

D. M. (David Malet) Armstrong's Moderate Realism

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SELECTED BIBLIOGRAPHY

Books

1. *Universals and scientific realism*. Cambridge: Cambridge 1978.
 Volume One: Nominalism and Realism
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"It is argued in this work, first, that there are universals, both monadic and polyadic, that is, properties and relations, which exist independently of the classifying mind. Realism is thus accepted, Nominalism rejected. Second, it is argued that no monadic universal is found except as a property of some particular, and no polyadic universal except as a relation holding between particulars. Transcendent or Platonic Realism is thus rejected. Third, it is argued that what universals there are is not to be determined simply by considering what predicates can be applied to particulars. Instead, it is the task of total science, conceived of as total enquiry, to determine what universals there are. The view defended is therefore a scientific Realism about universals. It might also be called a posteriori Realism. The working out of a scientific Realism about universals is intended to be the special contribution of these volumes.

Contemporary philosophy recognizes two main lines of argument for the existence of objective universals. The first is, or is a descendant of, Plato's One over Many argument. Its premiss is that many different particulars can all have what appears to be the same nature. In the terms used by C.

S. Peirce, different tokens may all be of the same type. The conclusion of the argument is simply that in general this appearance cannot be explained away, but must be accepted. There is such a thing as identity of nature.

I take this argument to be sound. But the argument is sometimes presented as an argument from general words. It is asked how a general term can be applied to an indefinite multiplicity of particulars. It is answered that these particulars must be identical in some respect. There are two disadvantages in presenting the argument in this linguistic fashion. First, it obscures the fact that the same term may apply in virtue of different natures of the different particulars. As a result, where Realism is embraced, it is likely to be a priori rather than scientific Realism. Second, presenting the argument linguistically encourages confusion with an unsound argument to universals from meaning. This second argument moves from the existence of meaningful general words to the existence of universals which are the meanings of those words. Universals are postulated as the second term of the meaning relation. The argument from ideal cases, such as Plato's perfect circle, is perhaps a special case of this semantic argument to universals.

I regard this second line of argument as completely unsound. Furthermore, I believe that the identification of universals with meanings (connotations, intensions), which this argument presupposes, has been a disaster for the theory of universals. A thoroughgoing separation of the theory of universals from the theory of the semantics of general terms is in fact required. Only if we first develop a satisfactory theory of universals can we expect to develop fruitfully the further topic of the semantics of general terms. Philosophers have all too often tried to proceed in the opposite way.

In this first volume, *Nominalism and Realism*, I criticize at length and reject various versions of Nominalism, together with Platonic Realism. I also examine and reject the view that properties and relations are as particular as the objects which have properties and relations. I conclude that we must admit objective universals which, however, cannot exist independently of particulars. I go on to examine the notion of a particular and reject the view that we can give an account of particulars as "bundles of universals". The conclusion drawn is that particularity and universality, irreducible to each other, are both involved in all existence. I end the first book by sketching a world-hypothesis which admits nothing but particulars having (universal) properties and relations.

The position reached at that point, though contested by many, is, at least in general outline, familiar enough. But in the second volume a detailed attempt is made to work out a theory of universals which is based upon natural science. In making this attempt, I enter relatively unexplored territory. For with the exception of a suggestive paper by Hilary Putnam (1970a) contemporary philosophers, at least, have largely ignored the possibility of developing a theory of objective universals, where the particular universals admitted are determined on the basis of scientific rather than semantic considerations. It might perhaps be argued that Plato in his later works, Aristotle and the Scholastic Realists were ahead of contemporary philosophy in this matter, although handicapped by the relative backwardness of the science and the scientific methodology of their day.

My contention is that, by accepting this a posteriori Realism, the theory of universals, arguably the central problem of ontology, can be placed on a securer and more intelligible foundation than anything previously available. In particular, such a doctrine makes possible the reconciliation of an empiricist epistemology, which I wish to retain, with ontological realism about universals.

Not all particulars are first-order particulars. Universals themselves fall under universals. That is to say, universals have certain properties and stand in certain relations to each other. In the final part of the second book an attempt is made to work out a theory of higher-order universals, but, again, one which is compatible with an empiricist epistemology. Of quite particular importance is the topic of relations between universals. For this topic may hold the key to an account of the nature of causation and of nomic necessity. By this means, it may prove possible to answer Hume without sacrificing Empiricism.

