

Theory and History of Ontology by Raul Corazzon | e-mail: rc@ontology.co

Logical and metaphysical works of Richard Sylvan [né Routley] (1978-1988)

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Bibliography

- Routley, Richard. 1978. "Semantics for Connexive Logics I." *Studia Logica* no. 37:393-412.

"According to the third view in the ancient debate on the nature of conditionals,[*] a sound conditional requires a connexion between antecedent and consequent. Both material implication (the first ancient view) and strict implication (the second ancient view) were rejected by the third view as satisfactory accounts of the conditional relation because they deliver conditionals such as those of the paradoxes of implication which are unsound, presumably on the ground that they fail to meet the requirement of connexion. We do not know what conditionals were said to meet this requirement, other than Identity, $A \rightarrow A$ (a principle that was explicitly rejected under the fourth ancient view).

The third ancient view has reappeared in the modern debate as to the nature of entailment, implication and conditionality, where the connexion requirement is commonly imposed as a requirement of meaning or content connexion between antecedent and consequent of valid implications. This requirement coincides with the broad requirement of relevance: for if antecedent and consequent enjoy a meaning connexion then they are relevant in meaning to one another, and if they are relevant in meaning to one another then they have through the relevance relation a connexion in meaning." (p. 393)

(...)

"Although the semantical analysis resolves many problems concerning connexive logics and provides new means of attacking other problems, it leaves many

- problems - perhaps too many - open." (p. 410)
 [*] *Note added* : See Sextus Empiricus, *Outlines of Scepticism* , edited by Julia Annas and Jonathan Barnes, Cambridge: Cambridge University Press, 200, II, 110–11 (pp. 95-96).
2. ———. 1978. "An Inadequacy in Kripke-Semantics for Intuitionistic Quantificational Logic." *Bulletin of the Section of Logic* no. 7:61-67.
 "The semantics for intuitionistic quantificational logic, that have come to be known as Kripke-semantics (see, e.g., [2], p. 246) after the influential presentation of Kripke [1], turn out to be unsound. Since a large body of theory concerning intuitionistic logics and mathematics is now based on these semantics the matter is of more than merely local significance.
 Although the points made apply equally against many other presentations of Kripke-semantics for intuitionist logic (e.g. those of Thomason [3], Aczel [4], Gabbay [5] and elsewhere), it is convenient to focus on Kripke [1], and to borrow his terminology and notation. Kripke in turn adopts (see [1], p. 93) the formulation of intuitionistic predicate logic of Kleene [6], and it is advantageous to follow suit. It is worth noting that Kleene's formulation allows both for free variables and for constants (and so also do the formulations adopted by some others: e.g. Thomason [3], p. 1 and Aczel [4], p. 2)." (p. 61)
- References
 [1] S. A. Kripke, *Semantical analysis of intuitionistic logic I*, [in:] *Formal Systems and Recursive Functions* (edited by J. N. Crossley and M. A. E. Dummett), North-Holland, Amsterdam, 1965, pp. 92-130.
 [2] A. A. Fraenkel, Y. Bar-Hillel and A. Levy, *Foundations of Set Theory* , Second Revised Edition, North-Holland, Amsterdam, 1973.
 [3] R. H. Thomason, On the strong semantical completeness of the intuitionistic predicate calculus, *Journal of Symbolic Logic* , vol. 33 (1968), pp. 1-7.
 [4] P. H. G. Aczel, Saturated intuitionistic theories, [in:] *Contributions to Mathematical Logic* , Proceedings of the Logic Colloquium, Hanover, 1966 (edited by H. A. Schmidt, K. Schütte and H. J. Thiele), North-Holland, Amsterdam, 1968, pp. 1-11.
 [5] D. M. Gabbay, On 2nd order intuitionistic propositional calculus with full comprehension, *Archiv für mathematische Logik und Grundlagenforschung* , vol. 16 (1975), pp. 177-186.
 Gabbay's earlier papers on the representative decidability and undecidability of various intuitionistic theories are cited in this paper.
3. ———. 1978. "Choice of Logical Foundations: Ultramodal Logic and Dialectical Foundations (Abstract)." *Journal of Symbolic Logic* no. 43:363-364.
4. ———. 1978. "Constant Domain Semantics for Quantified Non-Normal Modal Logics and for Certain Quantified Quasi-Entailment Logics." *Reports on Mathematical Logic* no. 10:103-121.
5. ———. 1978. ""Dialectical Set Theory (Abstract)." *Journal of Symbolic Logic* no. 43:363.
6. ———. 1978. "Lewis' Calculus of Ordinary Inference (as amended 1920 and 1977)." *Bulletin of the Section of Logic* no. 7:4-11.
 "In his original presentation of The System of Strict Implication ([1], chapter V) Lewis considers a 'partial system contained in Strict Implication' to which he believes some interest attaches.
 If our aim be to create a workable calculus of deductive inference, we shall need to retain the relation of logical product, $p \& q$, but material implication, $p \supset q$, and probably also material sum, $p \vee q$, may be rejected as not sufficiently useful to be worth complicating the system with. The ideas of possibility and impossibility also are unnecessary complications. Such a system may be called the Calculus of Ordinary Inference ([1], p. 318; with modern notation for connectives." (p. 4)
- References

- [1] C. I. Lewis, *A Survey of Symbolic Logic*, University of California Press, Berkeley, 1918.
7. ———. 1978. "Ultramodal Logic as Universal (Abstract)." *Journal of Symbolic Logic* no. 43:355-356.
8. Routley, Richard, and Loparić, Andréa. 1978. "Semantical Analysis of Arruda da Costa *P* Systems and Adjacent Non-Replacement Relevant Systems." *Studia Logica* no. 37:301-320.
- "Systems in the vicinity of the *P* systems, first formulated by Arruda and da Costa [1] (1) are logically important, for several reasons. Firstly, it is evident that a naive set theory with an unrestricted comprehension axiom, designed with certain of these systems as underlying logic, will prove to be a non-trivial though inconsistent theory (2). Thus, as remarked in effect in [1], these systems offer important initial bases on which to endeavour to erect mathematically adequate paraconsistent set theories." (p. 301)
- (1) Da Costa's use of *P* systems, and also of other systems than his *C* systems, was quite unfairly neglected in [8], where it was suggested that da Costa, though having the fine vision of a general theory of inconsistent or (as they are now called) paraconsistent systems, had concentrated on much too narrow a range of systems. But a theory of sufficient generality of paraconsistent systems -- as distinct from the investigation of just a few systems of the class -- has yet to be worked out.
- (2) Inconsistency is readily established by paradox arguments, e.g. by the standard argument for the Russell paradox. The intuitive argument which makes non-triviality evident is as follows: -- It is known from [2] that an extensional comprehension axiom can be added to quantified *P* systems without trivialising them, that is one can non-trivially adjoin a comprehension axiom limited only by the requirement that set determining wff contain but extensional connectives and quantifiers, i.e. in this context, contain no occurrences of the implicational connective \rightarrow . But, as the semantics will show in the case of appropriate *P* systems such as *BH*, no reduction of nested implication can be effected in these *P* systems; thus even if implicational connectives should occur in set determining wff they cannot be utilised, they are effectively locked away in the set determining wff. Hence, intuitively at least, an unrestricted comprehension axiom can be added to appropriate *P* systems without trivializing them.
- A proper demonstration of the non-triviality of naive set theory based on appropriate *P* systems can, it appears, be obtained enlarging on the persistence methods of [2], by adding world by world variation to the modelling that establishes the non-triviality of extensional dialectical set theory. Such a proof is made easier by the simplicity, surprising in view of [3], of the semantics for appropriate *P* systems. Da Costa and Arruda have apparently devised a different demonstration of the non-triviality of *P* with unrestricted comprehension.
- References
- [1] A. I. ARRUDA and N. C. A. DA COSTA, O paradoxo de Vurry-Moh-Shaw-Kwei, *Boletim da Sociedade de Matemática de São Paulo*, vol. 18 (1963).
- [2] R. T. BRADY and R. ROUTLEY, The non-triviality of extensional dialectical set theory, to appear. [G. Priest, R. Routley, & J. Norman (Eds.), *Paraconsistent Logic, essays on the Inconsistent*, Munich: Philosophia Verlag 1989, pp. 415–436.]
- [3] R. ROUTLEY and R. K. MEYER, Towards a general theory of implication and conditionals II, *Reports on Mathematical Logic*, vol. 9 (1977), pp. 47-62.
- [8] R. ROUTLEY and R. K. MEYER, Dialectical logic, classical logic, and the consistency of the world, *Studies in Soviet Thought*, vol. 16 (1976), pp. 1-25.
9. Routley, Richard. 1979. "The Theory of Objects as Commonsense." *Grazer Philosophische Studien* no. 9:1-22.
- "It is beginning to be appreciated that the Meinong of the mainstream philosophical literature is a mythological figure, that Meinong's philosophy has in fact been presented in an unfair fashion (perhaps even by largely sympathetic expositors such

as Findlay [2]), and that the theory of objects in particular has been either widely misunderstood or else deliberately misrepresented. What has not been much appreciated is that Meinong's theory of objects represents an important alternative to standard (Russellian) logical theory. (1) Whereas the entrenched theory is both reductionist and logico-empiricist in spirit, the alternative is nonreductionist, antiverificationist, and commonsense. Since the theory of objects has often - there are, however, important exceptions - been taken to be the very antithesis of commonsense, there is some explaining to be done. The problems are compounded by the fact that it is not at all easy to say what commonsense amounts to, and even more difficult to show that a philosophical theory is a commonsense one." (p. 1)

