SORITES

σωρίτης

An International Digital Journal of Analytical Philosophy
Indexed and Abstracted in ***THE PHILOSOPHER'S INDEX***
ISSN 1135-1349
Legal Deposit Registration: M 14867-1995

Editor: Lorenzo Peña

.....

Associate Editor: Txetxu Ausín

(Spanish Institute for Advanced Studies)

Board of Editorial Consultants:
Jean-Yves Béziau, Enrique Alonso, Guillermo Hurtado, Manuel Liz, Raymundo Morado

---

Regular-Mail Address:
Prof. Lorenzo Peña
CSIC [Spanish Institute for Advanced Studies]
Department of Theoretical Philosophy
Pinar 25
E-28006 Madrid
Spain
Fax +3491 564 52 52
Voice Tph +3491 411 70 60, ext 18

INTERNET ACCESS:
<**http://www.sorites.org/**>
<**http://www.sorites.info/**>
Editorial e-mail inbox: <**sorites@sorites.org**>

Issue #17 — October 2006

SORITES (ΣΩΡΙΤΗΣ)
ISSN 1135-1349
Issue #17 — October 2006
Copyright © by SORITES and the authors

MAIN INTERNET ACCESS:
<**http://www.sorites.org/**>
<http://www.sorites.info/>
<**sorites@sorites.org**> (Editorial e-mail inbox)

SORITES

ISSN 1135-1349

ROLL OF REFEREES

Rainer Born . . . . . Johannes-Kepler Universitaet Linz (Austria)
Amedeo Conte . . . . . University of Pavia (Italy)
Newton C.A. da Costa . . . . . University of São Paulo (Brazil)
Marcelo Dascal . . . . . University of Tel Aviv (Israel)
Dorothy Edgington . . . . . Birbeck College (London, UK)
Graeme Forbes . . . . . Tulane University (New Orleans, Louisiana, USA)
Manuel García-Carpintero . . . . . University of Barcelona (Spain)
Laurence Goldstein . . . . . University of Hong Kong (Hong Kong)
Jorge Gracia . . . . . State University of New York, Buffalo (USA)
Nicholas Griffin . . . . . McMaster University (Hamilton, Ontario, Canada)
Rudolf Haller . . . . . Karl-Franzens-Universitaet Graz (Austria)
Terence Horgan . . . . . University of Memphis (Tennessee, USA)
Victoria Iturralde . . . . . Univ. of the Basque Country (San Sebastian, Spain)
Tomis E. Kapitan . . . . . Northern Illinois University (USA)
Manuel Liz . . . . . University of La Laguna (Canary Islands, Spain)
Peter Menzies . . . . . Australian National University (Canberra, Australia)
Carlos Moya . . . . . University of Valencia (Spain)
Kevin Mulligan . . . . . University of Geneva (Switzerland)
Jesús Padilla-Gálvez . . . . . Johannes-Kepler Universitaet Linz (Austria)
Philip Pettit . . . . . Australian National University (Canberra, Australia)
Graham Priest . . . . . University of Queensland (Brisbane, Australia)
Eduardo Rabossi . . . . . University of Buenos Aires (Argentina)
David-Hillel Ruben . . . . . School of Oriental and African Studies, University of London
Mark Sainsbury . . . . . King's College (London, UK)
Daniel Schulthess . . . . . University of Neuchâtel (Switzerland)
Peter Simons . . . . . University of Leeds (Leeds, UK)
Ernest Sosa . . . . . Brown University (Providence, Rhode Island, USA)
Friedrich Stadler . . . . . Institut «Wien Kreis» (Vienna, Austria)

SORITES

ISSN 1135-1349

Issue #17 — October 2006

TABLE OF CONTENTS

SORITES (ΣΩΡΙΤΗΣ), ISSN 1135-1349
http://www.sorites.org
Issue #17 — October 2006. Pp. 3-6
Abstracts of the Papers
Copyright © by SORITES and the authors

ABSTRACTS OF THE PAPERS

About Properties of L-Inconsistent Theories

by Vyacheslav Moiseyev

In the paper a new type of the formal theory, «L-inconsistent theory», is constructed and some properties of such theories are investigated. First a theory T* is defined as a set of limiting sequences of formulas from a theory T with a language L. A limiting sequence $\{\mathbf{A_n}\}^{\infty}_{n=1}$ of the formulas from T is said to be a *theorem* of the theory T* if there exists an $m \geq 0$ such that for any $n \geq m$ the formula $\mathbf{A_n}$ of the language L is a theorem of the theory T. T is embeded into T*. Then, a theorem of T* is called an *L-contradiction* if the limit of this theorem equals $\mathbf{B} \wedge \neg \mathbf{B}$, where **B** is a formula of the language L. Finally, the theory T* is said to be an *L-inconsistent theory* if there exists an L-contradiction in T*. It is proved that the theory T* is consistent, complete, etc., iff the theory T is consistent, complete, etc. However, T* contains more theorems and inferences than T (see Theorems 9 and 10). L-inconsistent theory T* can be presented as a new approach to the Philosophical Logic, dealing with an extension of Method of Limits to thinking. Namely some philosophical antinomies, for example Kantian ones, could be presented as L-contradictions in an L-inconsistent theory.

Paraconsistent logic! (A reply to Slater)

by Jean-Yves Béziau

We answer Slater's argument according to which paraconsistent logic is a result of a verbal confusion between «contradictories» and «subcontraries». We show that if such notions are understood within classical logic, the argument is invalid, due to the fact that most paraconsistent logics cannot be translated into classical logic. However we prove that if such notions are understood from the point of view of a particular logic, a contradictory forming function in this logic is necessarily a classical negation. In view of this result, Slater's argument sounds rather tautological.

The Logic of Lying

by Moses Òkè

By definition, a lie is a dishonestly made statement. It is a wilful misrepresentation, in one's statement, of one's beliefs. Both a truthful person and a liar could hold false beliefs. We should not uncritically regard an untruthfully made statement as an untrue statement, or a truthfully made statement as a true statement. The only instance when a lie is necessarily false

is when the liar's corresponding belief that was distorted was true. In other instances, the lie could be either true or false. We conclude that a lie is not necessarily a false statement.

Sparse Parts

by Kristie Miller

Four dimensionalism, the thesis that persisting objects are four dimensional and thus extended in time as well as space, has become a serious contender as an account of persistence. While many four dimensionalists are mereological universalists, there are those who find mereological universalism both counterintuitive and ontologically profligate. It would be nice then, if there was a coherent and plausible version of four dimensionalism that was non-universalist in nature. I argue that unfortunately there is not. By its very nature four dimensionalism embraces theses about the nature of objects and their borders that make any version of non-universalist four dimensionalism either incoherent or at least highly implausible.

Are Functional Properties Causally Potent?

by Peter Alward

Kim has defended a solution to the exclusion problem which deploys the «causal inheritance principle» and the identification of instantiations of mental properties with instantiations of their realizing physical properties. I wish to argue that Kim's putative solution to the exclusion problem rests on an equivocation between instantiations of properties as *bearers of properties* and instantiations as *property instances*. On the former understanding, the causal inheritance principle is too weak to confer causal efficacy upon mental properties. And on the latter understanding, the identification of mental and physical instantiations is simply untenable.

Subcontraries and the Meaning of «If…Then»

by Ronald A. Cordero

In this paper I maintain that useful, assertable conditional statements with subcontrary antecedents and consequents do actually occur. I consider the paradoxical results of applying rules of inference like Transposition in such cases and argue that paradox can be avoided through an interpretation of conditionals as claims that the truth of one statement would permit a sound inference to the truth of another.

Does Frege's Definition of Existence Invalidate the Ontological Argument?

by Piotr Labenz

It is a well-known remark of Frege's that his definition of existence invalidated the ontological argument for the existence of God. That has subsequently often been taken for granted. This paper attempts to investigate, whether rightly so. For this purpose, both Frege's ontological doctrine and the ontological argument are outlined.

Arguments in favour and against both are considered, and reduced to five specific questions. It is argued that whether Frege's remark was right depends on what the answers to these questions are, and that for the seemingly most plausible ones — it was not.

Why Prisoners' Dilemma Is Not A Newcomb Problem

by P. A. Woodward

David Lewis has argued that we can gain helpful insight to the (all too common) Prisoners' Dilemmas that we face from the fact that Newcomb's Problems are easy to solve, and the fact that Prisoners' Dilemmas are nothing other than two Newcomb Problems side by side. The present paper shows that the (all too common) Prisoners' Dilemmas that we face are significantly different from Newcomb Problems in that the former are iterated while the latter are not. Thus Lewis's hope that we can get insight into the former from the latter is illusory.

A Paradox Concerning Science and Knowledge

by Margaret Cuonzo

Quine's and Duhem's problem regarding the «laying of blame» that occurs when an experimental result conflicts with a scientific hypothesis can be put in the form of a standard philosophical paradox. According to one definition, a philosophical *paradox* is an argument with seemingly true premises, employing apparently correct reasoning, with an obviously false or contradictory conclusion. The Quine/Duhem problem, put in the form of a paradox, is a special case of the skeptical paradox. I argue that both the Quine/Duhem paradox and the skeptical paradox enjoy the same type of solution. Both paradoxes have the kind of restricted solution that Stephen Schiffer calls «mildly unhappy-face» solutions. Although there can be no solution to these two paradoxes that gives an accurate account of the relevant notions (e.g., knowledge), replacement notions are given for the ones that lead to the paradoxes.

Between Platonism and Pragmatism: An alternative reading of Plato's *Theaetetus*

by Paul F. Johnson

In a letter to his friend Drury, Wittgenstein claims to have been working on the same problems that Plato was working on in the *Theaetetus*. In this paper I try to say what that problem might have been. In the alternative reading of the dialogue that I construct here, attention is drawn to Socrates' frequent appeal in the course of discussion to the ordinary ways of speaking that he, and Theaetetus, and everyone else in Athens at the time engaged in. The more abstruse theories of Heraclitus and Protagoras which Socrates and Theaetetus are discussing are found to do violence to these ordinary ways of talking, and found seriously wanting as a result. A case is made that the conventions and presuppositions of ordinary conversational speech are inherently normative, and constitute a valid standard against which philosophical theories may be measured. Lines of affinity are drawn between these claims advanced by Plato and the recent work of contemporary neo-pragmatists, and Robert Brandom's work in particular.

Blob Theory: N-adic Properties Do Not Exist

by Jeffrey Grupp

I argue for blob theory: the philosophic position that n-adic properties do not exist. I discuss hitherto unnoticed problems to do with the theories of property possession in the ontological theories of ordinary objects: the bundle theory of objects and substance theories of objects. Specifically, I argue that theories of property possession involved with the bundle theory and substance theories of objects are contradictory, and the best theory we have been given by metaphysical realists is a theory that reality is propertyless.

SORITES (ΣΩΡΙΤΗΣ), ISSN 1135-1349
http://www.sorites.org
Issue #17 — October 2006. Pp. 7-16
About Properties of L-Inconsistent Theories
Copyright © by Vyacheslav Moiseyev and SORITES

ABOUT PROPERTIES OF L-INCONSISTENT THEORIES

Vyacheslav Moiseyev

Apparently, there have been two traditions in the history of logic, these are Line of Parmenide and Line of Heraclitus. Former is originated from the ideas of Parmenide-Aristotle and is based on the Law of Identity. This line constitutes formal logic. Latter is originated from the ideas of Heraclitus-Plato and has been expressed itself in the ideas of dialectics, or dialectical logic. Contemporary mathematical logic is the worthy result of the development of the first line. Possibility of good precision and clear procedures of justification is the most strong side of this line. On the other hand, dialectics always have been trying to deny the meaning of Law of Identity. Dialectical ideal have been expressed itself in the idea of contradiction. But a very big problem have been subsisted here. This is the problem which we shall call *Problem of Logical Demarcation (PLD)*. Breafly speaking, essence of the problem is in the following idea. Mistakes are contradictions too and if dialectics does not want to be simply mistaken reasoning, then it must show a criterion with the help of which we could to separate contradictions-mistakes from dialectical contradictions (antinomies). We shall call such criterion as *Criterion of Logical Demarcation (CLD)*. Although dialectics has not been able to show CLD but there have been many interesting attempts to find the Criterion. One can refer here to Plato, Nicholas from Cusa, Russian Philosophy of All-Unity, etc.

It seems to us that one of the interesting ideas here is the idea of some connection between CLD and concept of limit. For example, Nicholas from Cusa tried to express idea of God in the image of a straight line which is limit for the infinite sequence of tangent circumferences. Our paper is an attempt to extend this trend and to formulate a version of CLD, where dialectical contradictions (antinomies) can be expressed as limits of ifinite sequences of formulas in a formal language. Main new idea is here in the technique of work with the limiting sequences of *formulas*, not terms. This idea is fully correlated with the method of extension of rational numbers by irrational ones in mathematical analysis. As is well known, every irrational number can be represented by a limiting sequence of rational numbers. Then we can represent rational numbers itselves as a particular case of limiting sequences, i.e., as stationary sequences. Thus we are passing to a new type of objects and we can define operations with these objects generalizing of operations on rational numbers. The same approach is demonstrated below but in the logical sphere.

Basic task here is to define limiting sequences of formulas. Separate formulas in a formal language can be considered as analogues of rational numbers in analysis. Stationary sequences of formulas must be a particular case of the definition of limiting sequence. We shall carry out the task of limiting sequence of formulas definition by use of limiting sequences of terms. Let us see the following simple example. Let $1/n = 1/n$ and $1/n \neq 1/n+1$ be formulas in a theory T generalizing theory of real numbers. Then for every $n = 1, 2, 3, \ldots$ we can prove that the corresponding formulas are theorems. Let us propose that we can prove also formula

$\lim(1/n) = 0$ in T (I shall mean the limit of sequence of terms a_n as $n\to\infty$ under the symbol $\lim(a_n)$), i.e., limit of sequence of numbers 1/n is zero. $(1/n = 1/n \wedge 1/n \neq 1/n+1)$ is also formula in T and we can consider the following infinite sequence of formulas

$(1/1 = 1/1 \wedge 1/1 \neq 1/2)$, $(1/2 = 1/2 \wedge 1/2 \neq 1/3)$, $(1/3 = 1/3 \wedge 1/3 \neq 1/4)$, ...

Every element of the sequence is formed as the result of substitution of constants 1/1, 1/2, 1/3, etc., for the places of variables in formula $(x=x \wedge x \neq y)$. For example, first formula can be represented as $(x=x \wedge x \neq y)_{x,y}$ [1/1, 1/2], i.e., as the result of substitution of constants 1/1 and 1/2 for variables x and y respectively. Hence we can rewrite the sequence of formulas in the following form

$(x=x \wedge x \neq y)_{x,y}$ [1/1, 1/2], $(x=x \wedge x \neq y)_{x,y}$ [1/2, 1/3], $(x=x \wedge x \neq y)_{x,y}$ [1/3, 1/4], ...

It permits to us to use the following designation for the expression of this sequence

$\{(x=x \wedge x \neq y)_{x,y}$ [1/n, 1/n+1]$\}$

Let us define the limit of this sequence as the result of substitution of limits of sequences of terms for the variables. In our case we receive

$\lim((x=x \wedge x \neq y)_{x,y}$ [1/n, 1/n+1]$) =_{Df} (x=x \wedge x \neq y)_{x,y}$ [lim(1/n), lim(1/n+1)]

Since $\lim(1/n) = \lim(1/n+1) = 0$, we finally receive

$\lim((x=x \wedge x \neq y)_{x,y}$ [1/n, 1/n+1]$) = ((x=x \wedge x \neq y)_{x,y}$ [0, 0]$) = (0 = 0 \wedge 0 \neq 0)$,

i.e., contradiction.

However, though limit of sequence of formulas is contradiction, every formula from the sequence is theorem of T. Such consequence of formulas plays a role similar to role of consequence of rational numbers which limit is absent between rational numbers, i.e., is an irrational number. We shall call consequences of theorems which limit is contradiction as *L-contradiction*, i.e., limit contradiction. Instead of working with contradiction we can work with limiting consequence of formulas which limit is the contradiction. Logic of limiting consequences of formulas is not poorer than logic of formulas since the last is generalized by the former on the basis of stationary sequences.