Finally, a word on the phrase "a posteriori Realism". The phrase may suggest that the theory advanced in this work is supported to be supported by a posteriori reasonings of the sort with which natural science has made us familiar. This is far from being the case. The reasoning will have the characteristically a priori flavour which philosophical reasonings, especially when they concern first philosophy, seem inevitably, if distressingly, to have. What is maintained is the proposition that what

universals there are is to be determined a posteriori. The status of this proposition is, however, a further question. It may have to be established, if it can be established, by a priori or relatively a priori reasoning." (Introduction to the First volume).

2. *A combinatorialist theory of possibility*. Cambridge: Cambridge University Press 1989.

Contents: Preface IX-XII; Part I: Non-naturalist theories of possibility. 1. The causal argument Part II: A combinatorial and naturalist account of possibility. 3; 2. Non-naturalist theories of possibility 14; 3. Possibility in a simple world 37; 4. Expanding and contracting the world 54; 5. Relative atoms 66; 6. Are there *de re* incompatibilities and necessities? 77; 7. Higher-order entities, negation and causation 87; 8. Supervenience 103; 9. Mathematics 119; 10. Final question: logic 138; Works cited 141; Appendix: Tractarian nominalism by Brian Skyrms 145; Index 153.

"What is put forward in this essay is a new version of the metaphysic of Logical Atomism. It is a Logical Atomism completely purged of semantic and epistemic atomism. The idea that one can reach the atoms by analysing meanings is utterly rejected. In general, it is not for philosophers to say what the fundamental constituents of the world are. That question is to be settled a posteriori. It is a question for total science.

The version of Logical Atomism put forward here even abstracts from the question of whether there are any atoms at all at the bottom of the world. That too is a question to be decided a posteriori, if it can be decided at all. In Chapter 5 I argue that Logical Atomism can still be sustained even if we never get past merely relative atoms.

But if there may be no genuine atoms, why continue to speak of Logical! Atomism? I do so because, with a little qualification, the scheme presented cleaves to the fundamental idea that the states of affairs into which the world divides (Wittgenstein's and Russell's atomic facts) are logically independent of each other. Each one is, as I will say, distinct from every other.

This becomes the basis of what I think is a simple (and naturalistic) Combinatorial theory of possibility. In his article 'Tractarian Nominalism' (*) Brian Skyrms sketches a metaphysics of facts (states of affairs, as I put it), facts having as constituents individuals and universals (the latter divided into properties and relations). I had already argued for such a position in my book *Universals and Scientific Realism* (1978). What I had not noticed was what Skyrms pointed out: that this could become the basis for a theory of possibility. The present work is an attempt to develop Skyrms's insight. With his approval, and the permission of the D. Reidel Publishing Company, his article is reprinted at the end of this volume as an appendix." (From the Preface)

(*) [*Philosophical Studies*, vol. 40, 1981, pp. 199-206]

3. *Universals. An opinionated introduction*. Boulder: Westview Press 1989.

Contents: Preface XI-XII; 1. The problem 1; 2. Primitive natural classes 21; 3. Resemblance nominalism 39; 4. Particulars as bundles of universals 59; 5. Universals as attributes 75; 6. Tropes 113; 7. Summing up 135; References 141; Index 145.

"This book is intended to be intelligible to the advanced undergraduate student and should also be suitable for graduate seminars. However, I hope that it will also be of interest to professional philosophers, particularly those who are sympathetic to the project of an empirical metaphysics. Since the publication of my book *Universals and Scientific Realism* in 1978, although my views have remained the same in broad outline, I have become aware of various mistakes and omissions in what I said then. The present work, therefore, besides introducing the topic, tries to push the subject further ahead.

I now think that a particular type of moderate Nominalism, moderate because it admits properties and relations, but a Nominalism because it takes the properties and relations to be particulars rather than universals, can be developed as an important and quite plausible rival to a moderate Realism about universals. In the earlier book I gave such a Nominalism only brief consideration. By contrast, in this work a battle between Nominalists and Realists over the status of properties and relations becomes one main theme.