(1) There need be no apology for calling modern, standard, orthodox, "nondeviant", "classical" logic 'Russellian'. The orthodox logic of the textbooks consists essentially of variations and improvements (or sometimes the reverse) on the logical theory devised in large measure by Russell, building on the work of Peano and others, and worked out in collaboration with Whitehead in *Principia Mathematica* [5]. Certainly there have been important additions by Hilbert, Wittgenstein, Tarski, Gentzen and others but these do not affect the general claim. In these terms influential modern logical theories, such as those of Quine [15], are but variations on a theme of Russell's. And they share the reductionist empiricist assumptions of Russell's logical theory.

References

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[5] A.N. Whitehead and B. Russell, *Principia Mathematica*, Second edition, Cambridge University Press, Cambridge, 1950.

[15] W.V. Quine, *From a Logical Point of View*, Second edition, revised, Harvard University Press, Cambridge, Mass., 1961.

10. ———. 1979. "Some Bad Arguments for and Against Conventionalism." *International Logic Review* no. 10:84-90.
11. ———. 1979. "Dialectical Logic, Semantics, and Metamathematics." *Erkenntnis* no. 14:301-331.
- "As with the thesis that God exists, so with the Consistency Hypothesis that the world is consistent, there are three main positions that can be taken; namely, a theistic or classical position which accepts the hypothesis, an agnostic or relevant position which suspends judgement, and an atheistic or dialectical position which rejects the hypothesis. (1) Here the world is Wittgenstein's world, the real or actual world of intensional semantics, that is the class T of all truths, and the Consistency Hypothesis, CH, is the thesis that T is simply consistent, that it contains no contradictory pairs of the form A and $\sim A$, where $\sim A$ is the negation of A. T, whether consistent or not, by no means exhausts the class of statements; for it is an empirical truth that the world is not trivial, that not all statements are true. Neither relevantly nor dialectically, however, does inconsistency lead to triviality; to assume, as classically, that it does is to assume the matter at issue, for the assumption is tantamount to CH (as [1]) explains)." (p. 301)
- (...)
- "The remainder of this paper endeavours to contribute something further to the discernment of such a dialectical theory, to circumscribing its underlying static logic and furnishing its semantics, to establishing its adequacy, and to outlining certain of its applications in mathematical and foundational studies." (pp. 302-303)
- (1) 1 Whereas in [1] adoption of the relevant position was argued for as the rational course of action, in [3] and [11] the dialectical position is defended. The case for the shift from the agnosticism of 1973-1974 to atheism is explained in [3]. [1] and [11] are desirable background reading for the present paper.

References

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- [3] Routley, R., Routley, V., and Meyer, R. K., *Relevant Logics and Their Rivals*. Research School of Social Sciences, Australian National University, 1980.
- [11] Routley, R., Ultralogic as Universal, in the *Relevance Logic Newsletter*, 2 (1977), 50-90 and 138-175.
12. ———. 1979. "Alternative Semantics for Quantified First Degree Relevant Logic." *Studia Logica* no. 38:211-231.
 Abstract: "A system **FDQ** of first degree entailment with quantification, extending classical quantification logic **Q** by an entailment connective, is axiomatised, and the choice of axioms defended and also, from another viewpoint, criticized. The system proves to be the equivalent to the first degree part of the quantified entailment system **EQ** studied by Anderson and Belnap; accordingly the semantics furnished are alternative to those provided for the first degree of **EQ** by Belnap. a worlds semantics for **FDQ** is presented, and the soundness and completeness of **FDQ** proved, the main work of the paper going into the proof of completeness. The adequacy result is applied to yield, as well as the usual corollaries, weak relevance of **FDQ** and the fact that **FDQ** is the common first degree of a wide variety of (constant domain) quantified relevant logics. Finally much unfinished business at the first degree is discussed."
 References
 Alan R. Anderson, Nuel D. Belnap, *Entailment: The Logic of Relevance and Necessity*, Vol. I, Princeton: Princeton University Press, 1975.
13. ———. 1979. "The Semantical Structure of Fictional Discourse." *Poetics* no. 8:3-30.
 "An attempt is made to account for the evident truths supplied by fictional discourse, and to vindicate the ordinary naive theory of fictions, within the single framework of universal semantics and the theory of objects. The theory offered is an elaboration of a contextual theory (which tits easily into universal semantics) according to which the context supplies base-shifting functions which alter the world where truth is assessed. The elaboration consists, firstly, of expansion of the theory of contexts to meet various objections, and, secondly, of deployment of the theory of objects to account for truths concerning fictional objects in non-fictional contexts (as regards the second, various options open on the contextual theory are sketched; but an important option the author now prefers is omitted).
 An account is given of fiction and its distinctive semantical features. A work of fiction is regarded as portraying part of a world, so a work of fiction is semantically like a theory. Since there is little restriction on the worlds of fiction, any modal theory of fiction is bound to be inadequate; there is in fact no general uniform logic of fiction. (This corresponds to the unrestricted imagination thesis, fundamental to a comprehensive theory of fiction, to the effect that there are no restrictions on what is imaginable.) Also criticised and rejected are other theories of fiction such as elliptical and dimensional theories.
 Not only the statements of fiction but the objects of fiction are considered. The worst logical difficulties concerning the objects of fiction are resolved, so it is argued, by adopting a neutral quantificational framework and by sharply qualifying the Leibniz identity principle.
 That the same object, e.g. London, occurs in a given fictional world as in the actual world is a matter of qualified author say so; transworld identity is *here* stipulative. The final points concern the incompleteness and fictionality of the theory developed." (p. 3)
14. Routley, Richard, and Griffin, Nicholas. 1979. "Towards a Logic of Relative Identity." *Logique et Analyse* no. 22:65-83.
 "Identity statements in natural language come in two syntactic varieties. Some are of the form '*a* is the same as *b*' or '*a* is identical with *b*' and may be symbolized, after the manner of classical identity theory, as ' $a = b$ '. These will be called absolute identity statements. Others have the form '*a* is the same Φ as *b*' where ' Φ ' is some general noun. Statements of this form will be called relative identity statements and

will be formalized (following Wiggins [1], p. 2) as ' $a =_{\Phi} b$ '. In such statements ' Φ ' is called the covering concept of the identity statement." (p. 65)

(...)

"Two theses are of central concern in considering relative identity. The first is the claim (R) that two items may be the same with respect to one general noun but distinct with respect to another; the second is the claim (D) that absolute identity statements are semantically incomplete." (p. 66)

(...)

"In this paper we propose (roughly in order of increasing plausibility) a variety of logics for relative identity theories of the first and second types, that is, theories with both (D) and (R) and theories with (R) but not (D). In doing this we refute two claims about relative identity which have gained currency: firstly, the claim made by Nelson [1] and Ayers [1] that identity theories in which (R) is satisfiable are incoherent; secondly, the claim, implied by Wiggins [1], p. 27, that (R) entails (D). In the case of each theory proposed, the satisfiability of (R) can be demonstrated by adding to the theory appropriate constants which can be used to form an example of (R)." (p. 67)

References

Ayers, Michael R. [1], 'Individuals Without Sortals', *Canadian Journal of Philosophy*, 4 (1974), pp. 113-148.

Nelson, Jack [1], 'Relative Identity', *Noûs*, 4 (1970), pp. 241-260.

Wiggins, David [1], *Identity and Spatio-Temporal Continuity* (Oxford: Blackwell, 1967).

15. Routley, Richard, Meyer, Robert K., and Dunn, Jon Michael. 1979. "Curry's Paradox." *Analysis* no. 39:124-128.

"In short, the conclusion of our examination of Curry's paradox is discouraging in the extreme for the hopeful naive set theorist. One sought to avoid the problems posed by Russell by weakening logic, in order to save the abstraction principle. We were willing to give up the usual aversion to contradiction. We faced with equanimity the sacrifice of the deduction theorem. To continue with the project, a minimal, decent respect even for *modus ponens* must be given up as well.