Finally, we can formulate CLD with the help of the idea of L-contradiction. Namely, contradiction $A\wedge\neg A$ is called an *antinomy (dialectical contradiction) relatively consistent theory* T if $A\wedge\neg A$ is formula of the language of T and there exists an extension of the theory T to a theory T* of limiting consequences of formulas from T such that there exists an L-contradiction from T* which limit equals $A\wedge\neg A$. Therefore it is clear that satisfactory decision of CLD and PLD is the consequence of satisfactory formulation of the theory T* and its properties. Below we shall investigate namely this problem.

Suppose T is a formal theory with a language L such that there exist formulas in L, which can be represented in the metalanguage as expressions of the form «$\mathbf{lim(a_n) = a}$», where «$\mathbf{a_n}$», «**a**» are names for terms from L, «**n**» is name for natural number n, and these formulas can be interpreted in a model M of the theory T as the equality of the limit of a sequence $\{a_n\}$ with individuals from M to an individual a from M. We shall say that such theory T is called *t-limiting theory* («t» is used from «term»). A theory of sets and theory of real numbers are examples of t-limiting theories.

Let T be a t-limiting theory with a language L, where $\mathbf{A_n}$ is a formula from L such that

(*) $\mathbf{A_n} = \mathbf{A}_{x1, x2, ..., xm}\ [\mathbf{a^1}_{n \pm p1}, \mathbf{a^2}_{n \pm p2}, ..., \mathbf{a^m}_{n \pm pm}]$,

where $p_j \in \mathbf{N}$,

N is set of natural numbers,

and j=1,...,m.

In other words, the formula $\mathbf{A_n}$ is the result of the substitution of terms $\mathbf{a^1}_{n \pm p1}, \mathbf{a^2}_{n \pm p2}, ..., \mathbf{a^m}_{n \pm pm}$ for free entrances of the variables $\mathbf{x_1}, \mathbf{x_2}, ..., \mathbf{x_m}$ into a formula **A**, where each of the terms $\mathbf{a^j}_{n \pm pj}$ is an element of an infinite sequence $\{\mathbf{a^j}_k\}$ (k is variable of sequence here), and theorems of the form

$\mathbf{lim a^j}_n = \mathbf{a^j}$

are deduced in the theory T for every j.

The sequence $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is defined for the formulas $\mathbf{A_n}$ of the sort (*). By definition, put

$\mathbf{A_\infty} = \mathbf{lim A_n} = \mathbf{A}_{x1, x2, ..., xm}\ [\mathbf{lim}(\mathbf{a^1}_n), \mathbf{lim}(\mathbf{a^2}_n), ..., \mathbf{lim}(\mathbf{a^m}_n)]$.

This definition allows us to reduce a concept of *formula limit* to limits of terms, which are included into a formula.

DEFINITION 1. Sequences $\{\mathbf{A_n}\}^{\infty}_{n=1}$ of the formulas $\mathbf{A_n}$ of the sort (*) and also stationary sequences of the formulas from L are called *limiting sequences* of the formulas from L.

Let a language L* be the set of all the terms from L and also the set of all limiting sequences of the formulas from L. The language L can be embeded into the language L* with the help of the injective map E*: L→ L* such that if **à** is a term from L, then E*(**à**)=**à**, if **A** is a formula from L, then E*(**A**) is the stationary sequence of the formulas **A**.

DEFINITION 2. Limiting sequences of the formulas $\{\mathbf{A_n}\}^{\infty}_{n=1}$ are called *formulas of the language L**.

Thus the languages L and L* do not differ between themselves by the alphabets and sets of terms but only sets of the formulas.

DEFINITION 3. We say that two formulas $\{\mathbf{A_n}\}^{\infty}_{n=1}$ and $\{\mathbf{B_n}\}^{\infty}_{n=1}$ from L* are called *equal* and this is denoted by «$\{\mathbf{A_n}\}^{\infty}_{n=1} = \{\mathbf{B_n}\}^{\infty}_{n=1}$» if the formula $\lim\mathbf{A_n}$ (i.e. formula, which is limit of sequence $\{\mathbf{A_n}\}^{\infty}_{n=1}$) can be obtained from the formula $\lim\mathbf{B_n}$ by right renaming of bound variables.

DEFINITION 4. A formula $\{\mathbf{A_n}\}^{\infty}_{n=1}$ of the language L* is said to be a *metatheorem of the theory T* if there exists an m≥0 such that for any n≥m the formula $\mathbf{A_n}$ of the language L is a theorem of the theory T.

DEFINITION 5. A limiting sequence of the formulas $\{\mathbf{A_n}\}^{\infty}_{n=1}$, which is a metatheorem of the theory T, is called an *L-contradiction* («L» from «limit») if the limit of this sequence, $\lim\mathbf{A_n}$, equals $\mathbf{B}\wedge\neg\mathbf{B}$, where **B** is a formula of the language L.

DEFINITION 6. The set of metatheorems of the theory T is called a *theory T**.

In this case, the metatheorems of the theory T can be called also *theorems* of the theory T*. The language L* is the language of the theory T*. We shall say that T* is called a *ft-*

limiting theory («f» from «formula»). The approach, circumscribed above, can be considered as a methodology of building-up of ft-limiting theories on the basis of t-limiting theories. The theory T* is said to be an *L-inconsistent theory* if there exists an L-contradiction in T*.

DEFINITION 7. The theory T* is called *consistent* if not all formulas from L* are theorems of the theory T* (see also Theorem 20).

THEOREM 1. If the theory T is consistent, then the theory T* is consistent.

PROOF. Suppose the theory T is consistent; then there exists a formula **A** from the language L such that **A** is not a theorem of the theory T. Let $\{\mathbf{A_n}\}^{\infty}_{n=1}$ be the stationary sequence, where for any n $\mathbf{A_n}$ is **A**. The sequence $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is a formula from L* but it is not a theorem of the theory T*. Therefore the theory T* is consistent.

THEOREM 2. If the theory T* is consistent, then the theory T is consistent.

PROOF. Assume the converse. Then the theory T* is consistent and the theory T is not. If T is nonconsistent, then any formula of the theory T is the theorem of this theory. If T* is consistent, then there exists a formula $\{\mathbf{A_n}\}^{\infty}_{n=1}$ from L* such that $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is not a theorem of the theory T*. Hence for any $m\geq 0$ there exists an $n\geq m$ such that the formula $\mathbf{A_n}$ is not a theorem of the theory T. This contradiction proves the theorem.

THEOREM 3. The theory T is consistent iff the theory T* is consistent.

PROOF. See Theorems 1 and 2.

DEFINITION 8. Let M be a structure for the language L. We shall say that a formula $\{\mathbf{A_n}\}^{\infty}_{n=1}$ from the language L* is valid in M if there exists an $m\geq 0$ such that for any $n\geq m$ the formula $\mathbf{A_n}$ is valid in M.

DEFINITION 9. A structure M for the language L is called a *model of the theory T** if any theorem of the theory T* is valid in M.

We shall say that a structure M for the language L is called a *structure for the language L**.

THEOREM 4. Let M be a model of the theory T; then M is a model of the theory T*.

PROOF. Let a formula $\{\mathbf{A_n}\}^{\infty}_{n=1}$ from the language L* be a theorem of the theory T*. Then there exists an $m\geq 0$ such that for any $n\geq m$ the formula $\mathbf{A_n}$ is a theorem of the theory T, i.e., $\mathbf{A_n}$ is valid in the model M of the theory T. Therefore the formula $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is valid in M. Hence M is a model of the theory T*.

THEOREM 5. Let M be a model of the theory T*; then M is a model of the theory T.

PROOF. Let M be a model of the theory T* and **A** be a theorem of the theory T. Suppose $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is the stationary sequence, where $\mathbf{A_n} = \mathbf{A}$ for any n; then $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is a theorem of the theory T* and $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is valid in M, i.e., there exists an $m\geq 0$ such that for any $n\geq m$ the formula $\mathbf{A_n}$ is valid in M. Since $\mathbf{A_n}$ is **A**, we see that the formula **A** is valid in M. Therefore M is a model of the theory T.

THEOREM 6. M is model of the theory T iff M is model of the theory T*.

PROOF. See Theorems 4 and 5.

DEFINITION 10. A formula $\{\mathbf{A_n}\}^{\infty}_{n=1}$ from the language L* is said to be an *axiom of the theory T*** if there exists an m≥0 such that for any n≥m the formula $\mathbf{A_n}$ is an axiom of the theory T.

DEFINITION 11. Suppose Γ_n is a set of formulas from L and there exists an m≥0 such that for any n≥m $\Gamma_n \vdash \mathbf{A_n}$ is an inference of an formula $\mathbf{A_n}$ from Γ_n in the theory T. Let the sequence of the sets $\{\Gamma_n\}^{\infty}_{n=1}$ have the limit and the sequence of the formulas $\{\mathbf{A_n}\}^{\infty}_{n=1}$ also have the limit. Then the object $\{\Gamma_n \vdash \mathbf{A_n}\}^{\infty}_{n=1}$ (i.e. sequence of inferences $\Gamma_n \vdash \mathbf{A_n}$, where n=1,2,3,...) is called an *inference in the theory T**. Denote by «$\{\Gamma_n\}^{\infty}_{n=1} \vdash_{T^*} \{\mathbf{A_n}\}^{\infty}_{n=1}$», or «$\{\Gamma_n\}^{\infty}_{n=1} \vdash \{\mathbf{A_n}\}^{\infty}_{n=1}$», any inference $\{\Gamma_n \vdash \mathbf{A_n}\}^{\infty}_{n=1}$.

DEFINITION 12. An inference $\{\Gamma_n \vdash \mathbf{A_n}\}^{\infty}_{n=1}$ in the theory T* is said to be a *proof in the theory T*** if there exists an m≥0 such that for any n≥m Γ_n is a set of axioms of the theory T or Γ_n is empty.

DEFINITION 13. A sequence of the sets $\{\Gamma_n\}^{\infty}_{n=1}$ is called *regular* if $\{\Gamma_n\}^{\infty}_{n=1} = \{\cup_{k=1}^{N}\{\mathbf{A^k_n}\}\}$ (here $\{\cup_{k=1}^{N}\{\mathbf{A^k_n}\}\}$ is sequence, where n=1,2,3,..., of unions $\cup_{k=1}^{N}\{\mathbf{A^k_n}\}$ of one-element sets $\{\mathbf{A^k_n}\}$), while N is a finite natural number or infinity, and $\{\mathbf{A^k_n}\}^{\infty}_{n=1}$ (here $\{\mathbf{A^k_n}\}$ is sequence of formulas of L, where n=1,2,3,...) is a formula from L*. In this case, denote by «$\{\{\mathbf{A^k_n}\}^{\infty}_{n=1}\}_{k=1}^{N}$» any $\{\Gamma_n\}^{\infty}_{n=1}$ and denote by «$\{\{\mathbf{A^k_n}\}^{\infty}_{n=1}\}_{k=1}^{N} \vdash \{\mathbf{A_n}\}^{\infty}_{n=1}$» any inference $\{\Gamma_n\}^{\infty}_{n=1} \vdash \{\mathbf{A_n}\}^{\infty}_{n=1}$. We shall say that the formula $\{\mathbf{A_n}\}^{\infty}_{n=1}$ *is deduced* from the set $\{\{\mathbf{A^k_n}\}^{\infty}_{n=1}\}_{k=1}^{N}$ of the formulas $\{\mathbf{A^k_n}\}^{\infty}_{n=1}$ in the theory T*.

THEOREM 7. If $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is a theorem of the theory T*, then $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is deduced in the theory T* from axioms of the theory T*.

PROOF. Let $\{\mathbf{A_n}\}^{\infty}_{n=1}$ be a theorem and not be an axiom of the theory T*; then there exists an m≥0 such that for any n≥m the formula $\mathbf{A_n}$ is a theorem and is not an axiom of the theory T, i.e., there exists an inference $\mathbf{B^n_1}, \mathbf{B^n_2}, ..., \mathbf{B^n_{k(n)}} \vdash \mathbf{A_n}$ in the theory T, where $\mathbf{B^n_1}, \mathbf{B^n_2}, ..., \mathbf{B^n_{k(n)}}$ are axioms of the theory T. Here $\Gamma_n = \{\mathbf{B^n_1}, \mathbf{B^n_2}, ..., \mathbf{B^n_{k(n)}}\}$. Further, if $\Gamma_n \vdash \mathbf{A_n}$, then $\Gamma^n \vdash \mathbf{A_n}$, where $\Gamma^n = \cup_{k=1}^{n} \Gamma_k$. The sequence $\{\cup_{k=1}^{n} \Gamma_k\}^{\infty}_{n=1}$ has the limit, this limit equals $\Gamma^{\infty} = \cup_{k=1}^{\infty} \Gamma_k$, and, for any n≥m, we have $\Gamma^{\infty} \vdash \mathbf{A_n}$. Γ^{∞} can be represented as $\{\mathbf{B_1}, \mathbf{B_2}, ..., \mathbf{B_N}\}$, where N is a finite number or infinity, and $\mathbf{B_1}, \mathbf{B_2}, ..., \mathbf{B_N}$ are axioms of the theory T. Let $\{\Gamma^*_n\}^{\infty}_{n=1}$ be the new sequence, where, for any n, $\Gamma^*_n = \Gamma^{\infty}$. Further, for any n≥m, we have $\Gamma^*_n \vdash \mathbf{A_n}$ and the sequences $\{\Gamma^*_n\}^{\infty}_{n=1}$, $\{\mathbf{A_n}\}^{\infty}_{n=1}$ have the limits. Hence the inference $\{\Gamma^*_n\}^{\infty}_{n=1} \vdash \{\mathbf{A_n}\}^{\infty}_{n=1}$ is defined in the theory T*. Besides, the sequence $\{\Gamma^*_n\}^{\infty}_{n=1}$ is regular. Indeed, $\{\Gamma^*_n\}^{\infty}_{n=1} = \{\cup_{k=1}^{N}\{\mathbf{B^k_n}\}\}^{\infty}_{n=1}$, where $\mathbf{B^k_n} = \mathbf{B_k}$ for any k. It follows that $\{\Gamma^*_n\}^{\infty}_{n=1} = \{\{\mathbf{B^k_n}\}^{\infty}_{n=1}\}_{k=1}^{N}$, where the stationary sequences of the axioms from T $\{\mathbf{B^k_n}\}^{\infty}_{n=1}$ are the axioms of the theory T*. In other words, if $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is a theorem and not an axiom of the theory T*, then there exists the inference $\{\{\mathbf{B^k_n}\}^{\infty}_{n=1}\}_{k=1}^{N} \vdash \{\mathbf{A_n}\}^{\infty}_{n=1}$ of the theorem $\{\mathbf{A_n}\}^{\infty}_{n=1}$ of the theory T* from axioms of the theory T*. If $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is an axiom of the theory T*, then there exists the inference $\{\vdash \mathbf{A_n}\}^{\infty}_{n=1}$ of the theorem $\{\mathbf{A_n}\}^{\infty}_{n=1}$ of the theory T* from the empty set of axioms of the theory T*.

Let Thm* be the set of all the theorems of the theory T*, Thm be the set of all the theorems of the theory T.

THEOREM 9. If the theory T is consistent and the theory T* contains an L-contradiction, then there does not exist a map h: Thm* → Thm such that

1) h is a bijection,

2) $h(\{\mathbf{A_n}\}^{\infty}_{n=1})$ is a theorem of the theory T iff $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is a theorem of the theory T *,

3) if $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is a stationary sequence, then $h(\{\mathbf{A_n}\}^{\infty}_{n=1}) = \mathbf{A_n}$.

PROOF. Assume the converse, i.e., there exists a map h with properties 1, 2 and 3. It follows that if $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is a theorem of the theory T*, then there exists the theorem **A** from T such that $h(\{\mathbf{A_n}\}^{\infty}_{n=1}) = \mathbf{A}$. Let $\{\mathbf{B_n}\}^{\infty}_{n=1}$ be the stationary sequence such that $\mathbf{B_n}$ is **A** for any n. Therefore, we have $h(\{\mathbf{A_n}\}^{\infty}_{n=1}) = \mathbf{A} = h(\{\mathbf{B_n}\}^{\infty}_{n=1})$. Since h is bijection, we obtain $\{\mathbf{A_n}\}^{\infty}_{n=1} = \{\mathbf{B_n}\}^{\infty}_{n=1}$, i.e., any theorem of the theory T* equals some stationary sequence of theorems from the T. On the other hand, let $\{\mathbf{C_n}\}^{\infty}_{n=1}$ be an L-contradiction, i.e., $\mathbf{C_n} = \mathbf{C}$, where $\{\mathbf{C_n}\}^{\infty}_{n=1}$ is a theorem from T* and **C** is a contradiction. By assumption, $\{\mathbf{C_n}\}^{\infty}_{n=1} = \{\mathbf{D_n}\}^{\infty}_{n=1}$, where $\{\mathbf{D_n}\}^{\infty}_{n=1}$ is a stationary sequence of the theorems from T, i.e., for any n, $\mathbf{D_n}$ is **D** and **D** is a theorem from T. This implies that $\mathbf{C_n}$ is $\mathbf{D_n}$ but $\mathbf{C_n}$ is **C**, and **C** is a contradiction, $\mathbf{D_n}$ is **D**, and **D** is a theorem from T. Since the theory T is consistent, we see that **C** can not be a theorem of T, i.e., **C** can not be equal to **D**. This contradiction proves the theorem.