In general, I have largely confined myself to moderate Nominalisms and moderate Realisms. That host of contemporary philosophers who unreflectively substitute classes of particulars for properties

and relations I take to be immoderate Nominalists. However, many of the arguments that I bring against the more moderate Natural Class theory are also arguments against this orthodoxy. I would also classify Quine as an extreme Nominalist (although he himself would not, on the grounds that he recognizes classes and that these are "abstract" or "platonic" entities)." From the Preface.

"Brushing aside the uneconomical view that admits both tropes and universals, we have a choice in Trope theory between natural class and resemblance views. The same sort of consideration that favors resemblances rather than natural classes of "regular" particulars seems to me to favor a Trope theory with resemblance. And although it is orthodox to bundle the tropes, I doubt if they are really well suited to be the substance of the world. We do better, with Locke and C. B. Martin, to hold the trope view in a substance-attribute form.

Our final two contenders, then, I suggest, are a Universals theory and a Trope Resemblance theory, each held in a substance-attribute form. How do we adjudicate between these two?

The Trope theory in its resemblance and substance-attribute form seems to me to face two unpleasantnesses. The first is relatively minor. It is the possibility of swapping exactly resembling tropes, to which attention was drawn in Section IX of Chapter 6. It is a somewhat implausible 'possibility', and is excluded by the substitution of universals for tropes.

The second difficulty is more serious, I think. It is the fact that the features of resemblance, what we have called the Axioms of Resemblance, would be explained with the greatest naturalness, simplicity, and economy if resemblance of nature was always identity of nature, either partial or complete identity. The difficulty, it will be remembered, is that the Axioms of Resemblance can be derived from the properties of identity provided that it is allowed that resemblance can be analyzed in terms of identity, that is, in terms of universals (Chapter 5, Section X). A Resemblance theory must treat this as a mere metaphysical coincidence between the properties of resemblance and the properties of identity. It is a serious difficulty for any resemblance analysis that the irreducibility of resemblance is so implausible an irreducibility.

What of the difficulties faced by the Universals theory? It might be thought that a great difficulty lies in its strange primitive: the cross-categorical and fundamental tie or nexus of instantiation. The Resemblance theory has no such problem because its tie of resemblance is an internal relation, supervening upon the particularized natures of the resembling things.

I do not think that instantiation involves any special difficulty for the Universals theory. Barring the postulation of a special nontransferability for tropes, we have seen the need for states of affairs for all layer-cake theories, including those involving tropes. If tropes are the attributes of substances, which I have argued is the best view of the matter, then a fundamental tie or nexus is involved, that is, there will be states of affairs involving substances, which are particulars, having properties, and also substances standing in relation to each other. If the bundle conception is correct, then a bundling tie (compreence) is still involved, and relations hold between bundles. Instantiations are just states of affairs involving universals and seem to involve no more paradox or difficulty than states of affairs involving tropes.

Where I do see trouble for a Universals theory is the question of the resemblance of universals. Once universals are admitted, it must also be admitted that universals themselves can be ordered and grouped by resemblance relations. These relations, however, involve less than exact resemblance. (Two universals could not resemble exactly!)

The vital question, then, is whether this less than exact resemblance of universals is or is not analyzable. My idea is that it is analyzable, analyzable in terms of a partial, an incomplete, identity of constituents of the universals involved, where these constituents are themselves universals. (In a Trope Resemblance theory, it would be a matter of exact resemblance of some, but only some, constituents of the inexactly resembling tropes.)

If this analysis of the inexact resemblance of universals can be carried through, then the Universals theory is considerably strengthened. But if it cannot be carried through, the theory is weakened, because the inexact resemblances will presumably have to be taken as unanalyzable primitives, strengthening the notion that exact resemblance is no more than the highest degree of this primitive. So, a great deal turns on whether the analysis of the inexact resemblance of universals can be carried through. I think that it can be carried through, but it faces some formidable ontological and

epistemological difficulties. A key question here is the nature of quantities. A quantity is for me a family of property universals bound together by inexact but systematic resemblances, but resemblances that involve identical constituents of the universals involved (see Armstrong - *Are quantities relations?* 1988). Here is an important area for further work." pp. 136-138.

4. *Dispositions. A debate*. New York: Routledge 1996.

Edited and with an introduction by Tim Crane.