We have always held that, in these permissive days, no rule is sacrosanct--except *modus ponens*. And one may, of course, still cleave to the *rule of modus ponens* without the *modus ponens* axiom; indeed, Routley

has conjectured that a naive set theory based on a very weak relevant logic is absolutely consistent. One might look for other escapes, too; e.g., the role of the ' \leftrightarrow ' in the abstraction principle above might be

reexamined. But the conclusion is none the less clear; unless we are prepared to give up a great deal of logic--not only of classical logic but of intuitionist and even relevant logic as well--a naive set theory is untenable." (p. 128)

16. Routley, Richard, and Routley, Val. 1979. "The (Logical) Importance of not Existing." *Dialogue* no. 18:129-165.

"An adequate theory of meaning and truth is semantically important. Such a theory necessarily includes in its analysis nonentities, items that do not exist. So what is semantically, and hence logically, important is bound to include nonentities. In virtue of the modifier 'semantically', the first premiss is analytic (what is semantically important may not be important), and it is comparatively uncontroversial. By contrast the second premise of the syllogism, which we want to stick to, is decidedly controversial. So too is the thesis (advanced in [2] and [3] and in Chisholm [15]) - which implies the inadequacy of classical logical theories - that there are a great many natural language statements, statements an adequate theory should be able to treat of, which cannot be analysed logically, and semantically, without the equivalent of an appeal to nonentities. Defence of the thesis has been somewhat piecemeal, taking the form that all the theories so far offered which try to dispense with nonentities break down or run into insuperable difficulties,

difficulties which are readily surmounted given appropriate talk about nonentities. In what follows we shall outline more general sorts of argument for the thesis, designed to show that no theory which dispenses with nonentities as objects of discourse can do justice to the data.

The thesis of the inadequacy of classical logical theory, basically one of Meinong's theses expanded and dressed up in more modern attire, has not exactly won widespread acclaim, but it has gained some notoriety and has encountered much opposition.

Much of what follows is an attempt to counter some of that opposition; to reinforce the claim that classical theories break down irreparably over the analysis of intensional discourse concerning nonentities; to meet the objection that objectual semantics for Meinongian-style theories of objects have themselves serious flaws; to refute the view that Meinongian theories have no philosophical advantages, only drawbacks; and to show, by way of illustration of the importance of nonentities in solving traditional philosophical problems, how the theory of objects, and only such a theory, can resolve many problems in epistemology, problems in fact generated by the classical theory." (pp. 129-130)

References

[2] R. and V. Routley, 'Rehabilitating Meinong's theory of objects', *Revue Internationale de Philosophie*, 27 (1973), 224-54.

[3] R. Routley, 'Exploring Meinong's Jungle, I and II', *Notre Dame Journal of Formal Logic* (forthcoming) [not published]. An expanded version will appear as *Exploring Meinong's Jungle and Beyond*, R. S. S. S., Australian National University, 1979. [1980]

[15] R. M. Chisholm, 'Beyond being and nonbeing', *Philosophical Studies*, 24 (1973) 245-57; also in *Jenseits von Sein and Nichtsein* (edited R. Haller), Akademische Druck- u. Verlagsanstalt, Graz, 1972.

17. Routley, Richard. 1980. *Exploring Meinong's Jungle and Beyond. An Investigation of Noneism and the Theory of Items* Canberra: Research School of Social Sciences, Australian National University.

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"A fundamental error is seldom expelled from philosophy by a single victory. It retreats slowly, defends every inch of ground, and often, after it has been driven from the open country, retains a footing in some remote fastness (Mill *A system of logic*, pp. 73-4).

The fundamental philosophical error, common to empiricism and idealism and materialism and incorporated in orthodox (classical) logic, is the Reference Theory and its elaborations. It is this theory (according to which truth and meaning are functions just of reference), and its damaging consequences, such as the Theory of Ideas (as Reid explained it), that noneism - in effect, the theory of objects - aims to

combat and supplant. But like Wittgenstein (in *Philosophical Investigations*), and unlike Mill, noneists expect no victories against such a pervasive and treacherous enemy as the Reference Theory. Though noneists take it for granted that 'Truth is on their side', and reason too, the evidence that 'Truth and reason will out' is exceedingly disappointing. Nor do they expect the enemy to vanish, even from open country: fundamental error will no doubt persist, to the detriment of philosophy, and of every theoretical and practical subject it touches. For there is great resistance to changing the framework (to amending the paradigm); so there is an attempt to handle everything within the prevailing philosophical frame. There is no need, it is thought, to change the framework, all problems can eventually be solved within the basic referential scheme - at worst by some concessions (1) which absorb some nonreferential fragments, and thereby decrease both the level of dissatisfaction with the going frame, and the prospects for perception of its real character.

The faith that the Reference Theory (and its forms such as extensionalism and empiricism) will find a way out of its impasses, a way to deal adequately with nonexistence and intensionality, is like the faith that technology will find *a way* to deal with social problems, especially with all the problems it creates (the faith is deeply embedded in the Technocratic Ideology). As with the Technocratic Ideology so with the Reference Theory, the Great Breakthrough which will resolve these problems, (patently) not soluble within the technological or referential framework, is always just around the corner, no matter how discouraging the record of failures in the past. The problems, difficulties, and failings of the Theory are not recognised as reasons for rejecting it and adopting a different theoretical-and ideological framework, but are presented as 'challenges', which further work and technology will doubtless find a way to resolve. And as with Technocracy the 'solution' of a problem in one area is liable to create a rash of new problems in other areas (e.g. increasing energy supply at the expense of increased pollution, forest destruction, etc.), which can, however, for a time at least, be conveniently overlooked in the presentation of the 'solution' as yet another triumph for the theory and its ideology. That is, the procedure is to trade in one problem for another, and hope that nobody notices.

The basic failings of the Reference Theory are at the logical level. The Reference Theory yields classical logic, and directly only classical.

An example of theoretical cooption is the (somewhat grudging) toleration of lower grades of modality and intensionality - which can however be referentially accounted for, more or less.

The basic failings of the Reference Theory at the logical level.

The Reference Theory yields classical logic, and directly only classical logic: in this sense classical logic is the logic of the Reference Theory. An important group of elaborations of the Reference Theory correspond in the same way to logics in the Fregean mode. Accordingly with the breakdown of the Reference Theory and its elaborations all these logics fail; and so, as with the breakdown of modern energy supplies, substantial adjustment and reconstruction is required. In fact no less than the effects of a logical revolution are called for (see *Relevant logics and their rivals*), though the aim of these essays is to achieve such results in a more evolutionary way, to take advantage of the classical superstructure, to build the new logic in part on what there is. The logical areas where change and improved treatment are especially, and desperately, needed are these:
 nonexistence and impossibility;
 intensionality;
 conditionality, implication and deducibility;
 significance; and context.

It is on the first two overlapping areas, the very shabby treatment of which is a direct outcome of the Reference Theory, that the essays which follow concentrate. (The remaining areas - which are, as will become quite evident, far from independent - are treated, still in a preliminary way, in two companion volumes to this work, *Relevant logics and their rivals* and *The logic of significance and context*, and in other essays.) When the Reference Theory and its elaborations (such