DEFINITION 15. Let the map λ take each formula $\{\mathbf{A_n}\}^{\infty}_{n=1}$ from L* to $\lim\mathbf{A_n}$ and take each term **à** from L* to **à**. The map λ: L* → L is called a *natural embedding of the language L* into the language L*. On the other hand, let the map λ* take each formula **A** from L to $\{\mathbf{A_n}\}^{\infty}_{n=1}$, where $\mathbf{A_n}$ is **A**, and take each term **à** from L to **à**. The map λ*: L → L* is called a *natural embedding of the language L into the language L**.

Obviously, if **A** is a theorem of the theory T, then λ*(**A**) is also a theorem of the theory T*. The return relation, as follows from Theorem 9, is not correct.

Maps λ and λ* can be extended to the set of inferences in the theories T* and T. Namely if an inference $\{\Gamma_n \vdash \mathbf{A_n}\}^{\infty}_{n=1}$ is given in the theory T*, then we can define the object $\lambda(\{\Gamma_n \vdash \mathbf{A_n}\}^{\infty}_{n=1}) = \lim\{\Gamma_n \vdash \mathbf{A_n}\} = \lim\Gamma_n \vdash \lim\mathbf{A_n}$ (in accordance with Theorem 10, the object $\lim\Gamma_n \vdash \lim\mathbf{A_n}$ is not always an inference of the theory T. In this case, the sign «⊢» is used as a formal character). On the other hand, if an inference $\Gamma \vdash \mathbf{A}$ is given in the theory T, then by definition, put $\lambda^*(\Gamma \vdash \mathbf{A}) = \{\Gamma_n \vdash \mathbf{A_n}\}^{\infty}_{n=1}$, where Γ_n is Γ and $\mathbf{A_n}$ is **A** for any n. Obviously, if $\Gamma \vdash \mathbf{A}$ is an inference in the theory T, then $\lambda^*(\Gamma \vdash \mathbf{A})$ is an inference in the theory T*. The return relation is not always correct (see below).

THEOREM 10. If the theory T is a consistent theory and the theory T* contains an L-contradiction, then there exists an inference $\{\Gamma_n \vdash \mathbf{A_n}\}^{\infty}_{n=1}$ in the theory T* such that $\lambda(\{\Gamma_n \vdash \mathbf{A_n}\}^{\infty}_{n=1})$ is not an inference of the theory T.

PROOF. Let $\{\Gamma_n \vdash \mathbf{A_n}\}^{\infty}_{n=1}$ be an inference in the theory T*, where for any n $\Gamma_n = \varnothing$, i.e., the inference is a proof, and $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is an L-contradiction. In this case, $\lambda(\{\Gamma_n \vdash \mathbf{A_n}\}^{\infty}_{n=1}) = \lim\{\Gamma_n \vdash \mathbf{A_n}\} = \lim\Gamma_n \vdash \lim\mathbf{A_n} = \vdash \lim\mathbf{A_n}$, where $\lim\mathbf{A_n}$ is a contradiction. Since the theory T is consistent, we see that the object $\vdash\lim\mathbf{A_n}$ can not be an inference in the theory T.

DEFINITION 16. Let the theory T be a theory with axiom schemes and $\{\mathbf{A_n}\}^{\infty}_{n=1}$ be an axiom of the theory T*. If there exists an m≥0 such that for any n≥m $\mathbf{A_n}$ belongs to one axiom scheme A, then we say that $\{\mathbf{A_n}\}^{\infty}_{n=1}$ *belongs to the axiom scheme A*.

The theory T* is called a *theory with axiom schemes* if the theory T is a theory with axiom schemes and for any axiom $\{\mathbf{A_n}\}^{\infty}_{n=1}$ in T* there exists an axiom scheme A such that $\{\mathbf{A_n}\}^{\infty}_{n=1}$ belongs to A.

THEOREM 11. Let T and T* be theories with axiom schemes and axioms of different schemes be mutually independent in the theory T; then axioms of different schemes in the theory T* are mutually independent.

PROOF. Assume the converse. Therefore if **A**, **B** are axioms of different schemes in the theory T, then there does not exist an inference $\mathbf{A} \vdash \mathbf{B}$ in the theory T. Besides, there exist axioms of different schemes $\{\mathbf{A_n}\}^{\infty}_{n=1}$ and $\{\mathbf{B_n}\}^{\infty}_{n=1}$ in the theory T* such that $\{\mathbf{A_n}\}^{\infty}_{n=1}$ and $\{\mathbf{B_n}\}^{\infty}_{n=1}$ are not mutually independent, i.e., there exists an inference $\{\mathbf{B_n}\}^{\infty}_{n=1} \vdash \{\mathbf{A_n}\}^{\infty}_{n=1}$ in the theory T*. It follows that there exists an $m \geq 0$ such that for any $n \geq m$ there exists an inference $\mathbf{B_n} \vdash \mathbf{A_n}$ in the theory T, where $\mathbf{B_n}$ and $\mathbf{A_n}$ are axioms of different schemes in the theory T. This contradiction proves the theorem.

THEOREM 12. Let the theories T and T* be theories with axiom schemes. If any two axioms of different schemes in the theory T* are mutually independent, then any two axioms of different schemes in the theory T are mutually independent.

PROOF. Assume the converse, i.e., any two axioms of different axiom schemes of the theory T* are mutually independent and there exist axioms **A** and **B** of different schemes in the theory T such that there exists an inference $\mathbf{A} \vdash \mathbf{B}$ in the theory T. Then there exists the inference $\{\mathbf{B_n}\}^{\infty}_{n=1} \vdash \{\mathbf{A_n}\}^{\infty}_{n=1}$ in the theory T*, where $\mathbf{A_n}$ is **A** and $\mathbf{B_n}$ is **B** for any n. Besides, the stationary sequences $\{\mathbf{A_n}\}^{\infty}_{n=1}$ and $\{\mathbf{B_n}\}^{\infty}_{n=1}$ are axioms of different schemes in the theory T*. This contradiction proves the theorem.

THEOREM 13. Let the theories T and T* be theories with axiom schemes. Then axioms of different schemes in the theory T are mutually independent iff axioms of different schemes in the theory T* are mutually independent.

PROOF. This follows from Theorems 11 and 12.

THEOREM 14. Let the theories T and T* be theories with axiom schemes. If there does not exist an axiom of the theory T, which can be deduced from any finite set of axioms of another schemes of the theory T, then this is correct for axioms of the theory T*.

PROOF. Assume the converse, i.e., the condition of the theorem is true and there exist an axiom $\{\mathbf{A_n}\}^{\infty}_{n=1}$ and a set of axioms of another schemes $\{\{\mathbf{B^k_n}\}^{\infty}_{n=1}\}_{k=1}^{N}$ in the theory T* such that there exists an inference $\{\{\mathbf{B^k_n}\}^{\infty}_{n=1}\}_{k=1}^{N} \vdash \{\mathbf{A_n}\}^{\infty}_{n=1}$ in the theory T* and N is a finite number. The expression «$\{\{\mathbf{B^k_n}\}^{\infty}_{n=1}\}_{k=1}^{N}$» guesses that the set of the axioms $\{\{\mathbf{B^k_n}\}^{\infty}_{n=1}\}_{k=1}^{N}$ is regular, i.e., $\{\{\mathbf{B^k_n}\}^{\infty}_{n=1}\}_{k=1}^{N} = \{\{\mathbf{B^k_n}\}_{k=1}^{N}\}^{\infty}_{n=1}$ and there exists an $m \geq 0$ such that for any $n \geq m$ there exists an inference $\{\mathbf{B^k_n}\}_{k=1}^{N} \vdash \mathbf{A_n}$ in the theory T, where the formulas $\mathbf{B^k_n}$ and $\mathbf{A_n}$ are axioms of different schemes in the theory T. This contradiction proves the theorem.

THEOREM 15. Let the theories T and T* be theories with axiom schemes. If there does not exist an axiom of the theory T*, which can be deduced from any finite set of axioms of another schemes of the theory T*, then this is correct for axioms of the theory T.

PROOF. Assume the converse, i.e., the condition of the theorem is true and there exist an axiom **A** and axioms $\mathbf{B_1}, \mathbf{B_2}, \ldots, \mathbf{B_n}$, which are of another schemes than **A**, such that there exists an inference $\mathbf{B_1}, \mathbf{B_2}, \ldots, \mathbf{B_n} \vdash \mathbf{A}$ in the theory T. Let $\{\{\mathbf{B^k_i}\}^{\infty}_{i=1}\}_{k=1^n} \vdash \{\mathbf{A_i}\}^{\infty}_{i=1}$ be the inference of the theory T*, where $\mathbf{A_i}$ is **A** and $\mathbf{B^k_i}$ is $\mathbf{B_k}$ for any i. This inference will be an inference of the axiom $\{\mathbf{A_i}\}^{\infty}_{i=1}$ from the axioms $\{\mathbf{B^k_i}\}^{\infty}_{i=1}$ of another schemes. This contradiction proves the theorem.

THEOREM 16. Let the theories T and T* be theories with axiom schemes. There does not exist an axiom of the theory T*, which can be deduced from any finite set of axioms of another schemes of the theory T* iff this is correct for axioms of the theory T.

PROOF. See Theorems 14 and 15.

DEFINITION 17. The theory T (T*) is called *semantically complete* if any formula from the language L (L*), which is valid in any model M of the theory T (T*), is a theorem of the theory T (T*).

THEOREM 17. If the theory T is semantically complete, then the theory T* is semantically complete.

PROOF. Assume the converse, i.e. the theory T is semantically complete and the theory T* is not. It follows that there exists a formula $\{\mathbf{A_n}\}^{\infty}_{n=1}$ of the language L* such that $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is valid in any model M of the theory T* and at the same time $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is not a theorem of the theory T*. If $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is valid in a model M of the theory T*, then there exists an $m\geq 0$ such that for any $n\geq m$ the formula $\mathbf{A_n}$ is valid in the model M. Since, according to Theorem 6, the model M of the theory T* is simultaneously a model of the theory T, we see that for any $n\geq m$ the formula $\mathbf{A_n}$ is valid in the model M of the theory T. Since M is any model of the theory T and the theory T is semantically complete, we see that for any $n\geq m$ the formula $\mathbf{A_n}$ is a theorem of the theory T, i.e., the formula $\{\mathbf{A_n}\}^{\infty}_{n=1}$ from the language L* is a theorem of the theory T *. This contradiction proves the theorem.

THEOREM 18. If the theory T* is semantically complete, then the theory T is semantically complete.

PROOF. Assume the converse, i.e., the theory T* is semantically complete and the theory T is not. It follows that there exists a formula **A** of the language L such that **A** is valid in any model M of the theory T and at the same time **A** is not a theorem of the theory T. Let $\{\mathbf{A_n}\}^{\infty}_{n=1}$ be the formula of the language L* such that $\mathbf{A_n}$ is **A** for any n. The model M, according to Theorem 6, is simultaneously a model of the theory T*. Then the formula $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is valid in any model M of the theory T*. Since the theory T* is semantically complete, we see that the formula $\{\mathbf{A_n}\}^{\infty}_{n=1}$ is a theorem of the theory T*, i.e., the formula **A** is a theorem of the theory T. This contradiction proves the theorem.

THEOREM 19. The theory T* is semantically complete iff the theory T is semantically complete.

PROOF. See Theorems 17 and 18.

THEOREM 20. Let a formula $\{\mathbf{A_n}\}^{\infty}_{n=1}$ of the language L* be a formula, for which there exists an $m\geq 0$ such that for any $n\geq m$ $\mathbf{A_n}$ is $\mathbf{B}\wedge\neg\mathbf{B}$, where **B** is a formula of the language L. Then for any formula $\{\mathbf{C_n}\}^{\infty}_{n=1}$ from the language L* there exists an inference in the theory T* $\{\mathbf{A_n}\}^{\infty}_{n=1} \vdash \{\mathbf{C_n}\}^{\infty}_{n=1}$.

PROOF. According to the definition, an inference $\{\mathbf{A_n}\}^{\infty}_{n=1} \vdash \{\mathbf{C_n}\}^{\infty}_{n=1}$ is an object $\{\mathbf{A_n} \vdash \mathbf{C_n}\}^{\infty}_{n=1}$, where there exists an $p\geq 0$ such that for any $n\geq p$ $\mathbf{A_n} \vdash \mathbf{C_n}$ is an inference of the theory T. If there exists an $m\geq 0$ such that for any $n\geq m$ $\mathbf{A_n}$ is $\mathbf{B}\wedge\neg\mathbf{B}$, then an inference $\mathbf{A_n} \vdash \mathbf{C_n}$ is always well defined in the theory T for any $n\geq m$, i.e., $p=m$.

After the technical side of the theory we would like to return to more philosophical aspects of the problem. Below we try to show an example of representation of concrete philosophical antinomy as an L-contradiction.

Let S be a consistent formal set theory with the posibility to prove in S a theorem of existence of set theoretical universes U_0, U_1, U_2, ..., where $U_i \subseteq U_{i+1}$, $U_i \neq U_{i+1}$ for any i, and if $X \subseteq U_i$ and $X \notin U_i$, then $X \in U_{i+1}$.

Let then $R^{i+1} = \{X \in U_i: X \notin X\}$ be an *(i+1)-Russell set*. We can prove that $R^{i+1} \notin U_i$, $R^{i+1} \notin R^{i+1}$, $R^{i+1} \subseteq R^{i+2}$ and $R^{i+1} \in R^{i+2}$ are theorems in S for any i. Let S be t-limiting theory, i.e., limit of infinite sequence of sets is defined in ordinary sense. In particular, limit of infinite sequence of sets $\{X_n\}$, where $X^n \subseteq X^{n+1}$ for any n, equals infinite unification $\cup\{X_n\}$. From here we receive that infinite sequence $\{R^{i+1}\}^{\infty}_{i=0}$ of i-Russell Sets has limit. I shall denote this limit as R^{∞}. Therefore there exists L-inconsistent theory S*, where the infinite consequence of formulas $\{R^{i+1} \notin R^{i+1} \wedge R^{i+1} \in R^{i+2}\}^{\infty}_{i=0}$ is L-contradiction. Really limit of this consequence is contradiction $R^{\infty} \notin R^{\infty} \wedge R^{\infty} \in R^{\infty}$. If this contradiction is considered as analogue of Russell paradox, then we receive the proof that this paradox is antinomy, not mistake.

On the basis of limiting consequence $\{R^{i+1}\}^{\infty}_{i=0}$ and limiting consequences of formulas we could to try to interprete some philosophical antinomies, for example, first antinomy of Kant' Critique. This antinomy asserts that Universe is and at the same time is not limited in space-time. Let $X \notin X$ be axiom of the theory S. Then $R^{i+1} = U^{i+1}$. Hence i-Russell set equals i-Universe, where i=1,2,3,.... If $X \in R^i$, then we can say that X is *i-limited*. Thus assertion that X *is not i-limited* is expressed itself in the formula $X \notin R^i$. The first Kantian antinomy can be interpreted not so much separate proposition as limiting consequence of propositions, i.e., as L-contradiction $\{R^{i+1} \notin R^{i+1} \wedge R^{i+1} \in R^{i+2}\}^{\infty}_{i=0}$, or $\{U^{i+1} \notin U^{i+1} \wedge U^{i+1} \in U^{i+2}\}^{\infty}_{i=0}$. Therefore Russell paradox has obvious connection with the dialectical tradition of philosophical logic and his formulation today is a certain manifestation of outgrowing of Line of Parmenides in contemporary logical thinking.