Contents: List of authors VII-VIII; Part I. The Armstrong-Place debate; 1. D. M. Armstrong: Dispositions as categorical states 15; 2. U. T. Place: Dispositions as intentional states 19; 3. D. M. Armstrong: Place's and Armstrong's views compared and contrasted 33; 4. U. T. Place A conceptualist ontology 49; Part II. The Martin-Armstrong-Place debate; 5. C. B. Martin: Properties and dispositions 71; 6. D. M. Armstrong: Reply to Martin 88; U. T. Place: Structural properties: categorical, dispositional or both? 105; 8. C. B. Martin: Replies to Armstrong and Place 126; D. M. Armstrong: Second reply to Martin 147; 10. U. T. Place: Conceptualism and the ontological independence of cause and effect 153; 11. C. B. Martin: Final replies to Place and Armstrong 163; Index 193.

"This book is about the nature of dispositional properties, or dispositions.

is hard to give an uncontroversial definition of the notion of a disposition, since its very definition is one of the matters under dispute. But we can make a start with the following preliminary definition: a disposition is a property (such as solubility, fragility, elasticity) whose instantiation entails that the thing which has the property would change, or bring about some change, under certain conditions. For instance, to say that some object is soluble is to say that it would dissolve if put in water, to say that something is fragile is to say that it would break if dropped in suitable circumstances; to say that something is elastic is to say that it would stretch when pulled. The fragility elasticity) is a disposition; the breaking (dissolving, stretching is the manifestation of the disposition.

The contemporary philosophical controversy over dispositions is the descendant of earlier disputes - for example, Aristotle's view of actualities and potentialities, and Locke's view of secondary qualities as 'powers'. The recent interest in dispositions arose in two main areas of philosophy: the philosophy of science and the philosophy of mind. The interest in dispositions in the philosophy of science resulted from the logical empiricists' worries about unobservables - how could the whole of physics be expressed in terms of propositions about sense-experiences if physics requires attribution of dispositional qualities, which need have no manifestation in sense-experience?' The interest in dispositions in the philosophy of mind largely arose through behaviourist definitions of belief and other mental states, according to which belief is a disposition to act and/or to speak. Among the questions with which the philosophy of mind grappled were: how should such dispositions be defined, and what explains the possession of such dispositions?

The three participants in the present Debate have all made substantial contributions to the philosophy of mind in the last fifty years. U.T. Place is well-known as one of the originators (with Herbert Feigl) of the mind-brain identity theory - and his work influenced other pioneers such as J.J.C. Smart. D.M. Armstrong was one of the first to develop in detail a causal theory of the mind. C.B. Martin had already been an early proponent of the causal theory of mind, and played a crucial role in the development of the philosophy of mind in Australia, which then spread throughout the rest of analytic philosophy's world. Part of Martin's role in influencing the shift from behaviourism to physicalism and functionalism was to insist on the importance of what came to be called the 'Truthmaker Principle': the principle that when a statement is true, there must be something (some fact or event or property) that makes it true?

Each of these three philosophers has developed a distinct conception of the nature of dispositions, conceptions which are central in their thought on mind, matter and causation. In this Introduction I shall give a brief guide to the difference between them. In order to do this I need to say something (not wholly impartial) about the recent background to the debate about dispositions, and a little about how to characterize dispositional and categorical properties." (From the Introduction by Tim Crane, pp. 1-2).

5. *A world of state of affairs*. Cambridge: Cambridge University Press 1997.

Contents: Preface XI; -XIII; 1. Introduction 1; 2. Some preliminary doctrines 11; 3. Properties I 19;

4. Properties II 47; 5. Powers and dispositions 69; 6. Relations 85; 7. Particulars 95; 8. States of affairs 113; 9. Independence 139; 10. Modality 148; 11. Number 175; 12. Classes 185; 13. Totality states of affairs 196; 14. Singular causation 202; 15. Laws I 220; 16. Laws II 242; 17. The unity of the world 263; References 270; Index 277.

"During the past twenty years or so, I have been working on ontological questions. What are universals, laws of nature, dispositions and powers, possibilities and necessities, classes, numbers? The present essay tries to bring all these topics together in a unified metaphysical scheme, an ontology. As a result, there is a certain amount of recapitulation of earlier writing. But putting the pieces together turned out to be quite difficult. A good deal of further work was necessary. Many mistakes, as I now think of them, had to be corrected. So what follows is not a mere sum of past thinking." (From the Preface)

"The hypothesis of this work is that the world, all that there is, is a world of states of affairs. Others, Wittgenstein in particular, have said that the world is a world of facts and not a world of things. These theses are substantially the same, though differently expressed.