- as Multiple Reference Theories) are abandoned the role of logic changes - its importance need not however diminish." (Preface, I)
- (1) An example of theoretical cooption is the (somewhat grudging) toleration of lower grades of modality and intensionality - which can however be referentially accounted for, more or less.
18. ———. 1980. "Problems and Solutions in the Semantics of Quantified Relevant Logics. I." In *Mathematical Logic in Latin America: Proceedings of the IV Latin American Symposium on Mathematical Logic held in Santiago, December 1978*, edited by Arruda, Ayda Ignez, Newton da Costa, Carneiro Affonso and Chaqui, Rolando Basim da, 305-340. Amsterdam: North-Holland.
Abstract: "The main problem investigated is the adequacy of constant domain relational world semantics for quantified relevant logics. The problem is solved, though in a disagreeably circuitous way, for many weaker relevant logics, and an outline of how the solution may be extended to stronger logics such as RQ is given. Alternative necessity and intensional conjunction style rules for the evaluation of quantifiers are studied and shown to simply force the main problems above with the usual (extensional conjunction style) quantifier- rule to reappear, unmitigated, at alternative outlets. Finally some philosophical problems allegedly engendered by constant domain world semantics are examined briefly: it is argued that the "problems" are no problems."
19. ———. 1980. "The Choice of Logical Foundations: Non-Classical Choices and the Ultralogical Choice." *Studia Logica* no. 39:77-98.
Abstract: "A multiple factor model for choice of best objective (which generalises on the modellings of optimisation theory, and so enables the unification of much decision theory) is developed. Essentially the recipe is to maximize a given function of expected values of the factors subject to a set of constraining relations on the factors and to overriding constraints (the constraining relations are not restricted to certain relations of equality and inequality). The model, which was designed to apply in environmental decision-making situations, has an important role in value theory and in the theory of choice of theories, and it specialises to the matter of choice of logical foundations.
It is argued by way of a series of actual examples that the limited quantifiability or nonquantifiability of the factors does not count against realistic applicability of the model. The factors and constraints in the special case of best choice of logical foundations (for the full range of logical purposes) are sketched and discussed. Important factors are those of scope and applicability to the data. other nonnegligible factors are such pragmatic factors as simplicity, economy, power, intelligibility, fruitfulness.
In addition to constraints between the factors there is a major overriding constraint, namely that of conformity to the facts.
The theoretical model is applied. First a criticism of other accounts of choice, especially pragmatism, and consistency criteria, is mounted. It is then argued, applying the account of best choice of logical foundations for discourse (including philosophical discourse) that has emerged, and making heavy use of factual constraints, that the choice to make is not a choice of classical logic, not a choice of some extension of classical logic, but choice of a paraconsistent logic, and among such essentially nonclassical logics, of an ultralogic, i.e. of a relevant inexistential highly intensional logic."
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Reprinted in *Synthese*, vol. 173, 2010, pp. 107-122.
Abstract: "The paper seeks a perfectly general argument regarding the noncontingent limits to any (human or non-human) knowledge. After expressing disappointment with the history of philosophy on this score, an argument is grounded in Fitch's proof, [*] which demonstrates the unknowability of some truths. The necessity of this unknowability is then defended by arguing for the necessity of Fitch's premise—viz., there this is in fact some ignorance."
[*] Fitch, F. B. (1963). A logical analysis of some value concepts. *Journal of Symbolic Logic*, 28, 135–142.
23. ———. 1982. "On What There Is Not." *Philosophy and Phenomenological Research* no. 43:151-177.
Reprinted in Michael C. Rea, *Arguing about Metaphysics*, New York: Routledge 2009, pp. 59-77.
"Consider some thing, d say, that does not exist, for example d is Meinong's round square. Then what does not exist is in this case d; but it in no way follows from "d is non-existent" that "d exists". Such nonentities as d need have no being in any sense. It is basically because whatness and thinghood have been illicitly restricted to what exists or has being, that a puzzle seems to have arisen: for certainly we contradict ourselves if we say that what has being does not have being. There is no contradiction however in saying that what is a thing or object, e.g. d, may have no being in any sense; and this dissolves what Quine nicknames *Plato's beard*, without using or blunting, Occam's razor. For Occam's razor to remain sharp requires only that entities not be multiplied beyond necessity; but no multiplication of entities has been made, no bloating of the universe (of what exists) has occurred. Indeed the theory of objects enables a very substantial reduction in what is said to exist, so that what is said to exist can coincide with what really does exist, namely only certain individual objects now located in space.(4) But, more to the point, Occam's razor embodies various muddles of the very sort that it is important to remove. In particular, Occam's dictum that entities [or differently, objects] should not be multiplied beyond necessity supposes that it is in our power to increase or decrease the number of entities [or objects]: but of course in *that* sense - as opposed to the destruction or creation of objects by one's activity - it is not. What we can increase or decrease is not what exists but what we *say* exists, what we (choose to) *talk about*, and what our theories commit us to in one way or another. So the dictum, and a use like Quine's of it, confuses what exists with what we (choose to) talk about or what we, or our theories, *say* exists - a confusion that runs through into recent criteria for ontological commitment, themes of ontological relativity, and programs for ontological reduction." (pp. 152-153)
(4) It was Meinong's thesis that any existing object has a more or less definite location in space and time. It is a corollary that abstract objects do not exist (see further [2], chapter 9).
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[2] R. Routley, *Exploring Meinong's Jungle and Beyond*, Research School of Social Sciences, Australian National University, 1979.
24. ———. 1982. "How Disjunctive Syllogism can be Seen as a Fallacy of Relevance." *Bulletin of the Section of Logic* no. 10:144-151.
25. Routley, Richard, Meyer, Robert K., Plumwood, Val, and Brady, Ross. 1982. *Relevant Logics and their Rivals. Vol. 1: The Basic Philosophical and Semantical Theory*. Atascadero: Ridgeview.
Contents: Introduction X; 1. The implication connection, and the ensuing inadequacy of irrelevant logics such as classical and modal logics 1; 2. Derivability, deducibility, and the core of entailment 69; 3. The shape of the first degree logical

and semantical theory, and competing profiles for higher degree logics 170; 3. The semantics of entailment and sufficiency conditionals, relevant affixing systems with normal conjunction, disjunction and negation, and their extensions 284; 5. Further investigation of relevant affixing systems and their parts 348; Appendix 1. The semantics of entailment IV: E, II' and II'' 407; Appendix 2. The pure calculus of entailment is the pure calculus of entailment 425; Postscript to the Appendices 430; References 435 Index (by Jean Norman) 452-460.

"This volume is primarily a logical and semantical investigation of an extensive class of zero-order intensional logics, i.e. of intensional logics which do not include variable binding devices such as abstraction operators, descriptors, quantifiers or their equivalents. The effect of adding variable binding devices will have to be reserved for another volume. Many of the philosophical investigations and issues which are presupposed by or arise from this predominantly formal study will, we still hope, appear in yet other publications (e.g. *Beyond the Possible*, long in preparation). The separation of these matters is admittedly deplorable (whether the proposed multiplication of book-entities is also deplorable will be left for readers to decide). The exclusion of quantifiers and descriptors deprives the logics of some of their interest and usefulness in the analysis of natural languages and philosophical and other argumentation, and the partial exclusion of intimately connected and motivating philosophical issues is artificial and weakens the case for such a detailed study of particular intensional logics. However this volume is evidently long enough already.

Relevant and irrelevant logics. We focus on those intensional logics that, satisfying weak relevance principles, have become known as relevant logics. The class of sentential logics that satisfy weak principles of relevance is however wide and includes many logics which are, in principle, rivals to the position(s) we shall be advancing.

We want it to emerge with stark clarity, however, that our main concern is not really relevance at all - the appropriate sort of relevance is a byproduct of any good implication relation, which comes out in the wash. Only one weak necessary condition for relevance features in what follows: that is all'. A study of relevance, of the sorts of relevance, of sufficient conditions for relevance, ... - all these matters are philosophically interesting, and some of them are important, especially for the logics of evidence and probability - but they are not our present concern. For this reason the name 'relevant logics', or 'relevance logic', is not entirely satisfactory - perhaps even, to lodge a much stronger claim, unfortunate - since the name tends to suggest, wrongly, that relevance is of the essence, instead of being a peripheral concern. Nonetheless the name has a point, and it is a little late to change it.

What our concern is with is implication and its varieties, and in particular with genuine implication in the sense that amounts to total sufficiency. Thus our concern is, in the first place, with sufficiency, or, as it is otherwise equivalently put in the logical case, with complete logical dependence, with total inclusion of logical content, and so on. Implication is not confined however to logical implication or deducibility; we are very much interested in having our systems apply to other sorts of sufficiency, physical or law-like sufficiency in particular, and to provide the bases, in enthymematic ways, for analyses of partial sufficiency, for instance for insufficiency conditionals - for conditionals, for example, which are obtained from genuine sufficiency conditionals by suppression of true or necessary antecedents (or, symmetrically, of false or impossible consequents). This will take us back through the usual logics of the textbooks, to intuitionistic logic and modal logics, and, in the extreme case, to classical two-valued logic. (p. X)

26. Routley, Richard, and Plumwood, Val. 1982. "Negation and Contradiction in Wittgenstein." In *Sprache und Ontologie. Akten des 6. internationalen Wittgenstein Symposiums 23. bis 30. August 1981, Kirchberg/Wechsel (Österreich)*, edited by Leinfellner, Werner, Kraemer, Eric and Schank, Jeffrey, 471-474. Wien: Verlag Holder-Pichler-Tempsky.

"In the earlier work, especially the *Tractatus*, the classical explosion model of negation is adopted; negation is represented as total exclusion. There has, of course, to be more to the account of negation than this. In particular, logical constants such as negation, since they would otherwise raise serious difficulties for the picture theory of meaning, call for special treatment, which they obtain through the theory of math-functions. Negation is simply such a classical function; nothing in reality corresponds to it." (p. 471)

(...)