By the same way we can express another philosophical antinomies, for example Hegel antinomy of being which is also nonbeing. Formula $X \in U^i$ can be expressed the idea that X is i-being. Let $\{X_i\}^{\infty}_{i=0}$ be a sequence of sets, where $X_{i+1} \notin U_i$ and $X_{i+1} \in U_{i+1}$ for any i=0,1,..., and there exists limit X_{∞} of sequence $\{X_i\}^{\infty}_{i=0}$. For example, $X_{i+1} = R^{i+1}$. Then sequence $\{X_i\}^{\infty}_{i=0}$ can be an expression of principle, which is being and also nonbeing. Really we have L-contradiction $\{X_{i+1} \notin U_i \wedge X_{i+1} \in U_{i+1}\}^{\infty}_{i=0}$. Let $\wedge$ be an operation, where $\{X_{i+1} \notin U_i\}^{\infty}_{i=0} \wedge \{X_{i+1} \in U_{i+1}\}^{\infty}_{i=0}$ equals by definition $\{X_{i+1} \notin U_i \wedge X_{i+1} \in U_{i+1}\}^{\infty}_{i=0}$. We can understand «$\wedge$» as meta-conjunction such that meta-conjunction of two sequences of formulas is sequence of conjunctions of formulas (by the similar way, we can define another logical operations in logic of limiting sequences of formulas). Then left member $\{X_{i+1} \notin U_i\}^{\infty}_{i=0}$ of meta-conjunction can be read as «X_{∞} is nonbeing», in accordance with limit $\lim(X_{i+1} \notin U_i) = X_{\infty} \notin U_{\infty}$. Accordingly, right member $\{X_{i+1} \in U_{i+1}\}^{\infty}_{i=0}$ of meta-conjunction can be read as «X_{∞} is being», in accordance with the limit $\lim(X_{i+1} \in U_{i+1}) = X_{\infty} \in U_{\infty}$. Finally we can interprete L-contradiction $\{X_{i+1} \notin U_i \wedge X_{i+1} \in U_{i+1}\}^{\infty}_{i=0}$ as Hegel antinomy «there exists a principle which is being and nonbeing».

In our opinion, by the similar way another philosophical and religious antinomies may be interpreted in suitable L-inconsistent theories. Taking into account the analogy between method of construction of mathematical continuum and method of L-inconsistent theories formation, one may conclude that numerous antinomies, constantly have been reproduced in the history of human thinking, are examples of «logical irrationalities». These are antinomies

of all the limiting concepts of philosophy, for example, «World», «Being», «Consciousness», «Will», «Freedom», «Personality», etc. And just as there exists common method of mathematical irrationalities expression, there could be a common method of logical irrationalities representation. Author hopes that ideas of this paper could to help us to come nearer to this method.

Vyacheslav Moiseyev
Moscow Medical Stomatological University
<vimo@list.ru>

SORITES (ΣΩΡΙΤΗΣ), ISSN 1135-1349
http://www.sorites.org
Issue #17 — October 2006. Pp. 17-25
Paraconsistent logic! (A reply to Slater)
Copyright © by Jean-Yves Béziau and SORITES

PARACONSISTENT LOGIC! (A REPLY TO SLATER)

Jean-Yves Béziau*

Je ne discute jamais du nom pourvu qu'on m'avertisse quel sens on lui donne.

Blaise Pascal, *Les Provinciales*

Contents

---

0. Paraconsistent logic

Paraconsistent logic is the study of logics in which there are some theories embodying contradictions but which are not trivial, in particular in a paraconsistent logic, the *ex contradictione sequitur quod libet*, which can be formalized as $Cn(T, a, \neg a)=\mathbf{F}$ is not valid. Since nearly half a century various systems of paraconsistent logic have been proposed and studied. This field of research is classified under a special section (B53) in the *Mathematical Reviews* and watching this section, it is possible to see that the number of papers devoted to paraconsistent logic is each time greater and has recently increased due in particular to its applications to computer sciences (see e.g. Blair and Subrahmanian, 1989).

However in a recent paper entitled «Paraconsistent logics?», a philosopher from Perth, B.H.Slater, pretends to show in less than ten lines that paraconsistent logic doesn't exist. Here is his laconic argument:

> If we called what is now «red», «blue», and vice versa, would that show that pillar boxes are blue, and the sea is red? Surely the facts wouldn't change, only the mode of expression of them. Likewise, if we called «subcontraries», «contradictories», would that show that «it's not red» and «it's not blue» were contradictories? Surely the same point holds. And that point shows that there is no «paraconsistent logic». (Slater 1995, p.451)

Are these few lines, the death sentence of paraconsistent logic?

---

*Work supported by a grant of the Swiss National Science Foundation

Slater' argumentation is based on the traditional notions of «contradictories» and «subcontraries». Unfortunately the Perthian doesn't give precise definitions of them. After giving such definitions and proving a general result about them, we will show that Slater's argument is not valid or, in the best case, is tautological.

1. Contradictories, subcontraries and contraries in the tradition

Such notions as «subcontraries» and «contradictories» belong to traditional logic, i.e. logic in the tradition of Aristotle. The first point is to precise what is their meaning in this tradition and the second point is to see how they can be understood in the light of modern mathematical logic.

One of the sad defect of Slater's argument is that both of these points are eluded and that therefore his argument is viciated by fuzziness. The farther precision Slater is getting at is when he says that *contradictories* cannot be true together - by definition» (Slater 1995, p.453). Even this precision is quite ambiguous because, due to the fact the Perthian doesn't give any definition of contradictories, one may imagine that the definition of contradictories is that two sentences are contradictories iff they cannot be true together, which is not the correct definition according to the tradition as we shall see very soon.

Of course one can imagine that it is not necessary to precise what is the exact meaning of notions such as contradictories and subcontraries, that everybody knows what their meaning is, and that this meaning is clear. But it is not so obvious, due to the fact that these notions belong to traditional logic, and that most concepts of traditional logic appear as confuse in the light of modern logic, and that at least their interpretations is not straightforward.

We will not enter into philological details to explain what is the meaning of «contradictories», and «subcontraries». The following excerpt from p.56 of (Kneale and Kneale 1962) will provide all the necessary information for our discussion including the standard definitions of contradictories, subcontraries and contraries (the concept of subalterns is not relevant for us here):

> … the square of opposition, is also not to be found in Aristotle's text, but it provides a useful summary of his doctrine. According to his explanations, statements are opposed as *contradictories* when they cannot both be true and cannot both be false, but as *contraries* only when they cannot both be true but may both be false [*De Interpretatione* 7 (17b 16-25)] … Although he does not use these expressions *subaltern* and *sub-contrary*), Aristotle (…) assumes that subcontraries cannot be false though they may both be true. This is shown by his description of them as contradictories of contraries.

For more details about the square of opposition, the reader may consult e.g. (Parsons 1997).

3. Contradictories, subcontraries and contraries in classical logic

Let **F** be the set of propositional formulas built with the connectives $\neg$, $\wedge$, $\vee$, $\rightarrow$. Formulas will be denoted by *a*, *b*, etc., sets of formulas by *T*, *U*, etc. The set **C** of classical valuations is defined as usual: it is a set of functions from **F** to {0,1} and its members obey the standard conditions, in particular we have: for any *v* in **C** and for any *a* in **F**, $v(a)=1$ iff $v(\neg a)=0$.

With this framework we are now able to define precisely the discussed notions in the context of the semantics of classical logic.

Given two formulas *a* and *b*, we say that they are:

- contradictories iff for any v in **C**, $v(a)=0$ iff $v(b)=1$;

- contraries iff for any v in **C**, $v(a)=0$ or $v(b)=0$ and there exists v in **C**, $v(a)=0$ and $v(b)=0$;

- subcontraries iff for any v in **C**, $v(a)=1$ or $v(b)=1$, and there exists v in **C**, $v(a)=1$ and $v(b)=1$;

Let us note that if we remove the second part of the definition of subcontraries

«there exists v in **C**, $v(a)=1$ and $v(b)=1$», which translates «may both be true», then all contradictories are subcontraries. In this case confusing subcontraries with contradictories would not be the same as switching red with blue, or cats with dogs, but rather would amount of confusing dogs with canines. Let us call *global confusion* this kind of error by contrast to the first one that we can call *switching confusion*. As Slater claims through his red and blue example that paraconsistent logicians are making a switching confusion rather than a global one, it seems implicit that he doesn't consider that all contradictories are subcontraries, neither do we here.

It is clear that for any formula a, a and $\neg a$ are contradictories. The connective $\neg$ is said to be a *contradictory forming relation*.

Which examples of subcontraries can we find? For any two atomic formulas a and b, a and $\neg a \vee b$ are subcontaries, as the reader can easily check. This can be illustrated by «Plato is a cat» and «Plato is not a cat or snow is blue», which cannot both be false but can both be true.

Can we define the relation which associates to any formula a the set of formulas $\{\neg a \vee b; b \in \mathbf{F}\}$ as a *subcontrary forming relation*? That sounds reasonable but we must be aware that in this case this relation includes pairs of formulas like a and $\neg a \vee (a \wedge \neg a)$ which are contradictories.

It is clear that inside classical logic, there are a lot of subcontrary forming relations; however the question is: are paraconsistent negations part of these subcontrary forming relations? And the answer is: no. Because these negations are not definable in classical logic.

For example da Costa's paraconsistent negation of the logic C1 is not definable in classical logic because it is not self-extensional (i.e. the replacement theorem does not hold for it).

A paraconsistent negation is not in general a subcontrary forming relation inside classical logic, maybe be it is a subcontrary forming relation from another point of view - this question will be examined later on - but anyway we must remember that in general paraconsistent negations are not definable in classical logic and that for example the logic C1 of da Costa is *strictly stronger* than classical logic in the sense that classical logic is definable in C1 but not the converse. The same happens with intuitionistic logic, and that is why from this point of view, intuitionistic negation is not a contrary forming relation, erroneous conclusion that someone may reach applying an argument similar to Slater's one.

Thus paraconsistent logic is not merely the result of changing the names of concepts of classical logic already existing, but the appearance of a new phenomenon. This is a first point against Slater.

Even if someone thinks that notions such as negation and contradictory cannot be used in another way that the way they are used in classical logic, he must admit that there are

notions of non classical logic that cannot be defined in classical logic (and that therefore, however they are named, these notions cannot be named by names naming some notions definable in classical logic).

As I have pointed out in my review of Slater's paper for *Mathematical Reviews* (96e03035), paraconsistent logic is not a result of a verbal confusion similar to the one according to which in Euclidean geometry «point» will be exchanged with «line», but rather the shift of meaning of «negation» in paraconsistent logic is comparable to the shift of meaning of «line» in non-Euclidean geometry.

3. Contradictories, subcontraries and contraries in paraconsistent logic

31. Da Costa's logic C1

The set of formulas of the logic C1 is the same set of formulas of classical logic. This logic was presented syntactically in (Costa 1963) and its semantics presented in (Costa 1976).

The semantics for C1 is a non truth-functional semantics. Its set **D** of bivaluations can be defined like this: $v \in \mathbf{D}$ iff v is a function from **F** into $\{0, 1\}$ obeying the following conditions:

- if $v(a)=0$ then $v(\neg a)=1$

- if $v(a \wedge \neg a)=1$, the $v(\neg (a \wedge \neg a))=0$

- if $v(a)=0$, then $v(\neg? a)=0$

- if $v(a \# b)=1$ and $v(a) \neq v(\neg a)$ and $v(b) \neq v(\neg b)$,

then $v(\neg(a \# b))=0$, where $\# \in \{\wedge, \vee, \rightarrow\}$.

These are the conditions for negation. We will not recall the conditions for the other connectives which are similar to the classical case (note however that the semantics for C1 cannot be generated by distributions on atomic formulas as it is the case in classical logic or other truth-functional semantics).

It is clear that if we redefine the notion of *contradictories*, *subcontraries*, and *contraries* inside C1 (i.e. using **D** instead of **C** in the definition of SECTION 2), then the paraconsistent negation $\neg$ of C1 is not a contradictory forming relation but is a subcontrary forming relation.

It is worth mentioning that da Costa has also developed a logic in which there is a paraconsistent negation which is neither a contradictory forming relation, nor a sucontrary forming relation, nor a contrary forming relation, from the point of view of the set of valuations of this logic (Loparic and Costa 1984).

32. Priest's logic LP

Priest has proposed a rival system to da Costa's one called LP (logic of paradox), presented for the first time in (Priest 1979). Priest claims that his logic is better than da Costa's, in particular because, according to him and Routley, da Costa's paraconsistent negation is not a negation but a subcontrary forming relation.

The argumentation of Priest and Routley appears in (Priest and Routley 1989). In the same paper the two pseudo-Australian claim that their argumentation against C1 cannot be applied to LP:

> Someone might try to make out that the negation of this system is not really a negation. But in virtue of all the above points, they would have little ground to stand on. (Priest and Routley 1989, p.169)

However Slater in his paper attacks also Priest's logic and says that the paraconsistent negation of Priest is also only a subcontrary forming relation. Although the argumentation of the Perthian is quite imprecise, and in particular is false in the sense that Priest's negation is not a subcontrary forming relation inside classical logic, it contains a valid remark that we will try to make clear.

Priest's semantics for his logic LP can be presented in different manners. It can be seen as a three-valued (truth-functional) semantics. The set of valuations **P** is a set of functions from **F** to {0, ½, 1}, obeying the following conditions for negation: for any v in **P**, and any a in **F**,

- $v(a)=0$ iff $v(\neg a)=1$

- $v(a)=$ ½ iff $v(\neg a)=$ ½.

Now if we want to interpret the discussed traditional notions in this context (more generally in the context of a logic with more than two values), we must fix what «truth» is and what «falsity» is. It is clear that if we interpret truth by 1 and falsity by 0, then $\neg$ is a contradictory forming relation. And that is apparently why Priest thinks that his paraconsistent negation is really a negation. But his argumentation is viciated as Slater himself confusedly perceived.

The reason why Priest's argumentation is wrong is the following: he considers as designated elements (in the sense of matrix theory) not only 1 but also ½, as we can see when he defines the notions of logical truth and semantic consequence. The last one is defined by:

$$a \in Cn(T) \text{ iff for every } v \in \mathbf{P},\ v(b)=0 \text{ for one } b \in T, \text{ or, } v(a)=1 \text{ or } v(a)=\tfrac{1}{2}.$$

This definition allows to have $a \notin Cn(b,\neg b)$, for any atomic formulas a and b, and therefore to say that LP is paraconsistent. Had 1 been taken as the only designated value, LP would have not been paraconsistent.

Priest's conjuring trick is the following: on the one hand he takes truth to be only 1 in order to say that his negation is a *contradictory forming relation*, and on the other hand he takes truth to be ½ and 1 to define LP as a paraconsistent logic. However it is reasonable to demand to someone to keep his notion of truth constant, whatever it is. Therefore we have only the two following possibilities, which show that Priest cannot run away: in one case LP is paraconsistent and its negation is only a subcontrary forming relation from the point of view of **P**, in the other case LP's negation is a contradictory forming relation but LP is not paraconsistent.

We cannot have the penny and the bun, that is what we will show explicitly in the next section.

4. A general result about contradictories and paraconsistent logic

It seems to us that the real question is to know whether a paraconsistent negation can be a contradictory forming relation from the point of view of its own semantics. We have seen that it is neither the case of da Costa's negation, nor of Priest's negation. In this section we will show that in general it is not possible for a paraconsistent negation to be a contradictory forming relation from the point of view of its own semantics.

For proving this result we will have to discuss and present succintly some general remarks on logic and semantics. This will permit us by the way to precise some points made about Priest's logic.

The notion of contradictories depends on the notions of truth and falsity. One may think that in the case of many-valued logics, the notion of contradictories would therefore be seriously challenged. But following the traditional matrix approach to many-valued logic, it is not really challenged because fundamentally a bivalent division is kept, as stressed by G.Malinowski:

> The matrix method inspired by truth-tables embodies a distinct shadow of two-valuedness in the division of the matrix universe into two subsets of designated and undesignated elements. (Malinowski 1993, p.72)

What happens is that matrices are used to define logical truth and also consequence relation in a way that there is no doubt that designated values should be taken as truth and undesignated values as falsity. Of course it would be possible to use many-valued matrices in a more radical way, breaking the bivalent paradigm, as proposed in (Malinowski 1994), but this is not what is done generally and in particular this is not what Priest is doing, as we have seen.