The general structure of states of affairs will be argued to be this. A state of affairs exists if and only if a particular (at a later point to be dubbed a *thin* particular) has a property or, instead, a relation holds between two or more particulars. Each state of affairs, and each constituent of each state of affairs, meaning by their constituents the particulars, properties, relations and, in the case of higher-order states of affairs, lower-order states of affairs, is a contingent existent. The properties and the relations are universals, not particulars. The relations are all external relations.

It is useful to admit *molecular* states of affairs. These, however, are mere conjunctions (never negations or disjunctions) of the original states of affairs. Molecular states of affairs constitute no ontological addition to their conjuncts. But in one special case, to be mentioned in a moment, they become very important.

For first-order states of affairs, that is, states of affairs that do not have states of affairs as constituents, the Tractarian thesis of Independence is somewhat speculatively, but nevertheless hopefully, advanced. No such state of affairs entails or excludes the existence of any other wholly distinct state of affairs. Given Independence, a rather simple and straightforward Combinatorial theory of what possibilities there are, can be put forward. If Independence fails, things get more complicated.

The present theory is not biased towards Atomism nor is it biased against Atomism. An *epistemic* possibility that requires to be noted is the possibility that every (first-order) state of affairs is molecular, that is, analysable into a conjunction of states of affairs. (A simple if to a degree controversial example: *a*' being F may be equivalent to *a*'s being G & *a*' being H, with F=G & H. The pattern may be repeated for G and H, and so for ever.) Every first-order state of affairs may be a nest of first-order states of affairs: states of affairs all the way down. To allow for this epistemic possibility, a Combinatorial theory of what possibilities there are requires further elaboration." pp. 1-2.

6. *Truth and truthmakers*. Cambridge: Cambridge University Press 2004.

Contents: Preface XI-XII; 1. An introduction to truthmakers 1; 2. The general theory of truthmaking 4; 3. Epistemology and methodology 26; 4. Properties, relations and states of affairs 39; 5. Negative truths 53; 6. General truths 68; 7. Truthmakers for modal truths, part 1: possibility 83; 8. Truthmakers for modal truths, part 2: necessity 95; 9. Numbers and classes 112; 10. Causes, laws and dispositions 125; 11. Time 145; References 151; Index 155.

"To postulate certain truthmakers for certain truths is to admit those truthmakers to one's ontology. The complete range of truthmakers admitted constitutes a metaphysics, which alerts us to the important point, stressed already but bearing much repetition, that the hunt for truthmakers is as controversial and difficult as the enterprise of metaphysics. I think that proceeding by looking for truthmakers is an illuminating and useful regimentation of the metaphysical enterprise, or at least the enterprise of a realist metaphysics. But it is no easy and automatic road to the truth in such matters.

But this raises the question of Quine, and the signalling of ontological commitment by what we are

prepared to 'quantify over'. Why should we desert Quine's procedure for some other method? The great advantage, as I see it, of the search for truthmakers is that it focuses us not merely on the metaphysical implications of the subject terms of propositions but also on their *predicates*. Quine has told us that the predicate gives us 'ideology' rather than ontology. (*) This saying is rather dark, but it is clear that, to some degree, he has stacked the ontological deck against predicates as opposed to subject terms. But when we look to truthmakers for truths, subject and predicate start as equals, and we can consider the ontological implications of both in an unbiased way.

The doing of ontological justice to the predicate leads us to consider whether we do not require at least selected properties and relations in our ontology. If properties and relations are admitted, we may think that some ontological connection between subjects and predicates is further required, and thus, perhaps, be led to postulate facts or states of affairs among our truthmakers. The propositional nature of truths will in any case push us in the same direction. The existence of negative truths and general truths raises the question whether negative and general facts are required as truthmakers. All these difficult metaphysical issues (which will receive discussion in chs. 5 and 6) tend to be swept under the carpet by correlating one's ontology with the subject term only of truths (what one takes to be truths).