"A cancellation view, incompatible with the classical model of the *Tractatus*, is infiltrated in subsequent work. A cancellation picture is already deployed in transitional work, e.g. 'the rules of Euclidean geometry don't contradict one another, i.e. no rule occurs which cancels out an earlier one (p and $\sim p$), , ,' (*PG*, p. 345). It is a cancellation picture, where contradictions have no content and say nothing (and so are useless), that lies behind Wittgenstein's assumption that one should not draw any conclusions from a contradiction (*LFM*, p. 220), or better, that a way should be found of not proceeding from a contradiction (*LFM*, p. 223).¹⁰ Furthermore, many of the pictures and images of negation Wittgenstein later considers are of a cancellation type or can be adjusted to fit a cancellation model. Although Wittgenstein repeatedly alludes to such images, at the same time he depreciates them (e.g. all attempts to explain why a contradiction "won't work" are spurious, *LFM*, p. xviii): they are all said to convert to no more than substitution of one symbolism for 'another. Even so, such things can have an explanatory and modelling role. Wittgenstein suggests not, because all that is offered is symbolism and figure, so the question of 'how one is going to use it?' (*LFM*, p. 181) remains, since any picture can be used in several ways. He goes on to advance the even more dubious description theme that 'anything which we give and conceive to be an explanation of why a contradiction does not work is always just another way of saying that we do not want it to work' (*LFM*, p. 187).

The assumption that contradictions don't, or won't, work and associated themes, e.g. that contradictions are useless, and associated images, e.g. the jamming picture (*LFM*, p. 178—9, ascribed to Moore, p. 190), are 'all connexivist in cast. With a contradiction, as when the cogs join, nothing emerges, 'we cannot do anything with it' (*LFM*, p. 191). It is from the same cancellation model that the no-content thesis, which jamming depicts, derives, that contradictions do not say anything, a thesis also equivalently (but misleadingly) expressed in 'contradictions don't make sense'. The cancellation view can be included in the relevant synthesis by appeal to abnormal worlds or language-games, games where contradictions do stop proceedings, and where A & $\sim A$ may have no content. But in assuming, as he often appears to, that games are restricted to those that are classical (effectively, in P) or those that are of a cancellation type (in a subclass of W - K), Wittgenstein much too drastically delimits the games, or worlds, needed in giving a full account of negation. And in assuming that abnormal cancellationtype games are characteristic —'that we exclude the contradiction and don't normally give it a meaning is characteristic of our whole use of language' (*LFM*, p. 179)—Wittgenstein goes curiously astray. Commonly we do not treat contradictions in this way. We reason on the basis of them (e.g. in *reductio* arguments), we act on the basis of inconsistent information (cf. the general who acts, and succeeds, on the basis of contradictory reports, *LFM*, p. 105), and we exploit paradoxes when we can." (p. 474)

References

LFM = *Lectures on the Foundations of Mathematics*

PG = *Philosophische Grammatik / Philosophical Grammar*

27. ———. 1982. "The Inadequacy of the Actual and the Real: Beyond Empiricism, Idealism and Mysticism." In *Sprache und Ontologie. Akten des 6. internationalen Wittgenstein Symposiums 23. bis 30. August 1981, Kirchberg/Wechsel (Österreich)*, edited by Leinfellner, Werner, Kraemer, Eric and Schank, Jeffrey, 49-67. Wien: Verlag Holder-Pichler-Tempsky.

"In contrast to empiricism the historical alternatives of (traditional) rationalism, Meinongian rationalism, mysticism and idealism are alike in their rejection of what we have selected as the most important characterising thesis of empiricism, that the world can be adequately accounted for or explained just in terms of what exists, in terms of the actual (referential) world *G*.

Meinongian rationalism has a modern logical expression in noneism, the theory of items elaborated elsewhere (especially in Routley (1979)). The core theses of noneism include the following:—Every (significant) singular term signifies an object, i.e. (in earlier terminology) is about an object. Everything whatsoever—whether it is possible or not, complete or not, paradoxical or not, thinkable or not—is an object. Most objects do not exist, in any way at all, or have any form of being (or other ontological status) at all. Nonexistent objects, nonentities, are constituted in one way or another, and have more or less determinate natures. An object, whether it exists or not, has those properties which characterise it, e.g. the object which *f*s does *f*, where *f* is a characterising property. But existence, and many other properties (especially “higher-order” properties) are not characterising properties. (8)

Additional theses, presupposed in and of some importance for what follows are these: Universals are objects which do not exist (hence also they are something). Objects are not reducible to entities; for instance, nonexistent objects are not in some way constructs from what does exist, and discourse about nonentities is not translatable, without residue, into discourse about entities.(9) Running in tandem with this is a nonreductionist theme (with something of the ring of the later Wittgenstein): Nonentities are mostly perfectly in order as they are, without reduction. With intensionality as with nonexistence, noneism is committed to commonsense theses (again of a later Wittgenstein cast): Very many intensional statements are perfectly in order as they are, without reductive analysis, and are about the objects they appear to be about. For example, ‘Bacon looked for Atlantis’ is about Bacon and Atlantis. There is just one object sought, Atlantis; there is no need to try to resolve the statement into one concerning concepts, or complex set-theoretic constructs, or such like; whether or not Atlantis ever existed.

The foregoing themes lead naturally (once the semantical theory is introduced) to further theses,(10) theses that go to the heart of philosophy (as many have seen it), theses stating conditions on the truth and explanation of things in the world: the truth conditions for the factual world *T*, and also for its actual subworld *G*, involve nonentities, essentially. This thesis, that truth depends on nonexistence, derives in part from the earlier theme that there are irreducible truths about what does not exist. Further, the explanation of what exists, and so of the actual world *G*, involves essential appeal to what does not exist, to other worlds beyond *G*. It is themes like these that render noneism a transcendental position,(11) and align it with idealism. Contrary to empiricism, then, we do need to go beyond the factual world and to consider possible and impossible worlds, and beyond entities of the factual world to consider a wide range of other objects, including impossible and merely possible ones. In particular, according to noneism, we cannot adequately understand or explain the actual world, its entities and its phenomena, without going beyond to other worlds, without adverting, in essential ways, to the non-actual. *The actual is not sufficient*, on its own, *to account either for truth or for explanation.*" (pp. 51-52)

(8) The emerging big theory, noneism, is a kind of amalgam of Meinong with the later Wittgenstein; so however strange the combination may seem, it can claim a good Austrian ancestry.

(9) While a semantical analysis of discourse about nonentities can be given, e.g. through a universal semantics (cf. Routley (1979), 1.24), in terms of what Platonists are pleased to call ‘entities’, the objects involved in the analysis do not exist.

(10) So far only nonepistemic themes have been assembled. For subsequent comparisons, especially with ways of knowing and interworld access of idealism, mysticism, primitivism, etc., it will however be important to introduce epistemic and limitative theses.

(11) In the standard sense of 'transcendental', of being other-worldly, necessary for (the explanation of) experience, and not reducible to it.

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28. Routley, Richard, and Priest, Graham. 1982. "Lessons from Pseudo Scotus." *Philosophical Studies* no. 42:189-199.
 "Medieval logicians have a great deal to teach their modern descendants.(1) They discussed issues that are of contemporary importance with an ingenuity and sophistication lost till this century. We will illustrate this by considering an argument produced by a medieval logician, fated to become known as 'Pseudo-Scotus'. It was rescued from oblivion by Bocheński in 1938 and has been commented on more recently, particularly by Benson Mates and Stephen Read.(2) However, a good deal more can be learnt from Scotus' argument as we will show. Specifically we will formulate separate lessons in Sections 2, 4 and 6." (p. 189)
 (1) This claim was made at the end of Priest and Read (forthcoming). The present paper goes some way towards bearing it out.
 (2) See Mates (1965), which gives details of Bocheński's work and Read (1979) which gives details of other modern commentators.
- References
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 "Criticisms of semantics for relevant logics, Commonly enough encountered in discussion, are beginning to appear in print. For example, such criticism has come from Scott who asserts, without any supporting argument, that 'the recent semantical interpretations [of relevance logics] have as yet no adequate philosophical justification' (74, p. 154). A rather similar criticism 'of model-theoretical interpretations of existing relevant logics' is implied by Hintikka (81, p. 80). Analogous criticisms are part of Lewis's recent attack on relevant and paraconsistent logics (in 82). But the bulkiest "case", which includes most of the criticisms commonly indicated, has been presented by Copeland:
 And the Routley-Meyer semantics, it will be urged, fails to satisfy those requirements which distinguish an illuminating and philosophically significant semantics from a merely formal model theory (Copeland 400)
 Although Copeland reiterates this now familiar claim, that the Routley Meyer semantics for relevant logic is a mere formal model theory as distinct from "a semantics" (see also pp. 406, 408, 412), like others he omits to specify the requirements upon 'an illuminating and philosophically significant semantics': so urging does not give way to arguing in any rigorous way for the theme (thus too the promise of his short title 'When a semantics is not a semantics' is never fulfilled). Furthermore, the supporting considerations offered for the theme are based, like several of the incidental remarks concerning relevant logics, upon faulty but often unstated assumptions and mistaken data. Although the

unfavourable conclusions are stated clearly enough, the structure of the argument by which they are reached is often decidedly unclear, and indeed the case relies upon obscurity and lack of precision. Consequently meeting this often nebulous set of objections requires proceeding beyond what is directly stated to examination of what the case requires if the considerations actually presented are to show anything damaging against relevant semantics in the way declared." (p. 71)