GENERAL DEFINITION OF CONTRADICTORIES

The notion of contradictories can be defined for any set of bivaluations **B** on a given set **L**, i.e. when **B** is a set of functions from **L** to {0,1}:

Given two objects x and y of **L**, we say that x and y are *contradictories* iff for every $v \in B$, $v(x)=0$ iff $v(y)=1$.

DEFINITION OF LOGIC

We call a logic ***L*** any structure $\boldsymbol{L} = \langle \mathbf{L}; Cn \rangle$ where **L** is any set and Cn any function from the power set of L into itself.

Remark We therefore do not presuppose that Cn obeys any axiom, or that L is a structure of a particular kind. Our reasoning can thus be applied to any logical language.

DEFINITION OF CLASSICAL NEGATION

Given a logic $\boldsymbol{L}=\langle \mathbf{L}; Cn \rangle$, a unary function $\neg$ on L is said to be a *classical negation* iff for every $x \in \mathbf{L}$ and $T \subseteq \mathbf{L}$,

$$x \in Cn(T) \text{ iff } Cn(T, \neg x) = \mathbf{L}$$

This definition is equivalent to other standard definitions of classical negation (see Béziau 1994).

We can ask: is classical negation a contradictory forming relation (i.e. a relation such that for every x, x and $\neg x$ are contradictories)? But contradictories in which sense?

Contradictories from the point of view of any set of bivaluations which can define the logic of this negation, i.e. any adequate bivalent semantics for this logic. Before turning to the definition of adequate bivalent semantics, let us note that therefore the notion of contradictory here makes sense only if the logic can be defined by a set of bivaluations. This is the case of

a wide class of logics, including most of many-valued logics (on this topic see Costa and Béziau 1994).

Note also that the theorem we will prove below makes sense only if we are in the case of logics which can be defined by a set of bivaluations, but that the proof of the theorem does not depend on any specific axioms for *Cn*.

DEFINITION OF ADEQUATE BIVALENT SEMANTICS

Given a logic $\boldsymbol{L}$=<**L**;*Cn*>, a set of functions **B** from **L** to {0, 1} is called an *adequate bivalent semantics* iff for every $x \in \mathbf{L}$ and $T \subseteq \mathbf{L}$:

$x \in Cn(T)$ iff for every $v \in \mathbf{B}$, if $v(y)=1$ for every $y \in T$ then $v(x)=1$.

THEOREM

$\neg$ is a classical negation (in a given logic $\boldsymbol{L}$) if for every x, x and are contradictories (from the point of view of any adequate bivalent semantics for $\boldsymbol{L}$).

Proof. Suppose that for every x, x and $\neg x$ are contradictories and that $\neg$ is not a classical negation.

1) There exists x, T and y, such that $x \in Cn(T)$ and $y \notin Cn(T,\neg x)$. If $y \notin Cn(T,\neg x)$, then there exists v, such that $v(T)=1$, $v(\neg x)=1$, $v(y)=0$. But if $x \in Cn(T)$ and $v(T)=1$, then $v(x)=1$. Therefore x and $\neg x$ are not contradictories, because they can both be true.

2) There exists x and T such that $x \notin Cn(T)$ and $Cn(T,\neg x)=\mathbf{L}$. If $x \notin Cn(T)$, then there exists v such that $v(T)=1$ and $v(x)=0$. Now suppose that $v(\neg x)=1$, then $x \notin Cn(T,\neg x)$, which is absurd due to the fact that $Cn(T,\neg x)=\mathbf{L}$. Therefore $v(\neg x)=0$. Therefore x and $\neg x$ are not contradictories, because they can both be false.

Remark The converse of this theorem is false. It can be proved (with some few additional negligible hypotheses) that if $\neg$ is a classical negation, then for every x, x and $\neg x$ are contraries, but it cannot be proved that x and $\neg x$ are subcontraries. One counter example is the following: as a corollary of a general result, the set of characteristic functions of deductively closed sets of formulas is an adequate bivalent semantics for classical logic. But it is clear that given two atomic formulas a and b, $a \notin Cn(b)$ and $\neg a \notin Cn(b)$.

COROLLARY

Given a paraconsistent negation $\neg$ (in a logic **L**), x and $\neg x$ cannot be contradictories for every x (from the point of view of any adequate bivalent semantics for **L**)}.

In another words: a paraconsistent negation cannot be a contradictory forming relation from the point of view of its own semantics (and the same holds of course for intuitionistic negation, Curry's negation, Johansson's negation, etc.).

We have not given a precise definition of paraconsistent negation, and in fact there is no uniform definition, but to infer the COROLLARY from the THEOREM, we just need to suppose that a paraconsistent negation is different from classical negation. So if we consider the rejection of the *ex contradictione sequitur quod libet*, $Cn(T, a, \neg a) = \mathbf{F}$, as a necessary condition for a negation to be paraconsistent, it is enough to get the COROLLARY.

5. Conclusion

In view of the above result, to say that a negation is not a negation because it is not a contradictory forming relation, is just to say that a negation is not a negation because it is not a classical negation, because only classical negation is a contradictory forming relation.

To state, without argumentation, that only classical negation is a negation and to claim that paraconsistent negations are therefore not negations, is just to make a tautological affirmation without any philosophical value.

But the real discussion does not reduce to such a trivial point. The question is to know what are the properties of classical negation which are compatible with the rejection of the *ex contradictione sequitur quodlibet*, rejection which is the basis of paraconsistent negation (on this topic see Béziau 2000).

Paraconsistent logic has shown in fact that a paraconsistent «negation» can have some strong properties, that for example it does not reduce to a mere modal operator and that it can make sense to use the word «negation» in the context of paraconsistency, in a similar way that it can make sense to speak of «intuitionistic negation» or of «Johansson's negation».

Moreover, obviously the meaning of the word «negation» in natural language does not reduce to the meaning of classical negation of classical logic and nobody has yet tried to prohibit the use of this word in natural language.

Finally, a possible way to consider that a paraconsistent negation (or another non classical negation) is a contradictory forming relation, despite of our negative result of SECTION 4, is to change the definition of contradictory forming relation and to say that two formulas *a* and *b* are contradictories iff one is the «negation» of the other.

Of course this can lead to nonsense if we are dealing with something which has nothing to do with negation. But if we reasonably change the meaning of «negation», it makes sense to accordingly change the meaning of «contradictories».

It seems that this is the option Priest has now taken after we present to him our present criticisms to his paper with Routley.

It is worth emphasized that from this point of view Priest's negation LP does not present any superiority to da Costa's negation C1 or other paraconsistent negations.

Postface

This paper was originally written in 1996, just after I wrote the review of Slater's paper, «Paraconsistent logics?» for *Mathematical Reviews*; a Romanian translation of it was published in 2004 in I.Lucica et al. (eds), *Ex falso qodlibet*, Tehnica, Bucarest. In particular this paper was written before the publication of Greg Restall's paper, «Paraconsistent logics!», *Bulletin of the Section of Logic* 26/3 (1997), with a title which is quite the same. However the contents of the papers are completely different. After writing this paper I wrote several papers which are a continuation of it:

J.-Y.Béziau, «Paraconsistent logic from a modal viewpoint», *Journal of Applied Logic*, 3 (2005), pp.7-14. [<http://www.unine.ch/unilog/jyb/jyb-wopalo-elsevier.pdf>]

J.-Y. Béziau, «New light on the square of oppositions and its nameless corner», *Logical Investigations*, 10, (2003), pp.218-232. [<http://www.unine.ch/unilog/jyb/sep.pdf>]

J.-Y.Béziau, «Are paraconsistent negations negations?», in *Paraconsistency: the logical way to the inconsistent*, W.Carnielli et al. (eds), Marcel Dekker, New-York, 2002, pp.465-486.

6. Bibliography

[Bez94] J.-Y.Béziau, 1994, «Théorie législative de la négation pure», *Logique et Analyse*, **147-148**, pp.209-225.

[Bez96] J.-Y.Béziau, 1996, review of [Sla], *Mathematical Reviews*, 96e03035.

[Bez97] J.-Y.Béziau, 1997, «What is many-valued logic?», in *Proceedings of the 27th International Symposium on Multiple-Valued logic*, IEEE Computer Society, Los Alamitos, pp.117-121.

[Bez00] J.-Y.Béziau, 2000, «What is paraconsistent logic?», in *Frontiers in paraconsistent logic*, D.Batens et al. (eds), Research Studies Press, Baldock, pp.95-111.

[BlS] H.A.Blair and V.S.Subrahmanian, 1989, «Paraconsistent logic programming», *Theoretical Computer Science*, **68**, pp.135-153.

[Cos] N.C.A.da Costa, 1963, «Calculs propositionnels pour les systèmes formels inconsistants», *Comptes Rendus de l'Académie des Sciences de Paris*, **257**, pp.3790-3793.

[CoA] N.C.A.da Costa and E.H.Alves, 1976, «Une sémantique pour le calcul C_1», *Comptes Rendus de l'Académie des Sciences de Paris*, **238A**, pp.729-731.

[CoB] N.C.A.da Costa and J.-Y.Béziau, 1994, «Théorie de la valuation», *Logique et Analyse*, **146**, pp.95-117.

[KnK] W.Kneale and M.Kneale, 1962, *The development of logic*, Clarendon Press, Oxford.

[LoC] A.Loparic and N.C.A.da Costa, 1984, «Paraconsistency, paracompleteness and valuations», *Logique et Analyse*, **106**, pp.119-131.

[Mal] G.Malinowski, 1993, *Many-valued logics*, Clarendon Press, Oxford.

[Mali] G.Malinowski, 1994, «Inferential many-valuedness», in *Philosophical logic in Poland*, J.Wolenski (ed), Kluwer, Dordrecht, pp.75-84.

[Par] T.Parsons, 1997, «The traditional square of opposition», *Stanford Encyclopedia of Philosophy*, http://plato.stanford.edu.

[Pri] G.Priest, 1979, «Logic of paradox», *Journal of Philosophical Logic*, **8**, pp.219-241.

[PrR] G.Priest and R.Routley, 1989, «Systems of paraconsistent logic», in *Paraconsistent logic: Essays on the inconsistent*, Philosophia, Munich, pp.151-186.

[Sla] B.H.Slater, 1995, «Paraconsistent logics?», *Journal of Philosophical logic*, **24**, pp.451-454.

Acknowledgments

I would like to thank N.C.A. da Costa, G.Priest and B.H.Slater for discussions and comments.

Jean-Yves Béziau
Institute of Logic and Semiological Research Center
University of Neuchâtel, Espace Louis Agassiz 1
CH - 2000 Neuchâtel, Switzerland
<jean-yves.beziau@unine.ch>

SORITES (ΣΩΡΙΤΗΣ), ISSN 1135-1349
http://www.sorites.org
Issue #17 — October 2006. Pp. 27-30
The Logic of Lying
Copyright © by Moses Òkè and SORITES

The Logic of Lying

Moses Òkè

Introduction

Usually, people normally expect that others should take whatever claims they make as true. Also, whenever it is said that a claim is a lie, most people generally tend to presume that the claim is false. It is also generally believed that a truthfully made statement is true.

In this discussion, I wish to call due attention to the nature of a lie to show that it is not the case that a lie is necessarily a false statement, just as a truthfully made statement is not necessarily a true statement.

The statements or claims we make are expressions of our beliefs and thoughts; our statements are reports of the information at our disposal. The information could have come to us from any sources whatsoever. The epistemic or any other value that we place on each source and kind of information is a different matter altogether, and not the concern of the present discussion.

The context for this discussion can be conveniently set in Chisholm's treatment of «the Epimenides». Accordingly to Chisholm (1977:91),

> If a man says, 'I am now lying' is he saying something that is true or something that is false? Either possibility seems to lead to a contradiction… we bring the problem into sharper focus if we consider a man who says more baldly, 'What I am saying is false'.

By definition, a lie is a dishonestly made statement. It is a statement which deviates from what its author actually knows, believes or holds to be true. To lie is, therefore, to say is false what one believes is true, or to say is true what one believes is false. We may say that a lie is an intentional and deliberate distortion by someone of what he or she believes or takes to be true. It is a wilful misrepresentation, in one's statement, of one's beliefs. In this regard, it is important to note that the opposite concept of lying is not truth, but truthfulness. It should also be noted that whereas truth and falsity are epistemic terms, truthfulness and lying (i.e. untruthfulness) are moral concepts. It is in this context that we can see how a truthfully made statement might be untrue, while an untruthfully made statement (i.e. lie) might not be untrue.

The truthful person is one who honestly says what he or she believes or thinks as he or she believes or thinks it to be. There is agreement between a belief and its corresponding expression, by a truthful person. However, a person's belief that P is true, or that P is false, does not imply that P is true, or that P is false. Wittgenstein indicates this point clearly when he says:

> From its *seeming* to me – or to anyone – to be so, it doesn't follow that it is so… For it is not as though the proposition 'It is so' could be inferred from someone else's utterance: 'I know it is so'. Nor from the utterance together with its not being a lie (Wittgenstein 1974:2, 3).

The truth-value of a statement is therefore independent of the manner of its utterance as well as the moral status of its author. An honest person and a dishonest person could equally say what is true, as well as what is false, on the same issue.

Statements, being the expression of their author's beliefs, thoughts, ideas, feelings, etc., could, for one reason or the other, be wrong or inaccurate with reference to what they seek to express. A person might in his statement express his belief, etc. incorrectly owing to ignorance, mistake, or illness. In each of these cases, the error involved is epistemic, without any intention to deceive or misinform anyone. On the other hand, when a statement is not an accurate expression of its author's belief owing to his or her intention to do mischief, deliberately to misinform and deceive those to whom the statement is communicated, we have a case of dishonesty that falls within the purview of morality rather than that of epistemology.

Hallen (1998:187-204, and 2000:13-35) hints at the tendency of people to mistake truthfulness for truth when they evaluate one another's statements. For instance, people generally tend not to believe or hold as true whatever a person known to be a liar says. On the other hand, people generally feel inclined to accept as true whatever anyone adjudged to be truthful or honest says. Wiredu (1996:106) also remarks how the connection between truthfulness and truth makes the word 'truth' ambiguous and confusing.

However, people generally expect that other persons would accept their claims as true. Thus, even the person who says 'What I am saying is false', or the one who says 'I am lying' would want and expect to be taken as saying the truth. The point to note here is that the person who declares his or her own statement false might, in his or her declaration, be making a false statement, such that the allegedly false statement may in fact be true. On the other hand, the self-acclaimed liar might be saying the truth about himself or herself, but the statement might also be true. That is, a liar's lie might be a true statement. This points to the fact that a liar does not necessarily say what is false whenever he lies.

A lie might be a true statement if the belief which the liar held to be true, and which he or she sought to distort, was in fact false. This follows from the fact that owing to a number of epistemic defects, a person may sincerely hold a false belief to be true, or a true belief to be false, and say honestly that it is true, or that it is false, respectively. From this, it is to be noted that a person's truthfulness does not imply the truth of his or her statements. A truthful person is not a person who is filled with truths and nothing but truths. In the same vein, a person's untruthfulness (or habit of lying) does not imply the falsity of his or her statements. An untruthful person (a liar) is not a person full of nothing but untruths. In other words, a truthfully made statement could be either true or false, just as a lie, too, could be either true or false independently of the motive or character of its author.

Whether a statement is true or false is, therefore, not a function of the moral character of the statement's author, but rather of the situation to which the statement pertains. Hence, we may have (i) statements that are truthfully made but which are false, (ii) statements that are truthfully made and are true, and (iii) lies that are true statements. We may thus say very rightly that truthfulness and lying are to persons as truth and falsity are to statements. The ability to lie is thus an essential characteristic of persons, just as falsity-possibility is an essential feature of statements, thoughts and beliefs.

Both a truthful person and a liar could hold false beliefs. However, whereas the truthful person expresses and communicates his or her belief without any deliberate or intentional distortion, the liar deliberately and intentionally communicates the opposite, the negation, the caricature or the counterfeit of his or her belief. It has to be re-emphasised, however, that a truthfully made statement is not necessarily a true statement, or a statement of truth. This is so in the same way that Hanson (1952:4-24) has shown that a factual statement is not necessarily a statement of fact. In a related reference, Wittgenstein (1953: Part II, 192e) cautions that we should not mistake a hesitant assertion for an assertion of hesitancy. Similarly, we should not uncritically regard an untruthfully made statement as an untrue statement, or a truthfully made statement as a true statement.