Some may argue that what I see here as advantages of thinking in terms of truthmakers are actually disadvantages. The world is a world of things not of facts, it may be said, and so we do not want facts, and the nightmare of such entities as negative facts, in our ontology. This is an arguable position, of course, but, conceding it true for the sake of argument, it can still be accommodated by a doctrine of truthmakers. Let the world be a world of things. The fundamental truths (those that have unique minimal truthmakers) will then have the form 'X exists' and the Xs, whatever they may be, will be truthmakers for these truths." pp. 23-24

(*) Quine writes: 'In science all is tentative, all admits of revision. But ontology is, pending revision, more clearly in hand than what may be called *ideology* - the question of admissible predicates' (Quine, *The way of paradox and other essays*, New York, Random House, 1966, p. 232).

Articles

1. "Materialism, properties and predicates," *Monist* 56: 163-176 (1972).
"How are contingent identifications ('heat is mean kinetic energy') possible? It is argued, first, that we require a realistic (but not Platonistic) theory of properties. second, that we must reject the common assumption that to each distinct predicate there corresponds its own peculiar property. Contingent identification occurs where two distinct predicates apply to the same object or objects in virtue of just one property of that object."
2. "An argument against David Lewis' theory of possible worlds," *Australasian Journal of Philosophy* 62: 164-168 (1984).
3. "In defence of structural universals," *Australasian Journal of Philosophy* 64: 85-88 (1986).
4. "The nature of possibility," *Canadian Journal of Philosophy* 16: 575-594 (1986).
5. "Classes are States of Affairs," *Mind*: 189-200 (1991).
"David Lewis argues, and this article accepts, that many-membered classes are nothing more than mereological wholes composed of their unit sub-classes. What, then, is a unit-class? It is a state of affairs, the possession by its member of the property of unithood. These states of affairs are complex, having constituents. But the complexity is non-mereological. Lewis cannot accept this account, since he holds that all composition is mereological."
6. Properties. In *Language, truth, and ontology*. Edited by Mulligan Kevin. Dordrecht: Kluwer 1992. pp. 15-27
1. Why we should admit Properties 15; 2. Universals vs. Tropes 22.
7. "Categorialist versus Dispositionalist accounts of properties," *Acta Analytica*: 7-19 (1996).
"Should properties be thought of as having a "categorial" nature or should they be thought of as having a "dispositional" nature? The author presents arguments for and against dispositionalism and discusses a middle way between dispositionalism and categorialism. He defends the position according to which all true properties are nondispositional, they do not have a nature that is

exhausted by their possible manifestations. The difficulties for dispositionalism are more serious disadvantage than any facing categoricism."

8. "Difficult cases in the theory of truthmaking," *Monist* 83: 150-160 (2000).

Studies about his work

1. *D. M. Armstrong*. Edited by Bogdan Radu. Dordrecht: Reidel 1984.
2. *Ontology, causality and mind. Essays in honour of D. M. Armstrong*. Edited by Bacon John, Campbell Keith, and Reinhardt Lloyd. Cambridge: Cambridge University Press 1993.
Contents: Preface VII; Contributors XII; I. Possibility and identity. 1. William G. Lycan: Armstrong's new combinatorialist theory of modality 3; Reply 18; 2. David Lewis: Many, but almost one 23; Reply 38; II. The theory of universals. 3. Peter Forrest: Just like Quarks? The status of repeateables 45; Reply; John Bigelow: Set are haecceitas 73; Reply 96; 5. D. H. Mellor: Properties and predicates 101; Reply 113; III. Causality and laws of nature. 6. Evan Fales: Are causal laws contingent? 121; Reply 144; 7. J. J. C. Smart: Laws of nature as a species of regularities 152; Reply 169; 8. C. B. Martin: Power for realists 175; Reply 186; 9. Peter Menzies: Laws of nature, modality and Humean supervenience 195; Reply 225; IV. Consciousness and secondary qualities. 10. Frank Jackson: Block's challenge 235; Reply 246; 12. Keith Campbell: David Armstrong and realism about colour 249; Reply 269; Bibliography of the works of D. M. Armstrong 275; Index 285.
3. "The philosophy of D. M. Armstrong," *Australasian Journal of Philosophy* 84: 155-310 (2006).
Guest Editor: Peter Anstey
4. Bigelow John, "Toward structural universals," *Australasian Journal of Philosophy* 64: 94-96 (1986).
5. Lewis David, "Comment on Armstrong and Forrest," *Australasian Journal of Philosophy* 64: 92-93 (1986).

Links

Curriculum Vitae

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