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31. ———. 1983. "Relevantism and the Problem as to When Material Detachment and the Disjunctive Syllogism can be Correctly Used." *Research Papers in Logic* no. 12.
Reprinted in: *Ruch Filozoficzny*, 41, 1984, pp.: 127-162.
32. Routley, Richard, and Meyer, Robert K. 1983. "Relevant Logics and their Semantics Remain Viable and Undamaged by Lewis's Equivocation Charge." *Topoi* no. 2:205-216.
- "Is relevant logic but a logic for equivocators? Such Lewis's provocatively entitled 'Logic for equivocators', directed against relevant logic, certainly seems to imply. But the ambiguity interpretation which he proposes he is unable to get to work for relevant logic, so he falls back on the first degree implication (fde) parts(4) of the irrelevant logics *LP* and *RM* : in these "we have two logics for ambiguous sentences - and lo, they are partly relevant" (p. 439). Not only is Lewis well off the relevant target(5) ; but the argument for the conclusion that relevant or cryptorelevant logics are logics of ambiguity, or, for equivocators, is a decidedly poor one. For what we are offered are three-valued interpretations of fde *LP* and *RM* through the values: true osd only, i.e. true on all its disambiguations; false osd only, i.e. false on all its disambiguations; and both true osd and false osd, i.e. true on some disambiguations and false on others (pp. 438-9). The Lewis interpretation is evidently a simple variation on the truth-valued interpretation obtained by, in effect, omitting 'osd', an interpretation - the intended interpretation for *LP* and *RM* -- which Lewis tries to rule out as "not making sense". (p. 206)
- (4) There is a logical howler running systematically through Lewis's paper. He has 'first degree' where he should have 'fde', unless nonstandard names are adopted. But as 'first degree' is nowhere explained, it must be assumed to have its standard sense. It follows, e.g., from what Lewis asserts that the first degree part of E has a four-valued semantics (see p. 433). This is false.
- Since everything in the discussion that follows is restricted to the first degree, talk of 'relevant logic' in the singular is (perfectly) in order.
- (5) And *Io*, also, they are substantially irrelevant. While *RM* has long been associated with the relevant enterprise, though not as an acceptable explication of the key notions under investigation, *LP* has not, and, at the time of design and development of *LP* , Priest explicitly disassociated himself from the relevant enterprise.
- (23)
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34. Sylvan, Richard, Brady, Ross, Meyer, Robert K., and Mortensen, Chris. 1983. "Algebraic Analyses of Relevant Affixing Logics, and Other Polish Connections." *Research Papers in Logic* no. 16:56 pages.
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36. Routley, Richard. 1984. "The American Plan Completed: Alternative Classical-Style Semantics Without Stars, for Relevant and Paraconsistent Logics." *Studia Logica* no. 43:131-158.
 Abstract: "American-plan semantics with 4 values $1, 0, \{1, 0\} \{ \}$, interpretable as True, False, Both and Neither, are furnished for a range of logics, including relevant affixing systems. The evaluation rules for extensional connectives take a classical form: in particular, those for negation assume the form $1 \varepsilon t(\sim A, a)$ iff $0 \varepsilon t A, a$ and $0 \varepsilon t(\sim A, a)$ iff $1 \varepsilon t(A, a)$, so eliminating the star function $*$, on which much criticism of relevant logic semantics has focussed. The cost of these classical features is a further relation (or operation), required in evaluating falsity assignments of implication formulae.
 Two styles of 4 valued relational semantics are developed; firstly a semantics using notions of double truth and double validity for basic relevant system **B** and some extensions of it; and secondly, since the first semantics makes heavy weather of validating negation principles such as Contraposition, a reduced semantics using more complex implication M rules for relevant system **C** and various of its extensions.
 To deal satisfactorily with elite systems **R**, **E** and **T**, however, further complication is inevitable; and a relation of mateship (suggested by the Australian plan) is introduced to permit cross-over from 1 to 0 values and vice versa."
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 "Relevantism, as a matter of definition, rejects classical logic as incorrect and adopts instead a relevant logic as encapsulating correct inference. It rejects classical logic on the grounds that the rule of Material Detachment, from A and not A or B to infer B, (that is, Disjunctive Syllogism considered as an inferential principle), sometimes leads from truth to falsity. Relevantism - although promoted by some relevant logicians (Routley and Routley), and an integral part of ultralogic (i.e. universal, all purpose, ultramodallogic; cf. [1], [8]) - has recently encountered heavy, but interesting, criticism from relevance logicians themselves (from Belnap, Dunn, and Meyer). Though the discussion that follows accordingly involves some reporting of internal wrangling among relevance logicians, it is feuding of major importance as regards the question of choice of logical theory. For, firstly, if relevantism is right, then orthodox choices of logic, such as classical or intuitionist choices, are wrong. Secondly, the issue is by no means as parochial as relevant logic, but concerns the matter of serious choice of paraconsistent logic as correct, and as working logic (on paraconsistent logics see Arruda [7]). For Material Detachment is inferentially equivalent in a relevant setting to the Duns Scotus principle $(A, \sim A \rightarrow B, \text{ from } A \text{ and not } A \text{ to infer } B)$, the rejection of which separates paraconsistent logic from classical (and intuitionistic) logic. The wider issue generated is then: to what extent, and when, can a *paraconsistent theory correctly, or legitimately, make use of classical reasoning?* " (pp. 167-168)
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Introduction to a special number dedicated to the paraconsistent logics.
"The papers in this volume are all on the subject of paraconsistency.
This introduction locates the papers in their context and also provides a survey of the general area." (p. 3)
(...)
"The important fact about paraconsistent logics is that they provide the basis for inconsistent but non-trivial theories. In other words, there are sets of sentences closed under logical consequence which are inconsistent but non-trivial. This fact is sometimes taken as an alternative definition of 'paraconsistent' and, given that logical consequence is transitive, it is equivalent to our definition. For this reason we call inconsistent but non-trivial theories *paraconsistent*.
The equivalence indicates one reason why paraconsistent logics are worthy of study. For there are important inconsistent theories which are non-trivial. Any analysis of their logical structure must therefore be done using a paraconsistent logic. Clearly, to adopt an explosive logic such as Frege/Russell or intuitionist logic would trivialise them." (p. 3)
40. ———. 1984. "Paraconsistent Logics." *Studia Logica* no. 43.
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41. Sylvan, Richard. 1984. "How Science and Myth and Fiction Step Beyond the Actual and Sometimes Beyond the Possible." *Research Series in Unfashionable Philosophy* no. 1:1-33.
Abstract: "Sistology, the general Investigation of all items, Is explained. It Is contrasted with its dwarf subtheory, ontology, which is restricted to existent objects. Sistology cannot be recovered from ontology. Sistology, unlike ontology, assigns nonexistent and Impossible objects standing. How this is accomplished logically is outlined; and resulting advantages for linguistics, language and literature are indicated. The theory is then applied to a comparison, in depth, of (failed) science with fiction.

Science and fiction are much more alike than generally supposed. Indeed they do not differ essentially in syntactical ways, and overlap significantly in content. (While they do differ more significantly on technological applications, that is frequently not to science's credit.) To force what differences there are, a detailed characterisation of *science* is presented, which is then compared point by point with fiction. What emerges is that science and fiction form merging families, with deductive closure and qualified confrontation with experience affording main separation features.

What remains of the gap between science and fiction is bridged by myth, which often provides other cultures' versions of science. Leading features of myth are explained and two styles of myth roughly delineated, anthropic myths and naturalistic myths. The latter merge with failed science.