The liar might hold as true a belief that is false. That is, a person who lies about his or her belief could have unintentionally said the truth. This comes to saying that the lie (i.e. the negation or distortion of the belief held to be true) was false. On the other hand, a lie could, unintended though, be true if the author of the lie originally held as false a true belief. Either way, there is no contradiction involved in the statement or the assertion of it. What we have is a disagreement between a person's belief and his or her statement that purports to express that belief. Hence, whenever a lie is true, the logical implication is that the liar was mistaken about the truth-value of the belief that he or she sought to misrepresent or distortedly communicate. In the case of a truthful person, his or her statement will be false only when his belief is false and true whenever his belief is true.

It is important to note that in the case of a liar, his or her lie could be false both when the corresponding belief is true and when it is false. This is because the lie may sometimes not be a logical negation of the liar's belief; it could be a different false statement that neither truly expresses the liar's mistaken false belief, nor falsely expresses his or her true belief.

We can illustrate the possibilities with a simple example. Let us assume that today is Monday. A liar (or any other person, for that matter) could believe that today is Monday or that today is any other day of the week, Friday for example. That is, the liar's belief could be either true or false. If a liar believes falsely that today is Friday, but untruthfully says that today is Tuesday, for instance, the lie would be a false statement. Also, if the liar believes truly that today is Monday but, lying, says that today is Tuesday, for instance, the lie would also be a false statement. The only instance, therefore, when a lie is necessarily false is when the liar's corresponding belief that was distorted was true. In other instances, the lie could be either true or false.

We conclude, therefore, that a lie is not necessarily a false statement. This shows, as Wittgenstein (1953:182) had noted, that the logical relations between the words 'lie', 'true', and 'false' are «more involved… than we are tempted to think.»

References

Chisholm, R.M. (1977), *Theory of Knowledge*, Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

Hallen, B. (1998), «Moral Epistemology – When Propositions Come out of Mouths: Reply to Oke», *International Philosophical Quarterly*, vol. xxxviii, No. 2, Issue 50.

——— (2000), *The Good, The Bad and The Beautiful: Discourse About Values in Yoruba Culture*, Bloomington and Indianapolis: Indiana University Press.

Hanson, N.R. (1952-54), «Fact and Factual Statements», *Analysis*, vol. xiii-xiv.

Wiredu, K. (1996), *Cultural Universals and Particulars: African Perspective*; Bloomington and Indianapolis: Indiana University Press.

Wittgenstein, L. (1953), *Philosophical Investigations*, trans. G. E .M. Anscombe, New York: The Macmillan Company.

——— (1974), *On Certainty*, ed. G.E.M. Anscombe and G.H. von. Wright; trans. Denis Paul and G.E.M., Anscombe, Oxford: Basil Blackwell.

Moses Òkè
Department of Philosophy
Obafemi Awolowo University
Ile-Ife, Nigeria
<rosenhillme@yahoo.co.uk>

SORITES (ΣΩΡΙΤΗΣ), ISSN 1135-1349
http://www.sorites.org
Issue #17 — October 2006. Pp. 31-48
Sparse Parts
Copyright © by Kristie Miller and SORITES

SPARSE PARTS

Kristie Miller[*]

---

1 Introduction

It is sometimes said that four dimensionalists are guilty of ontological profligacy. They admit into their ontology crazy objects such as that composed of your cat on Tuesday and my dog on Wednesday. It is thus at least implied that four dimensionalism is incompatible with the view that ontology is sparse, that is, the view that only some arrangements of basic particulars compose composite concrete objects.[1] This incompatibilty, however, has as yet not definitively been shown to be the case. I argue that four dimensionalism in its most common variety, perdurantism, is indeed incompatible with the view that ontology is sparse, but that this need not provide reason to reject four dimensionalism. For this incompatibility is merely a specific instance of a more general problem that a sparse ontology view faces with respect to parthood, namely the problem that we frequently quantify over non-existent parts.

Suppose we agree about the distribution of basic particulars,[2] and we ask what, if anything, is composed of those particulars: that is, we ask which objects exist. One natural response to this question is to hold that only some ways of arranging particulars composes an object, and some other ways do not. Call this the view that composition is restricted.[3] There are various different accounts of just *which* ways of arranging particulars will result in some object being composed.[4] In general however, these accounts attempt to preserve our intuitions that there is, for instance, no object composed of myself and George Bush, or of a tennis racket and your left foot. The view that composition is restricted therefore results in what we might call a sparse ontology, for it countenances the existence of far fewer objects than, for instance, the view of mereological universalism according to which every way of arranging

---

[*]. With thanks to David Braddon-Mitchell, Mark Colyvan and Dominic Hyde for helpful discussion of these issues.

[1]. Henceforth I use «object» to refer to any non-basic particular that is composed of particulars arranged in some manner. Moreover, I do not use «object»as a term of art to refer to some sub-set of the composite things that exist. I do not use object, for instance, to refer just to those composite things that are recognised by our conceptual apparatus, or which have some sort of natural border. Rather, all composite things that exist are objects.

[2]. Henceforth I use «particulars» to refer to the most basic things that exist, whatever these things are.

[3]. Proponents of this view include Van Inwagen (1987) and Wiggins(1980).

[4]. Defenders of restricted composition include Van Inwagen (1990) and Wiggins (1980).

particulars composes some object.[5] I will thus refer to the view that ontology is sparse in this way, as *sparsism*, and to proponents of this view as *sparsists*.

Sparsism, then, is not simply the view that some subset of all the objects that exist are special in some way. It is not the view that there are two distinct kinds of objects, natural objects and gerrymandered objects, and that while gerrymandered objects are mere mereological fusions, there is some special composition relation that holds between and only between particulars and the natural objects they compose. Sparsists are not those who see their project as providing an account of the necessary and sufficient conditions for something to count as a natural object. That view, whatever we call it, is perfectly consistent with both mereological universalism and with four dimensionalism.

Four dimensionalism is a theory of persistence. It holds that persisting objects are temporally extended: they have not only spatial dimensions, but also a temporal dimension. The most common version of four dimensionalism is perdurantism, according to which objects persist by perduring, that is, by being the mereological sum of temporal parts.[6] It is arguably the case that most perdurantists are mereological universalists,[7] and prima facie there seems be a tension between perdurantism and sparsism. Although it seems coherent to hold that only some ways of arranging particulars over time composes persisting objects, and that those objects persist by perduring, this appears to be an odd combination of views. For at least intuitively, temporal parts do not seem to be the sorts of objects that the sparsist is likely to countenance in her ontology.

Why so? Well there is much debate about whether there are any non-arbitrary, informative criteria that determine when composition occurs and when it does not.[8] Let us call whatever these criteria are, the *composition criteria*. In this paper I will assume that there are composition criteria, that is, I will assume that composition is not a brute relation. Further, I will assume that whatever these criteria are, they will preserve most of our core intuitions about which objects exist and which do not. For surely the central motivating force behind the sparsist position is that we are in *general* right about what exists and what does not, and about which *sorts* of things exist and which do not.

Sparsist accounts are founded on the idea that an arrangement of particulars composes some object just if that arrangement exemplifies some property, where this property supervenes on the complex causal relations of the particulars. So for instance the sparsist might hold that particulars compose an object just if they are continuous, or if they form a

---

5. Defenders of unrestricted mereological composition include Lewis (1991) and Heller (1990).

6. Perdurantism is to be distinguished from other versions of four dimensionalism such as Ted Sider's stage view according to which our everyday linguistic terms do not refer to the mereological fusion of temporal parts, but rather to temporal stages. Claims about the past and future of these persisting objects are then made true by the existence of the relevant temporal counterparts. While the stage view is not technically a perdurantist view, it will be open to the same sorts of criticisms that I level against a sparsist version of perdurantism.
For a defence of the stage view see Sider (2001).

7. See for example Lewis (1991); Heller (1990).

8. Cf. van Inwagen (1987); Heller (1990); Lewis (1986). pp. 212-213; Wiggins (1980); Markosian (1998).

functional unit, or if they form a unit that is a member of a certain sortal or natural kind[9] or if their collective activity constitutes a life.[10] The idea is that the behaviour of particulars is such that there exists an integrated, functional unit with global properties that supervene on those particulars.

Whatever the composition criteria are, they explain why the borders of objects are where they are, and thus explain how it is that we are able confidently to pick out objects. Indeed, I take it that the sparsist takes as primary datum the fact that objects have discernible, non-arbitrary borders.[11] For presumably the idea is not that we begin with the intuition that there are certain functional or complex causal properties in the world, and then go about marking out the borders of the things that exemplify those properties, finally to exclaim «ah! so *that's* an object.» Rather, we begin with intuitions about where the borders of objects lie, we develop some general ideas about the features of these borders, and from there we attempt to construct an account that explains why objects lie within, and only within, those borders. So any sparsist account should respect this core idea that objects have what I will call *natural borders*.

This is not so say, of course, that all such borders are natural in the sense that they are carved out by nature. Some borders, such as those of natural kinds, will be natural in the sense that they are borders recognised by the physical sciences. But if particulars ever compose artefacts, then the borders of these objects are not carved by nature. Still, the borders of such objects are not merely arbitrary: there is *some* genuine difference between that which lies to one side of the border, and that which lies to the other. Broadly speaking then, we will say that a border is natural to the extent that either it is carved by nature, or it is non-arbitrary. Now of course, it is sometimes the case that the concept of non-arbitrariness is analysed in terms of the notion of being carved out by nature. It might be that for some, what it is for there to exist a non-arbitrary border, is for there to exist a border carved by nature. Clearly this is not the analysis of non-arbitrary that I wish to embrace. Nor is it the analysis that most sparsists would want to adopt, since it would mean that a great number of arrangements of particulars that we take to have natural borders and thus to compose objects, in fact fail to do so. It would turn out that only natural kinds exist. So a more robust sparsism requires that there be some account of a non-arbitrary border that does not make recourse to the idea of being carved by nature. I cannot provide such an account here. Indeed, providing such an account lies at the very heart of the sparsist project, and the difficulty of this task is one of the major stumbling blocks for sparsism. Here I assume that there is some such account, and that at least the general idea of a non-arbitrary border is sufficiently intuitively clear.

The idea that objects have natural borders lies, then, at the very core of sparsism, and thus is a notion that the sparsist should take seriously. It is a notion, however, that seems to be inconsistent with perdurantism. For perdurantists are typically committed to the idea that for any perduring object O and arbitrary temporal interval T during which O exists, there is some temporal part of O that exists during and only during T. Though the temporal extent of any temporal part is held to be an essential property of that part, the temporal borders of temporal

---

9. Wiggins (1980). pp. 57-70

10. Van Inwagen (1990). chapter 10 pg. 98

11. Where to say that an object has some border is not to say that it has some determinate border, only that the border, if it is vague, is discernible.

parts are purely arbitrary. Temporal parts do not have natural borders, and are thus precisely the sorts of objects that the sparsist refuses to admit into her ontology.

Indeed, one of the reasons some three dimensionalists reject four dimensionalism is because of the apparent arbitrariness of the borders of temporal parts: they do not see how it is that at the moment one object ceases to exist, another comes into existence that is qualitatively identical to the previous object at the moment of its cessation. All they see is a unitary persisting object.[12] And this is precisely because they see only one natural temporal border, not a series of such borders that mark out the borders of the various temporal parts.

In the next section I begin by outlining the difficulties for a perdurantist version of sparsism, and then move on to consider a number of ways these difficulties might be met. I consider Storrs McCall's sparsist perdurantism, and argue that he is faced with a dilemma. If temporal parts are mere abstractions then they cannot do the metaphysical work proposed for them. If they are not abstractions then they appear to have non-natural borders and thus are inconsistent with sparsism. Then I consider a revised perdurantism which is consistent with sparsism, but which faces almost insurmountable metaphysical difficulties. Finally I examine sparsism itself, and conclude that it faces some difficulties of its own which may provide reason to prefer perdurantism.

2 The Problem

Perdurantism is the thesis that objects persist by perduring: by being composed of temporal parts. Roughly speaking, temporal parts as they are widely construed, are objects that exist during and only during a particular temporal instant or interval, and which during that instant or interval wholly overlap the perduring object of which they are a part.[13] So if I perdure, then a temporal part of me is some object that exists during and only during interval T, which during T has my spatial dimensions, and which is part of me simpliciter. More formally, following Ted Sider we will define both an instantaneous and an extended temporal part as follows:

> x is an instantaneous temporal part of y at instant $t =_{df}$ 1) x is part of y. 2) x exists at, but only at t. 3) x overlaps every part of y that exists at t.
>
> An extended temporal part of x during T is an object that exists at all and only times in T, is part of x at every time during T and at every moment in T overlaps everything that is part of x at that moment.[14]

So consider some persisting object O. Perdurantists hold that for every temporal instant t at which O exists, there is some instantaneous object that exists at that time, which overlaps O at that time and which is part of O. So too for any arbitrary temporal duration T during which O exists, they hold that there is some object that exists only during T, which overlaps O during T and which is part of O. That is, the perdurantist subscribes to what van Inwagen calls the doctrine of arbitrary temporal parts:

---

12. Cf. Van Inwagen (2000).

13. Sider (2001) pg. 60; Zimmerman (1996); Markosian (1994).

14. Sider (2001) pg. 60.

> DATP: for every persisting object P, if I is the interval of time occupied by P and sub-I is any occupiable sub-interval of I whatever, there exists a persisting object that occupies the interval sub-I and which, for every moment t that falls within sub-I, has at t exactly the same momentary properties that P has.[15]

I think that most perdurantists are committed to this doctrine, though it is prima facie plausible that they need not be. They will almost certainly, however, want to be committed to a related doctrine. For the heart of the perdurantist thesis is that objects persist by being composed of parts at times. If an object O persists through interval T, then at each time at which O exists, some part of O must exist at that time. This does not imply that for any interval of time T during which O exists, there is some object that exists only during T and overlaps O during T. But it does imply what we will call the doctrine of instantaneous temporal parts (DITP):

> DITP: for every persisting object P, if I is the interval of time occupied by P and t is any occupiable instant of I whatever, there exists an instantaneous object that occupies t and that at t has the same momentary properties that P has at t.

Perdurantists will want to adopt DITP. For suppose the perdurantist held that there exist no instantaneous temporal parts. Rather, persisting objects are composed of extended temporal parts with natural borders. Consider the example of a member of the genus Lepidoptera. On this view such an organism is composed of four extended temporal parts: an egg temporal part, a caterpillar temporal part, a pupa temporal part and a butterfly temporal part. The Lepidoptera thus perdures, but it is composed only of parts with natural borders. There are two obvious worries about this proposal. First, in the case of many persisting objects, there do not appear to be any candidates to be temporal parts with natural borders. Given our definition of temporal part then, these objects then cannot perdure. Second, in many cases the temporal borders of such temporal parts would be excessively vague: consider the example of a person with stages of childhood, adolescence and so forth. While sparsists may embrace ontological vagueness, it is difficult to see how an object could be composed of parts where the indeterminacy of the borders ranges over a number of years. Even putting these worries aside, however, few perdurantists would embrace such an account. For a rejection of DITP is a rejection of pure perdurantism in favour of some perdurantist-endurantist hybrid.

To see this, suppose we grant that a member of the Lepidoptera genus perdures by being composed of extended temporal parts with natural borders. Then how do these extended temporal parts persist? These temporal parts persist by perduring just if they are composed of temporal parts, and so too for the temporal parts of their temporal parts and so forth down the line. We get perdurantism «all the way down» so to speak, just if persisting objects are ultimately composed of instantaneous objects. If we reject DITP then we are forced to hold that persisting object perdure in virtue of being composed of objects that do not themselves perdure.[16] While it might be argued that such a hybrid view is plausible, it is so only if the

---

15. van Inwagen (1981). pg. 203.

16. Of course, someone might resist the idea that we have perdurance all the way down, on the grounds that there are smallest units of spacetime such as the Planck length and Planck time. In that case DITP should be altered to be the doctrine of the shortest temporal parts (DSTP). While it is true that these shortest temporal parts would not perdure (just as instantaneous temporal parts do not perdure), and this technically an adoption of DSTP might be seen as a hybrid view, the general point remains the same: it cannot be that the onlytemporal parts that exist are extended temporal parts with natural borders.

temporal parts that endure are not themselves composite persisting objects: if Lepidoptera perdure then surely so do caterpillars and butterflies!

Even if perdurantists were willing to accept this peculiar hybrid view as a trade-off for retaining their sparsist intuitions, they would surely baulk at the loss of virtually all of the theoretical elegance of perdurantism. Perdurantists hold that if all properties are disguised relations to times as endurantists maintain, then there are no truly intrinsic properties, for no object ever exemplifies any property simpliciter. The perdurantist account allows that persisting objects exemplify properties at times in virtue of being composed of temporal parts that exemplify those properties simpliciter, and this is the sense in which properties are intrinsic.

