in v^*(c[\Phi])$. So it is clear that a Henkin-style completeness proof could be constructed for the Monistic language. This demonstrates the claim that the PT-CC's of the two languages are identical; nonetheless, their TTC's are not—in **M*** there is a set of individuals, in **M** there is not.

To facilitate easy regimentation of his language, the Monist might want to introduce as definitions:

$$\begin{aligned}(\Phi \supset \Psi) &=_{df} (\sim \Phi \vee \Psi) \\(\Phi \& \Psi) &=_{df} \sim (\sim \Phi \vee \sim \Psi) \\WT(\Phi, OM^i) &=_{df} \sim WT(\sim \Phi, SOM^i)\end{aligned}$$

and also introduce a special constant I^{a^b} which satisfies both

$$\begin{aligned}WT(I^{i,i}, OM^i) \\WT(WT(((I^{i,j} \& \Phi^i) \supset \Phi^j), OM^i), OM^j)\end{aligned}$$

—where Φ^j comes from Φ^i by replacing some occurrence of $F_n^{a_1 \dots i \dots k}$ by an occurrence of $F_n^{a_1 \dots j \dots k}$ (so long as the substitution is “proper”— $F_n^{a_1 \dots i \dots k}$ is not “in the scope” of SOM^i or OM^i in Φ^i , and $F_n^{a_1 \dots j \dots k}$ is not “in the scope” of SOM^j or OM^j in Φ^j).

He might also give the following “contextual definition”.

$$WT((\Phi^i \& \Psi^{i*}), CS) =_{df} WT(\Phi^i \& (\Psi^i \& WT((\Psi^i \supset I^{i,j}), OM^j)), SOM^i)$$

(with the stipulation that Ψ^j not also be of the form Ψ^i , and where Ψ^j is obtained from Ψ^i by proper substitution as explained above.

The syntactical function c which converts the Monist's formulae into classical quantification formulae operates on these last few thus:

$$\begin{aligned}c[I^{a^b}] &= x_a = x_b \\c[WT(\Phi, OM^i)] &= (x_i) c[\Phi] \\c[WT((\Phi^i \& \Psi^{i*}), CS)] &= c[\Phi] x_i / (\lambda x_i) c[\Psi]\end{aligned}$$

where the last piece of notation (of the sentence in classical quantification theory) means that free occurrences of the variable x_i in $c[\Phi]$ are to be replaced by occurrences of $(\lambda x_i) c[\Psi]$. (And where it is understood that definite descriptions are to be eliminated à la Russell). Thus, a sentence in a Pluralist's idiom like *The smallest prime number is even* might be regimented:

$$F_1((\lambda x_1) (F_2(x_1) \& (x_2) ((F_2(x_2) \& x_1 \neq x_2) \supset F_3(x_1, x_2))))$$

The sentence *Whereto It evens and both It prime-numbers and It smallests, thereto it co-shows*, which has the same PT-CC's as the Pluralist sentence, might be regimented:

WT ($F_1^1 \& (F_2^1 * \& WT(((F_2^2 \& \sim I^{1*2}) \supset F_3^{1*2}), OM^2))$), CS)

F_1 : is even, F_2 : is a prime number, F_3 : is smaller than (for the Pluralist; *mutatis mutandis* this applies to the Monist).¹¹

What we hope to have strongly supported in this paper, by treating the Monist's particularly difficult case, is the claim that any ontological scheme worth its symbolic salt can be given a firm logical basis in the sense of having the appropriate TTC's. Logic in itself is independent of such schemata and thus cannot legitimately be used to refute them. The most that can be said is that certain of these ontological frameworks lead to a more easily expressed model structure. But this by itself cannot be an adequate reason for rejecting a categorial scheme. The moral is clear: *Ontological questions cannot be decided by logical analysis*.¹²

NOTES

¹J. Lachelier, *Oeuvres*, (Paris, 1933), ed. L. Brunschvicg, I, 129-138; I, 200-219.

²Cf. Russell, *The Problems of Philosophy* (London, 1912), pp. 101 ff; *A Critical Exposition of the Philosophy of Leibniz* (Cambridge, 1932, Sec. Edition), 13-15; *Logic & Knowledge* (London, 1956, ed. R.C. Marsh) 221, 225-226. The fusing and flaunting of these dogmas is typified by such sentences of Russell's as "It is easy to prove that the fact expressed by a proposition (like 'A precedes B', 'A is to the left of B') cannot consist of the possession of a quality by a substance"; "... a proposition must, in the last analysis, have a subject and a predicate ... Any philosophy which uses either Substance or the Absolute will be found, on inspection, to depend on this belief".

³*Journal of Philosophical Logic* I, 2 (1972), 467-480.

⁴Russell's treatment of Leibniz's Monadology on the score of handling External Relations has been recently attacked by Nicholas Rescher in *The Philosophy of Leibniz*, (New Jersey, 1967), 72-79 and Hide Ishiguro *Leibniz's Philosophy of Logic and Science* (Ithaca, 1972), 71-105. If the Monistic system we shall construct here proves viable, then Monadology can be articulated contrary to Russell's claim, whether or not Rescher's and Ishiguro's attacks are successful. See our remarks at *Zeitschrift für allgemeine Wissenschaftstheorie* III, 1 (1972), 33-35.

⁵See our remarks at *Laval Théologique et Philosophique*, XXXIX, 2 (1973), 126-30.

⁶D. Kaplan, "What is Russell's Theory of Descriptions?" in D.F. Pears (ed.) *Bertrand Russell: A Collection of Critical Essays*, (Garden City, N.Y., 1972), 227-244. Richard Rorty offers a notable discussion of these views in the introduction to his anthology *The Linguistic Turn* (Chicago, 1967).

⁷See our "Myths of the Given and the 'COGITO' Proof", *Philosophical Studies*, xiii, 4 (1961), 49-53. We comment on a letter of Sellars' at 52-53.

⁸*Laval Théologique et Philosophique*, XXXIX, 2 (1973), 132-135.

⁹The substitution of one-place predications in Castañeda-like chains for expressions of the form *It biggers*^{1,2} might make Monism even easier for some (nearly) broad-minded people to swallow.

¹⁰Or, as Castañeda puts the same point in reference to the Platonist: he cannot be happy with the mere typographical change, because he wants the complexity of the symbol (*i.e.* the symbol denoting relations) to represent some ontological structure. This piece of semantics is indeed what makes his typographical change a genuine orthographic alteration, *i.e.*, an ontologically correct writing.

¹¹Since The Monist's language is an ordinary first-order theory with equality and has an infinite normal model, it has a normal model of any cardinality \aleph_α . See, for proof, Mendelson, *Introduction to Mathematical Logic*, p. 93. Thus the Monist's language can be extended to handle non-denumerable domains.

¹²Much of the groundwork for the present technical proposals is discussed informally in John King-Farlow and J.M. Rothstein, "Dialogue Concerning Natural Metaphysics", *Southern Journal of Philosophy*, Vol. VII, 1, 1968, pp. 24-30.