The resemblances are exploited both in criticising fashionable accounts of scientific theories and scientific explanation, and in offering new accounts. A scientific theory is a story, which is closed, in particular under deduction, and which suffers qualified exposure to experience, that is, which meets reality requirements. Scientific explanation also fits within the story setting, a covering story replacing the orthodox "covering law" model. The account accommodates what is crucial in much explanation, explanation of what exists by way of what does not exist. Science is integrally involved not merely with what does not exist, but also with what is impossible. The role of inconsistent theories and other inconsistent objects is indicated, and the emerging theory is applied to certain psychological puzzles concerning thinking the impossible."

This paper is to appear in German, in an issue of *Zeitschrift für Semiotik* entitled *Zeichen und Fiktion*. [Vol. 9, 1987, with the title: "Wissenschaft, Mythos, Fiktion: Sie alle überschreiten die Grenzen des Wirklichen und manchmal gar die des Möglichen".]

42. Routley, Richard, and Routley, Val. 1985. "Negation and Contradiction." *Revista Colombiana de Matemáticas* :201-231.
 Abstract: "The problems of the meaning and function of negation are disentangled from ontological issues with which they have been long entangled. The question of the function of negation is the crucial issue separating relevant and paraconsistent logics from classical theories. The function is illuminated by considering the inferential role of contradictions, contradiction being parasitic on negation. Three basic modellings emerge: a cancellation model, which leads towards connexivism, an explosion model, appropriate to classical and intuitionistic theories, and a constraint model, which includes relevant theories. These three modellings have been seriously confused in the modern literature: untangling them helps motivate the main themes advanced concerning traditional negation and natural negation. Firstly, the dominant traditional view, except around scholastic times when the explosion view was in ascendancy, has been the cancellation view, so that the mainstream negation of much of traditional logic is distinctively nonclassical. Secondly, the primary negation determinable of natural negation is relevant negation. In order to picture relevant negation the traditional idea of negation as otherthanness is progressively refined, to nonexclusive restricted otherthanness. Several pictures result, a reversal picture, a debate model, a record cabinet (or files of the universe) model which help explain relevant negation. Two appendices are attached, one on negation in Hegel and the marxist tradition, the other on Wittgenstein's treatment of negation and contradiction."
43. Sylvan, Richard. 1986. "Toward an Improved Cosmo-Logical Synthesis." *Grazer Philosophische Studien* no. 25/26:135-179.
 Originally published as "Towards a CosmoLogical Synthesis", *Research Series in Unfashionable Philosophy*, 2, 1985, 42 pages.
 "There is a persistent tradition implying simple and unassailable logical foundations - as yet undiscovered - for the whole of cosmology. The tradition, which peaked in modern rationalism, continues strong in contemporary cosmological speculation."

Thus, for example, recent rationalistic theories of the universe, ambitiously aimed at mathematico-logical expression and capture of nature." (p. 135)

(...)

"Logic reassumes its ancient role as the fundamental science; the Word expresses a logic recipe.

(...)

The synthesis outlined in what follows fits into this more modest setting. It is achieved by suitably relocating cosmology as a part of semantics (generously construed, for example, to admit contextual elements)." (pp. 135-136)

(...)

"The underlying idea of the synthesis is simply this: a subspace of neutral worlds semantics is also a suitable framework for cosmology, for an interpretation of the logical theory of the universe as a whole." (p. 136)

(...)

"The setting in terms of objects which do not exist, other worlds especially, is essential. For one reason, the idea grew out of investigation (for UQ) of what is normally taken to be a philosophical question, indeed by some such as Heidegger as the fundamental question of metaphysics, namely 'Why does anything at all exist?'. Reset in world terms this becomes a question of the selection of a world such as that we find ourselves in which contains something existent (us among other existent things) as opposed to an alternative world, which contains nothing- a much more tractable question. But the recasting loses explanatory merit should all the worlds involved be taken to exist. For then the old objectionable circle is simply reentered, explaining existence in terms of more existents." (p. 137)

Reference

N. Griffin and R. Sylvan, *Provisional Answers to Ultimate Questions*, typescript, Canberra, 1984; referred to as UQ.

44. ———. 1987. "A Generous Jainist Interpretation of Core Relevant Logics."

Bulletin of the Section of Logic no. 16:58-66.

Both of the 'principal philosophical theories' by which Jainism is commonly distinguished(2), relative pluralism (*anekantarada*) and qualified scepticism (*syavada*) involve 7-fold lists. In the first there is a categorization of 7 perspectives, while, under the second, more important here, 7 modes of predication are marked out. 'About a given object, we may assert [with respect to a given feature, or existentially] (1) "Maybe it is"; (2) "Maybe it is not"; (3) "Maybe it both is and is not"; (4) "Maybe it is inexpressible"; (5) "Maybe it both is and is inexpressible"; (6) "Maybe it is not and is inexpressible"; and (7) "Maybe it both is and is not, and is inexpressible".

The maybe's here are intended to show that dogmatic assertions are out of place ... (Smart, p. 160). Often the maybe's are omitted from lists of the modes of predication, and other variations are found e.g. 'inexpressible' is alternatively translated as 'indescribable', etc.

Thus, given Jainism apparently entailed a correspondence theory of truth (Smart p. 160), for every statement p – (inevitably) or subject predicate form – there are the following assignments of values, all of which may be attained: (1) true, i.e. t, where (maybe) it is; (2) false, i.e. f, where (maybe) it is not; (3) t and f; (4) inexpressible, i.e. i, where (maybe) it is inexpressible; etc." (p. 62)

(2) To be a little more precise than Smart, those are the main epistemological theories which distinguish Jainism. For Jainist bio-conativism, which anticipates Schweitzer and a reverence-for-life position in contemporary environmental philosophy, is certainly a philosophical theory, and apparently that for which Jains are best Known.

References

[7] N. Smart, 'Indian Philosophy', *Encyclopaedia of Philosophy* (ed. P. Edwards), Macmillan, New York, 1967.

45. ———. 1987. "A Relevant Invalidity in Curry's Foundations." *Bulletin of the Section of Logic* no. 16:51-53.
 Reply by Jonathan P. Seldin, "A Relevant Invalidity in Curry's Foundations: A Reply to Richard Sylvan", *Bulletin of the Section of Logic*, 16, 1987, pp. 68-70.
 "Curry claims that the positive paradox principle, $\vdash A \supset (B \supset A)$ (33) in his elementary statement presentation, 'is valid in any normal interpretation' ([1], p.173). By previous definition, 'an interpretation of a system S is a normal interpretation just when the proposition A is true when and only when $\vdash A$ ' (p.172). But his argument to normal validity (and so truth) is interestingly, and relevantly, invalid." (p. 51)
 (...)
 "This may seem to make, obscurely at that, no more the familiar concession that the positive paradox (33) does not hold for logical (or strict) implication. But given Curry's identification of \supset as the propositional analogue of a conditional, it says much more than that: it says, correctly, that the positive paradox principle does not hold for the conditional.
 Nor do matters end there. There are relevant consequences, to be looked at elsewhere, for illative combinatory logic and type-free λ -theory." (p. 53)
 References
 [1] H. B. Curry, *Foundations of Mathematical Logic*, McGraw-Hill, New York, 1963.
46. ———. 1987. "Establishing the Correspondence Theory of Truth and Rendering it Coherent." In *Stephan Körner - Philosophical Analysis and Reconstruction*, edited by Srzednicki, J. T. J., 75-83. Dordrecht: Martinus Nijhoff.
 "In his rewarding book, *Fundamental Questions of Philosophy*, Stephen Körner introduces the correspondence theory of truth as seemingly 'the most natural analysis of truth', explains what the theory tries to do, and what it does not attempt, defends the theory against some standard objections, and advances difficulties for rival theories of truth (see p. 101ff.). What follows removes the limitations Körner claims to find on the correspondence theory; it also elaborates upon what Körner has explained, but at the same time makes one or two significant variations, as will appear." (p. 75)
 (...)
 "Certainly any idealist who finds classical logic the right medium in which to logically set his or her verificationist proclivities - as the logical positivists thought that this was the right medium for verification, with none of this new-fangled intuitionism - should not be displeased. As for us, well, we can have both correspondence and coherence along with Tarski-Bolzano theory duly generalised. (8) And no doubt other theories of truth can be worked into the synthesis too; but that's a task diverging from KBrner and for another day." (p. 80)
 (8) Tarski not only saw the semantic theory as complementing a correspondence theory but also was one of the first to explicate maximal consistent sets; he, if anyone, is behind this whole conspiracy.
 References
 S. Körner, *Fundamental Questions of Philosophy*, (Harvester Press, Sussex, 1979).
47. Sylvan, Richard, Pettit, Philip, and Norman, Jean, eds. 1987. *Metaphysics and Morality: Essays in Honour of J. J. C. Smart*. Oxford: Basil Blackwell.
 Contents: D.M. Armstrong: Smart and the secondary qualities; L. Jonathan Cohen: Laws, coincidences, and relations between universals; Donald Davidson: Problems in the explanation of action; Brian Ellis: The ontology of scientific realism; R.M. Hare: Why moral language?; Frank Jackson: Group morality; D.H. Mellor: The singularly affecting facts of causation; Hilary Putnam: The diversity of the sciences; Peter Singer: Life's uncertain voyage; J.J.C. Smart: Replies.
48. Sylvan, Richard. 1988. "Intuitionistic Logic - Subsystem of, Extension of, or Rival to, Classical Logic?" *Philosophical Studies* no. 53:147-151.