But a temporal part exemplifies a property simpliciter only if the entire temporal duration of that part exemplifies the property. Temporal part P is red simpliciter only if P is red at all times at which it exists. Suppose persisting object O is rapidly changing colour from being all red to all blue to all red again. If O's having the property of being red is to be an intrinsic property as understood by the perdurantist, there must be some part of O that exists only during the short period in which O is red. Thus for every momentary intrinsic property that O exemplifies, there must be some instantaneous temporal part of O that exemplifies that property simpliciter. If O were composed only of extended temporal parts, then there would be properties that O exemplified which were not properties of any of O's parts simpliciter and which therefore would not be intrinsic in the relevant sense. Thus if the perdurantist is to retain the apparatus with which to explain how persisting objects exemplify intrinsic properties at times, she must at least subscribe to DITP.

Prima facie though, both DATP and DITP are problematic doctrines for the sparsist, since they seem to entail that arrangements of particulars *can* compose objects with wholly arbitrary temporal borders. So it seems that the very essence of perdurantism is in conflict with the core of sparsism. Is there any way to resolve this conflict? In the next section I consider a putative reconciliation of sparsism and perdurantism proposed by Storrs McCall, and argue that in fact it is no reconciliation at all. I then move on to consider two other proposals. In the first we take instantaneous objects to be basic and then ask ourselves how those objects need to be arranged in order to compose some persisting object. In the second I broaden the definition of temporal part, and argue that a reconfigured perdurantism can accommodate sparsist intuitions. Unfortunately this version of perdurantism is unsuccessful in its own terms, as a metaphysics of persistence.

3 Sparse Perdurantism

3.1 McCalls' Solution

One defender of a sparse ontology who embraces perdurantism is Storrs McCall. He suggests that rather than regarding persisting objects as being composed of more basic stages united by some unity relation, we should instead think of the four dimensional object as basic, and the stages as derivative «abstractions».[17] On this view, four dimensional volumes have a natural shape associated with a sortal or natural kind: they are not made of arbitrary portions of spacetime. These natural four dimensional volumes can then be divided into temporal stages or parts, just as the earth can be divided into spatial parts by meridian lines.

[17]. McCall (1994). pp. 211-214

It is not clear in exactly what sense McCall means to count temporal parts as abstractions. The comparison to meridian lines suggests that he means to take a sort of anti-realist view of temporal parts. Just as we can imagine dividing up the earth in many different ways, corresponding to the different places we might draw meridian lines, so too we can divide up four dimensional objects in many different ways, each corresponding to one way of drawing the temporal border of a temporal part. If this is what is mean by «abstraction» however, it simply will not do. Perdurantism is the view that persisting objects have the properties they do in virtue of having temporal parts that exemplify those properties. Those temporal parts have to be real parts, not mere abstractions: no abstraction is red, only objects are red.

The other possibility is that McCall simply means by «abstraction», taking a top-down view of composition, that is, abstracting away from the whole four dimensional object to determine which temporal parts that object has. This too is problematic. For McCall's sparsism tells us that only those four dimensional volumes that have natural borders contain objects. Then four dimensional volumes contain temporal parts just if those volumes have natural borders. Since most of the temporal parts countenanced by perdurantists do not have natural temporal borders, by McCall's own composition criteria, those temporal parts do not exist.[18] It is not sufficient simply to say that we can use our intuitions about which particulars compose objects to determine which four dimensional objects exist, and then use a top-down process to maintain that in addition, all of the volumes contained within that four dimensional volume contain some object: a temporal part. Whatever our composition criteria are, all and only those arrangements of particulars that meet these criteria compose an object; there is no distinction to be drawn between four dimensional objects and temporal parts such that the former but not the latter need meet these criteria.

This does not necessarily mean, however, that there is no way to alter McCall's proposal so that it allows a reconciliation of sparsism with perdurantism. It is to that possibility that we next turn.

3.2 DATP and DITP

Suppose as sparsists we had the following intuition: if objects are in constant flux at the micro-level, then an arrangement of particulars that composes an object at some time t, can never be identical to an arrangement of particulars that composes an object at t*. This is a fairly standard perdurantist intuition according to which the only sense in which something that exists now is identical with something that exists at some other time, is the sense in which both of those things are parts of the same perduring object. If we accept this intuition, then we are faced with two questions: which arrangements of particulars at a time compose some instantaneous object, and which combinations of instantaneous objects compose some persisting object.

It's easy to see how this second question might be answered if we first grant that every arrangement of particulars at a time composes some instantaneous object. We could maintain

[18]. McCall attempts to solve this problem by arguing that three and four dimensionalism are equivalent theories. I am sympathetic to this view, but I do not see how it helps in this matter. Either there is some object that exists within a certain temporal border or there is not. I grant that the three dimensionalism can agree that such an object exists, but can argue that the object is not a part of the persisting object. The two theories might then come out as equivalent if it were construed as a debate about what it is to be a part of an object. In this case, however, the issue is about whether there is some object that exists during a period of time T and overlaps a persisting object at that time, not whether or not that object is a temporal part. See McCall (1994) pp. 215-216.

that instantaneous objects compose some persisting object just if they are related in a particular way, namely, if they are causally connected in a smooth and continuous manner such that the existence of an instantaneous object at one time causes the existence of an instantaneous object at the next time. That is, a series of instantaneous objects compose some persisting object O just if they form a nice smooth four dimensional volume. This would rule out punctuate objects and other odd gerrymandered objects, for there would be no instantaneous objects causally connected in the requisite way. Since not every arrangement of instantaneous objects would compose some persisting object, we would preserve the sparsist intuition that ontology is sparse, yet it would still be true that objects persist by perduring.

Further, since the perdurantist need not be committed to DATP, she can hold that there exist only instantaneous objects and the persisting objects that they compose. Just as some object that exists at a time is composed of certain basic particulars at that time, so too an object that exists over time, is composed at each of those times of basic instantaneous objects. There are no extended temporal parts whose temporal borders are oddly arbitrary: there is no object that wholly overlaps my dog and exists for only ten minutes on Tuesday. So the appearance of a plethora of objects with arbitrary temporal borders is removed. For just as the spatial borders of a mereological simple are natural, so too the temporal borders of an instantaneous object are natural.

All well and good. The difficulty lies in conceding, as I did, that every arrangement of particulars at a time composes some instantaneous object. I do not think that many sparsists will be happy with this concession. Sparsists will not, I think, want to allow that there is some object that exists only at t, and which is composed of my dog at t, Jupiter at t, and your pillow case at t. While this object might have a natural temporal border, it certainly does not have a natural spatial border. This is not to say that this position is a hopeless one. Perhaps there are sparsists who hold that there is something special about persisting objects, such that sparsism-over-time is a more important doctrine than sparsism-at-a-time. Perhaps such a person would be willing to concede that there exist odd instantaneous objects, but no odd persisting objects. But I am not entirely sure what would motivate such a position. Why should we think that the «glue» that holds objects together over time is fundamentally different from the «glue» that holds them together at a time?

This latter question is particularly pertinent given that we are talking about a sparist version of perdurantism. For consider, the endurantist explicitly holds the view that the manner in which objects persist through time is radically different to the manner in which they extend through space. Objects extend through space by having spatial parts at spatial locations, while they persist through time by being wholly present at each time at which they exist. Perdurantists, however, construe persistence through time as analogous to extension through space, with objects persisting by having parts — temporal parts — at temporal locations. Given this, it is not clear what would motivate the claim that across-time sparseness is radically different to at-a-time sparseness. If there is such a case to be made, it is at least imcumbent on the perdurantist sparsist to make that case.

So while this is perhaps one way to reconcile perdurantism with sparsism, it is not a wholly attractive way, and nor, I imagine, is it an option that will find favour with many sparsists. But if the sparsist rejects the assumption that every instantaneous object exists, then we need to determine which instantaneous objects exist and why. Clearly the best proposal would be to hold that there exist the various everyday persisting objects of our ontology, and the instantaneous temporal parts of those objects. Adopting McCall's top-down approach then,

it might be thought that this is precisely what we can accomplish. As sparsists, we feel confident that dogs exist. Given that dogs exist, we can conclude that the instantaneous temporal parts of dogs exist. Thus dogs perdure in virtue of being composed of temporal parts, and those temporal parts have natural borders in that they are temporally basic: they are instantaneous. There are two problems for this view. First, we do not want sparsism to be simply the view that particulars compose some object just if we think they do, that is, just if that is what our intuitions tell us. Sparsism is supposed to be the view that there are some informative composition criteria. On many criteria, composition involves complex causal relations between the composing particulars (whether these be causal relations constituting a life, or constituting a natural kind or sortal). Whatever these criteria amount to, they must apply equally to all objects. But in general, instantaneous objects do not meet the usual sorts of sparsist criteria for composition. Instantaneous objects are probably not members of sortals or natural kinds, for the underlying properties that constitute those kinds are properties of persisting objects. So too no instantaneous object exemplifies the property of having a life.

So the top-down solution does not seem hopeful: for it is plausible only if we think that the composition criteria for persisting objects is different to that for instantaneous objects. Perhaps so. But some account of the composition criteria for instantaneous objects would need to be forthcoming, and this criteria could not simply be that particulars compose some instantaneous object if that object is a temporal part of a persisting object. For that is not to provide composition criteria, it is just to state which objects exist and which do not. Until such criteria are forthcoming then, the top-down view is not at all compelling.

Moreover, the view is faced with an additional problem. On this view, there do not exist any extended temporal parts. Now consider some person P, who has some blue experience. P has the property of having a blue quale. Now suppose that blue experiences are not ever experiences of instantaneous objects.[19] Having a blue experience, however, is surely an intrinsic property of P. Unfortunately though, it is not a property of any temporal part of P, since P has no extended temporal parts. Strangely then, although having a blue experience would have been an intrinsic property of P if that experience had been instantaneous, since P would have had a temporal part that had that property simpliciter, as things stand, P has no such temporal part, and thus does not have that property simpliciter. So too for any «temporally extended» property. So this version of perdurantism is stuck with saying that some apparently intrinsic properties are really disguised relations to times or some such. This is even more alarming than straight endurantism, since it turns out that some apparently intrinsic properties are indeed intrinsic in virtue of being properties of temporal parts, and some other apparently intrinsic properties are not intrinsic, in virtue of failing to be properties of any temporal part.

So where does that leave us? If the perdurantist is committed to DITP, and if that doctrine is inconsistent with sparsism, then are we forced to conclude that sparsism and perdurantism are inconsistent? Before we make such a declaration, we should first consider whether there is some other way to salvage a perdurantist sparsism. In the next section we will briefly consider whether it is perdurantism that ought to be jettisoned in favour of some other version of four dimensionalism. Though this suggestion will be rejected, it does lead to the idea that we should alter the definition of temporal part. This alteration yields a version of perdurantism that is acceptable to the sparsist, and is, I will argue, the best reconciliation of perdurantism

[19]. As for instance McKinnon (2003) strongly argues.

with sparsism. But while it is the best reconciliation, ultimately it too must be rejected on the grounds that it simply does not have the theoretical apparatus to explain the phenomena that an account of persistence must explain.

5 Temporal Extension without Temporal Parts?

We might think that the best way to combine sparsism with four dimensionalism is by rejecting perdurantism. This would need to involve more than, for instance, adopting Sider's stage view which accepts the same ontology as perdurantism but merely disagrees about which objects in that ontology ought to be the referents of our terms. Rather, it would require the radical view that objects can be temporally extended and thus four dimensional, and yet have no proper temporal parts. Call such an object a *temporal simple*. This view has recently been defended by Parsons.[20] Parsons does not suppose that composite persisting objects such as dogs and trees could be temporal simples, and indeed it is hard to see why a view that countenanced this possibility would be preferable to three dimensionalism. For it would no longer be possible to use the apparatus of temporal parts to explain change over time or to provide an account of temporary intrinsics. If anything, it would seem to render to nature of persisting objects all the more mysterious.

The idea of temporal simples does, however, suggest another possibility. For consider what happens when we attempt to «construct» a composite four dimensional object that lacks proper temporal parts. For the perdurantist, a four dimensional object is composed of various instantaneous objects which are themselves composed of particulars at a time. But suppose that we think of a some object not as composed of instantaneous objects at times, but simply as composed of particulars at times. That is, some persisting object O is composed of particulars S at t, P at t, Q at t, S at t_1, P at t_1, R at t_1 etc. Then have we just described a four dimensional object with no proper temporal parts, or merely a persisting three dimensional object?

If we think that the particular S at t and S at t_1 is the very same particular S, viewed at different times, then O is simply an enduring three dimensional object. If S at t and S at t_1 are strictly identical, then S endures, and so too with all of the other particulars. Then O is a composite object composed of enduring particulars S, T, R, Q etc. Since by definition there exists no object that wholly overlaps O at a time and is part of O, that is, by definition O has no proper temporal parts, O must itself be an enduring three dimensional object.

On the other hand, if we think that S at t and S at t_1 are distinct particulars, then we think that there exists S-at-t and S-at-t_1. O is thus composed of S-at-t and S-at-t_1: it has these particulars as parts simpliciter. Thus there is an important sense in which O deserves to be called four dimensional despite the fact that it is not composed of temporal parts as I defined them earlier. As I defined a temporal part, x is a temporal part of y at t only if x wholly overlaps y at t. Call this a *maximal* temporal part. O has no maximal temporal parts. However, O is composed of four dimensional particulars. Each particular has temporal parts: S exists at different times, and it does so in virtue of being composed of instantaneous temporal parts S-at-t, S-at-t_1 and so forth.

If an object O perdures just if O persists by being the mereological fusion of maximal temporal parts, then the object just described does not perdure. It has been suggested,

[20]. Parsons (2000).

however, that we ought to broaden our definition of temporal part to include non-maximal parts.[21] Let us then define a non-maximal temporal part as follows:

> x is an instantaneous non-maximal temporal part of y at t just if 1) x is part of y 2) x exists at, and only at t and 3) x is wholly overlapped at t by some part of y that exists at t.
>
> x is an extended non-maximal temporal part of y during interval T just if 1) x exists at all and only times in T, 2) x is part of y 3) x is wholly overlapped by some part of y at all times during T.

We can then say that an object O perdures just if O persists by being the mereological fusion of maximal or non-maximal temporal parts. Then the object O described above will perdure in this sense, since it is composed of non-maximal temporal parts.

The critical question then, is whether the sparsist should think that S at t and S at t_1 are distinct particulars or are strictly identical. There is a case to be made for each view. On the one hand, the sparsist thinks that we have a single unitary object just where we have natural borders. She certainly thinks that S-at-t *would be* a distinct particular in a world W where there is nothing S-like at temporal instants that abut t. For in that world, S-at-t clearly has natural temporal borders. In the actual world though, sparsist intuitions might steer one towards holding that there is no object S-at-t, for that putative object has no natural borders in virtue of being temporally abutted by other S-like particulars. Rather, we have one particular, S, and to claim that in addition to S, there exist various instantaneous objects that compose S, would be to claim that there exist objects with arbitrary borders.

There is something appealing about the intuition that something has a natural temporal border only if it is not temporally abutted but like particular or particulars. After all, part of the intuition that the putative temporal part of me that exists only for ten minutes today has arbitrary temporal borders, is that it is temporally abutted by person-like objects. If that same putative object existed in some world W and was not abutted by anything person-like, we would be happy to concede that it has natural temporal borders in that world. Recall however, that in the previous section we rejected the idea that any arrangement of particulars can compose some instantaneous object, on the grounds that many such objects would have arbitrary spatial borders. We noted though, that just as the spatial borders of a mereological simple are natural, so too the temporal borders of an instantaneous object are natural: these objects are temporally fundamental. So the most basic particular is one that is mereologically simple, and temporally fundamental,[22] and the borders of this most basic particular are natural. If the sparsist accepts this, then she can proceed to hold that some of these instantaneous simples are causally related such that they compose perduring basic particulars such as S. For the persisting object S is mereologically simple, but not temporally fundamental: it is composed of the most basic particulars S-at-t, S-at-t_1 and so forth. We can then say that composite objects are composed of perduring particulars like S, and thus ultimately of mereologically simple instantaneous objects. These composite objects therefore have no maximal temporal parts, but only non-maximal parts with natural borders.