"The short well-known answer to the title question is, yes, all of those. It depends, in large measure, on how we formulate the systems, compare them, and apply them. Formulated as a system in connectives $\{\rightarrow, \vee, \&, \sim\}$, Lewis modal system S3 is a subsystem of classical logic S, similarly formulated, which results (for instance) by adjoining Peirce's implausible law. But with S recast as a system in connectives $\{\&, \sim\}$ (or $\{\vee, \&, \sim\}$), S3 reappears as extension of S, got by adding a modal connective \rightarrow , (interdefinable with \Box) and appropriate postulates.

With relevance logics, such as *R* and *E*, which are in many respects like modal logics (S3 is tantamount to *E* + Antilogism), it is similar: these logics are both subsystems of S and extensions of it. But there is a most significant difference from the modal situation, which concerns applications. The difference, important for applications to inconsistent and also incomplete theories, turns primarily on the scope of the rule of Material Detachment MD. A, $\sim(A \& \sim B) / B$." (p. 147)

(...)

"It is of passing interest, then, that intuitionist logics and some of their neighbours can be construed as maintaining classical, truth-functional, behaviour for connectives 'and' and 'not' (or, to start with, absurdity), while diverging as regards behaviour of 'or' and 'only if'. From this perspective of course, intuitionism and minimalism become, like modal logics, extensions of classical logic, adding to it intensional connectives of disjunction and implication -- not rivals to it, though not rulepreserving extensions. Thus are many claims in the standard literature upset, not only those of Fitting, but, for instance, scene-setting assumptions of Haack concerning intuitionistic deviance." (p. 150)

References

M. Fitting, *Proof Methods for Modal and Intuitionistic Logics*, D. Reidel, Dordrecht, 1983.

S. Haack, *Deviant Logic*, Cambridge University Press, 1974.

49. ———. 1988. "Assorted Semantics." *Journal of Symbolic Logic* no. 53:334.

50. ———. 1988. "Radical Pluralism - an Alternative to Realism, Anti-Realism and Relativism." In *Relativism and Realism in Science*, edited by Nola, Robert, 253-291. Dordrecht: Kluwer.

"Realism, the dominant 20th century position in Anglo-American thought, is, in the relevant sense, a one world position. There exists a unique actual world, or reality, external to "us", which not only determines

how things are locally and globally, but determines as well truth, and thus also uniquely fixes correctness in science, the correct theory being that which corresponds to reality. Anti-realisms such as idealism

and phenomenalism reject, in one way or another, the tricky externality requirement. Relativism and pluralism, by contrast, reject one of the uniqueness requirements, but in significantly different ways. Relativism

resists, in one fashion or another, the imposition of any ranking better than "equally good" and of any rankings warranting differential choice, on the multiple interpretations or, very differently, multiple realities or

worlds disclosed. Pluralism, however, to set down at once the crucial contrast, permits and typically makes rankings, which enable choice (including realist and idealist and theist choices, among many others).

Pluralism thus comes in two distinct forms: theory or meta-pluralism, according to which there are many correct theories (especially larger philosophical positions) but at most one actual world; and radical or

deep pluralism which goes to the root of these differences in correctness, to be found in things, and discerns a plurality of actual worlds as well as of theories." (p. 253)

(...)

"Why select sistological pluralism, that is, a pluralism based upon object-theory? A first reason is that some selection is practically inevitable.

(...)

Partly to reduce complexity, then, but also partly because of severe limitations of space and energy, only one main form of pluralism has been outlined, sistological pluralism. It is but one style of pluralism, an apparently novel, radical form. It does not, like wishy-washy orientational or entrepreneurial pluralism operate only at the theory level (or meta-level), somehow abandoning the hard-to-separate world level (or object-level) level to realism and its more puritan rivals. There is excellent reason not to do so. For one, sistological pluralism does not need to rely on an implausible sharp cut-off between levels. For another, it does not simply give a pluralistic veneer to orthodoxy and dogma, such as accompanying object-level "realism" may underwrite." (p. 278)

(...)

"Justification for looking at, studying, presenting or showing off a pretty logic, or an unusual radical theory, does not have to be of pragmatic cast, that it does something, succeeds somewhere, works well. It may just be a fine enough thing in its own right - somewhat as a tract of rainforest may be valuable in itself, and, though rather rich and complex, not particularly well-organised, or useful for humans, or good for this or that, or unique. Sistological pluralism is a fine and rich theory, fun to work and play with, and to contemplate, irrespective of whether it is good for much - which, as it fortunately happens, it is. (p. 285)

51. ———. 1988. "Relevant Containment Logics and Certain Frame Problems of AI." *Logique et Analyse* no. 121-122:11-25.
Abstract: "Relevant containment logics, which combine relevant logics with content containment requirements, are motivated and explained. Semantics for some of these logics are introduced and shown to be adequate. In the light of the semantics the logical theory is improved, and other directions for elaboration are indicated. Finally, the logics are applied to one significant part of the vexatious frame problems of AI , and a route to implementation is suggested."
52. ———. 1988. "Relevant Containment Logics and Frame Problems." In *Artificial Intelligence: Developments and Applications* , edited by Gero, John S. and Stanton, Robin Barrington, 169-181. Amsterdam: North-Holland.
53. Sylvan, Richard, da Costa, Newton, and Carneiro, Alfonso. 1988. "Cause as an Implication." *Studia Logica* no. 47:413-427.
Abstract: "An appropriately unprejudiced logical investigation of causation as a type of implication relation is undertaken. The implication delineated is bounded syntactically. The developing argument then leads to a very natural process analysis, which demonstrably captures the established syntactical features. Next relevantly-based semantics for the resulting logical theory are adduced, and requisite adequacy results delivered. At the end of the tour, further improvements are pointed out, and the attractive terrain beyond present developments is glimpsed."
"The notion of cause, having fallen from favour in the heydays of logical positivism, has enjoyed a contemporary resurgence. But despite its fashionability now, especially as a major foundational element in epistemology, the logical and structural properties of causation remain quite insufficiently examined. In this situation, who knows whether the foundations will carry the philosophical castles being built (they are never complete, and invariably ramshackle)? Our preliminary investigation of causal implication suggests they will not; like structurally and materially short-supplied high-rise buildings, they will come tumbling down." (p. 413)
54. Sylvan, Richard, and Goddard, Lenn. 1988. "Reasoning I. Reason for, and also Against." *Journal of Symbolic Logic* no. 53:334.
Reprinted in: *Artificial Intelligence in Australia* , 1988, p. 37.

55. Sylvan, Richard, and Priest, Graham. 1988. "Answering Another Alleged Dilemma Destroying Dialetheism." *Bulletin of the Section of Logic* no. 17:42-52.
 "To leave matters in no doubt, we obligingly assert that the Russell class R , i.e. $\{x : x \notin x\}$, both belongs to itself and also does not belong to itself; in short, we assert $R \in R \ \& \ \sim (R \in R)$. To be quite explicit, we assert the contradiction $r \ \& \ \sim r$, where r abbreviates $R \in R$. Thus, in convenient symbols, $\vdash_{\delta} r \ \& \ \sim r$ where δ is the group of dialethicists comprising (at least) Priest and Routley. Now Goldstein asserts not, or not just, that we should not do what we have naughtily done, but that we cannot; it "is not that people should not assert contradictions, but that they cannot, even though they may purport to do so" ([1], p. 11).
 Goldstein offers a neat, but nonetheless fallacious, argument to support his assertion that we, along with distinguished dead dialethicists (Fichte, Hegel and Peirce are cited), cannot do what we purport to have done, asserted a contradiction." (p. 42)
 (...)
 "The problem with contradictions, on mainstream perceptions, is not that they cannot be asserted, but that they lead, not nowhere, but everywhere.
 But no one with a modicum of logical sophistication, not just dialethicists, would accept this idea, would grant *ex falso quodlibet* and its scruffy mates." (p. 47)
 References
 [1] L. Goldstein, *A problem for the dialetheist*, *Bulletin of the Section of Logic*, Polish Academy of Sciences 15/1 (1986), pp. 10–14.