---

[21]. See for example Merricks (1999).

[22]. Where being temporally fundamental is either being instantaneous, or being of the shortest possible temporal length eg. Planck length if it is not possible to be instantaneous.

So the sparsist requirement is fulfilled: there exist no objects that have wholly arbitrary borders. Yet this view also seems to afford the perdurantist all of the metaphysical apparatus needed to explain change and temporary intrinsics. Though we cannot say that object O is red at t in virtue of having some maximal temporal part O-at-t that is red simpliciter, we can say that O is red at t in virtue of each of its non-maximal temporal parts S-at-t, R-at-t and so forth being red simpliciter. Problem solved; sparsism and perdurantism reconciled.

Not so fast. This reconciliation too is problematic. For plausibly, macro-properties such as being red, being cold, being conscious, being a person and so forth, are not exemplified by instantaneous objects. Plausibly, they are not exemplified by any instantaneous maximal temporal part, but they are *certainly* not exemplified by any instantaneous non-maximal basic particular. Consider some object O that is red at t. We cannot, in fact, say that O is red at t in virtue of ever basic particular that composes O at t, being red at t. For S-at-t is not red. S-at-t is too small to be red. What is red at t, is the totality of the arrangement of the particulars at t. This arrangement, however, does not compose any object, for there is no maximal temporal part of O at t. So there is nothing that exists at t and is red simpliciter, and we find ourselves faced again with the problem of temporary intrinsics. So too, on this view there exists no extended maximal temporal parts, and thus no such parts of persons. Since consciousness almost certainly supervenes on some temporally extended temporal part, here too there is a problem. Not only is it not the case that any most basic particular S-at-t is conscious, but no arrangement of these most basic particulars at a time has the property of being conscious: only some arrangement of these particulars over time could exemplify that property, but no such arrangement composes any object. So only entire four dimensional persons are conscious.

Of course, a proponent of this view might maintain that there is no real problem here. After all, this is precisely the sort of difficulty certain sorts of eliminativists, (such as eliminativists about beliefs or eliminativists about composite objects) face each day when our everyday language quantifies over non-existent objects.[23] For eliminativists, talk that quantifies over non-existent dogs, for instance, is true just if there is some paraphrase in which it is true that there are particulars arranged in a dog-wise way, or some such. So too, we might think, the sparse perdurantist can maintain that O is red at t just if there is some O-wise arrangement of particulars at t that is red simpliciter.

But this is all rather tortuous. For those who (plausibly) think that an arrangement of particulars exemplifies some macro-property such as being red just if that arrangement composes some macro-object, the eliminativist solution will be no solution at all. Either the arrangement of particulars at t composes some object, namely O-at-t which is a maximal temporal part of O and is red simpliciter, or the arrangement does not compose any object at t and there is no object that is red simpliciter at t. There is no middle ground, and thus no way to have one's sparsist cake and eat it too. So while there might be those who are sympathetic to the eliminativist strategy and thus willing to accept this combination of sparsism and perdurantism, they must surely be in a minority.

There is of course one other way that this version of sparsist perdurantism could deal with maco-properties, and that is by adopting an endurantist analysis of properties. There are two

[23]. Cf. Unger (1979) and Unger (1990).

possibilities available, indexicalism,[24] according to which properties are temporally relativised, and adverbialism[25] according to which the having of properties is temporally relativised. For the perdurantist «O» refers to the whole four dimensional object. So if O is red at t and blue at t_1, following indexicalism we can say that O has the properties of being is red-at-t and blue-at-t_1. Or following adverbialism we can say O has the properties of being red tly and blue $t_1$ly. So although there is no temporal part of O that is red or that is blue, we can still attribute these properties to O.

This is by far the best solution, and this is certainly the best combination of sparsism and perdurantism. It is consistent and workable, but it has the cost of jettisoning much of the theoretical apparatus that motivated perdurantism to begin with. Many perdurantists such as Lewis are moved to embrace perdurantism because they believe that it best deals with the problem of change, in that allows that temporary intrinsics are not disguised relations to times.[26] In adopting an endurantist analysis of properties, however, this version of perdurantism is forced to concede that O does not have the property of being red simpliciter, but rather has a property that is temporally relativised in one way or another. The extent to which this sparsist perdurantism is acceptable then, will depend on how repugnant one finds the endurantist analysis of properties. That is, it will depend on just how strong one's intuitions are that intrinsic properties are not relations to times. The dilemma is that the more one is attracted to the endurantist analysis, the less reason one has to prefer perdurantism in the first place, and the more repugnant one finds the analysis, the less one will be happy to accept this version of perdurantism. So while I cannot rule out this version of sparsism perdurantism as being coherent, it does require the loss of much of the theoretical elegance of traditional perdurantism, and might well not be a view that many perdurantists, even those of a sparsist bent, will be happy to embrace.

6 The Brutality of Composition

A final possibility. Suppose the sparsist relinquishes the idea that there are any non-arbitrary informative criteria of composition. She might, for instance, follow Markosian in holding that composition is brute.[27] Either arrangements of particulars compose an object or they do not, and there is no further story to tell. If composition is brute, then both sparsist and perdurantist intuitions can straightforwardly be reconciled. Some arrangements of particulars compose objects that appear to have wholly arbitrary temporal borders, namely temporal parts. Other arrangements of particulars fail to compose objects that would have had arbitrary borders had they existed. But there just is no reason why the former objects exist and the latter do not, for there is no principled reason why some arrangements of particulars compose objects and others do not. Indeed, there *can* be no such reason.

Perhaps there are good reasons to think that composition is brute. Still, this move seems wholly unsatisfactory when applied to the case at hand. The proposition that composition is brute is arrived at by considering the cases where we take composition to occur and those

---

[24]. Cf. van Inwagen (1990).

[25]. Cf Johnston (1987) and Haslanger (1989).

[26]. Lewis (1986) pg. 204.

[27]. Markosian (1998).

where we do not, and arguing that there is no informative criteria that would pick out only the former and not the latter as being instances of composition. It is by considering examples of composition in the real world that we are lead to adopt sparsism. So it had better turn out that most of our intuitions about when composition occurs are right, or the very motivation for adopting sparsism in the first place will evaporate. It would, therefore, be disingenuous to claim that *even though* our sparsist intuitions tell us that temporal parts do not exist, we can maintain that they do exist, and that no explanation for this inconsistency need be forthcoming since composition is brute. On these grounds I could argue that there is some object that is composed of my dog and Lincoln's foot, and that there is no object composed of your dog and Jefferson's foot. Why? Well who knows, composition is brute!

7 A General Problem

The difficulty inherent in trying to reconcile sparsism and perdurantism is that sparsism just does not afford a sufficient number of parts to meet perdurantist requirements. Because the version of perdurantism discussed in section 5 eschews the existence of maximal temporal parts, there exists nothing that is me-now. That is, there exists no object that is wholly present now and which exemplifies all of my momentary properties now. So too although there is some object that is my heart, and which is a proper part of me, my heart is a four dimensional object which is part of a four dimensional person. Since my heart is not composed of maximal temporal parts, there is no object that is wholly present now and is part of me-now. Neither endurantism nor traditional perdurantism has this odd consequence. For the endurantist thinks that both me and my heart are now wholly present, and thus that my wholly present heart is now part of wholly present me. So there is a straightforward sense in which my whole heart is part of me now. Perdurantists, on the other hand, although they disagree that my whole heart is now part of me, do agree that there is some object that is wholly present now and is part of me now, namely the maximal temporal part of my heart-now. The time-slice of me-now has that entire object as a part. So neither are forced to conclude that there is no sense in which my heart now is not a part of me at all.

This counterintuitive consequence of this version of perdurantism might lead one to conclude that sparsism and perdurantism simply are not to be reconciled, and thus that one must be abandoned. Since sparsist intuitions have a firm grip on us, there are those who will jettison perdurantism in favour of these intuitions. But is this the correct response? In fact when we consider sparsism stripped of any perdurantist overtones, we find that we are faced with an analogous difficulty. Indeed, it turns out that the counter-intuitive consequences of sparsist perdurantism is just a specific version of a general problem faced by sparsism alone.

Consider a time honoured paradox we find in the literature on persistence: Tibbles the unfortunate cat.[28] According to the paradox, there exists an object, Tibbles the cat, and some proper part of Tibbles, call it Tib, which includes all of Tibbles but for her tail. The paradox arises after Tibbles has her tail amputated, and we are asked to consider what we should say about the relation between Tib and Tibbles post-amputation. But what is this object Tib of which I write? At time t, prior to the amputation, Tib is a proper part of Tibbles. Both three and four dimensionalists alike accept this, though of course they gloss it differently. In general, the existence of Tib has been granted without comment by all sides of the debate,

[28]. The example of Tibbles the cat is found in Geach (1980) section 110, but is formally the same as the case of Dion and Theon originally created by Chryssipus, a stoic philosopher in 280-206 BC. A discussion of the Dion and Theon problem can be found in Burke (1994).

including three dimensionalists who are frequently sparsists.[29] The exception here is van Inwagen who rejects the existence of Tib precisely because its existence is necessary in order to generate the paradox.[30] van Inwagen goes further than merely denying the existence of Tib, he rejects the spatial analogue of the doctrine of arbitrary temporal parts, the doctrine of arbitrary undetached parts (DAUP):

> DAUP: For every material object M if R is a region of space occupied by M at time t and if sub-R is any occupiable sub-region of R whatever, there exists a material object that occupies the region sub-R at t.[31]

Tibbles-type paradoxes do not require that one reject DAUP. But should the sparsist accept DAUP? I think not. Whatever the composition criteria turn out to be, it is difficult to see how Tib and putative objects like it, could be seen as meeting those criteria. For suppose we follow van Inwagen in holding that particulars compose something just in case their arrangement constitutes a life. Does the Tib-wise arrangement of particulars compose something that constitutes a life? Well in one sense it does. Since Tibbles can survive the loss of her tail, Tib, if it exists, must be a sufficient supervenience base for life. But I think this misses the point. For it is clear that the tail-wise arrangement of particulars, though they are not sufficient in and of themselves to constitute a life, are *part* of a life, namely the Tibbles life. There is but one life there (with the exception of any cellular organisms that are floating around of course - but that is beside the point). There is not Tibbles' life, and then Tib's life, one life which includes the tail, and the other which does not. But if there is only one life, and that life if the life of Tibbles, then we cannot conclude that the Tib-wise arrangement of particulars composes anything.

Similarly, consider the view that particulars compose some object just if their arrangement constitutes something whose underlying explanatory properties mark it out as a member of a natural kind or sortal. Then we can see why the Tibbles-wise arrangement of particulars composes something: because that arrangement constitutes something that is a cat, and a cat is a member of a natural kind. But is there any natural kind or sortal of which Tib, if it exists, is a member? I cannot see that there is. Tib certainly would not be a member of a natural kind, nor does it seem plausible to think that it is a member of a sortal. If this is so, then we should conclude that the Tib-wise arrangement of particulars do not compose anything.

None of this should come as a surprise, since Tib, if it existed, would flout the sparsist intuition that objects have natural borders. For we arbitrarily defined Tib as that thing which includes all of Tibbles but her tail. Sparsists should conclude that Tib does not exist. And if Tib does not exist, then Tib is not a proper part of Tibbles. So when the sparsist says that Tib is a proper part of Tibbles she says something that should be, by her lights, false.

The case of Tibbles is by no means an isolated one. Discussion of the relation of objects to their proper parts often involves talk of proper parts that by the lights of the sparsist, do not exist. Consider the case where we talk of a statue that has a little chunk of clay removed from it. Three dimensionalists typically want to say that the aggregate of clay «Clay» that

---

29. Cf. Baker (1997); Simons (1987); Thomson (1998).

30. van Inwagen (1981).

31. van Inwagen (1981) pg .191.

constitutes the statue, «Statue» prior to the removal of the chunk, cannot survive this removal for Clay persists only if it is mereologically constant. On the other hand, they want to say that Statue does survive the removal of the chunk, for its persistence conditions are such that it can survive such an event. This story only makes sense, however, if the chunk of clay is a proper part of the statue, and again, I see no reason to suppose that it is if one accepts sparsism.

It turns out then, that if the sparsist is right, we frequently quantify over non-existent objects. We talk of the part of Tibbles that is the small hunk of flesh on her right thigh. We talk of the small piece of clay that fell off the statue. We talk of a scoop of ice cream removed from the tub. We talk of the enamel chip that fell off the plate. And in all of these cases we will often talk of the flesh, the clay, the chip and so forth as being proper parts of the objects in question. But if sparsism is true, then I submit that we would be wrong to do so. For I can see no basis at all on which to say that these are objects at all.

If sparsism is true, then sometimes we quantify over the non-existent. So it is not merely the sparsist perdurantist who is forced to embrace the eliminativistic paraphrasing of everyday language. Just as there is no maximal temporal part of O that is red simpliciter, so too there is no chunk of clay is part of O at t. When our everyday talk appears to be quantifying over proper parts that do not exist, we are really quantifying over certain arrangements of particulars. Thus although strictly speaking Tib does not exist, there does exist a Tib-wise arrangement of particulars. And we can truly say that none of the particulars that are arranged Tib-wise, are arranged tail-wise. If this is so, then when I say that Tib is not part of the tail, what I say is true. Similarly, when I say that Tib is part of Tibbles, what I say is true just if there is some Tib-wise arrangement of particulars such that each of those particulars is part of Tibbles.

Again though, this relies on it being coherent to talk of the macro-properties of arrangements of particulars despite the fact that there is no object that exemplifies those properties. Perhaps this is not an insurmountable problem for the sparsist. What is shows, however, is that the difficulties inherent in reconciling sparsism and perdurantism are merely specific instances of difficulties that the pure sparsist faces with the notion of parthood. Not only does the sparsist not have enough parts to meet perdurantist requirements, it doesn't have enough parts to meet everyday folk requirements. It is usually held to be a major virtue of sparsist views that they take the middle ontological road between eliminativism and universalism, and thus avoid not only the plethora of odd objects posited by universalism, but also the need for paraphrasing ordinary language required by eliminativism. But sparsism does not avoid all such paraphrasing, and does not preserve *all* of our ontological intuitions, for it entails that Tib and others of its ilk do not exist.

8 Conclusion

Sparsism is inconsistent with any plausible version of perdurantism. Should we then reject sparsism in favour of perdurantism, or perdurantism in favour of sparsism? The answer to this question involves a delicate balancing act of weighing up the virtues of each. Perdurantism has much theoretical elegance to recommend it. Sparsism has much intuitive appeal. But not as much intuitive appeal as we might have thought, since by the lights of sparsism we quantify over non-existent objects quite frequently. Perhaps this difficulty provides sufficient weight to tip the scales in favour of perdurantism over sparsism. Or perhaps sparsist intuitions are so resilient that some will prefer to adopt an eliminativist-type strategy in dealing with non-existent objects such as Tib. The point is that some sacrifice will need to be made: it is

not possible to reap the theoretical elegance of perdurantism and also the ontological parsimony of sparsism. Something has to give.

References

Baker, L. R. (1997). «Why Constitution is not Identity.» *Journal of Philosophy* 94: 599-621

Burke, M. (1994). "Dion and Theon: An Essentialist Solution to an Ancient Puzzle." *Journal of Philosophy* 91: 129-139.

Geach, P.T. (1980). *Reference and Generality: An Examination of Some Medieval and Modern Theories.* Cornell University Press.

Haslanger, S. (1989). «Endurance and Temporary Intrinsics.» *Analysis* 49: 119-125.

Heller, M. (1990). *The Ontology of Physical Objects: Four Dimensional Hunks of Matter.* Cambridge: Cambridge University Press.

Johnston, M. (1987). «Is There a Problem about Persistence?» *The Aristotelian Society* Supp 61: 107-135. pp 113-115.

Lewis. D. (1986). *On the Plurality of Worlds*. New York Blackwell Press

Lewis, D. (1991). *Parts of Classes*. Oxford: Blackwell.

Markosian, N. (1994). «The 3D/4D Controversy and Non-Present Objects.» *Philosphical Papers* 23: 243-49.

Markosian, N. (1998). «Brutal Composition» *Philosophical Studies* 92: 211-249.

McKinnon, N. (2003). «Presentism and Consciousness.» *Australasian Journal of Philosophy* 81(3): 305-323.

Parsons, J. (2000). «Must a Four-dimensionalist Believe in Temporal Parts?» *The Monist* 83(3) 399-418.

Rea, M. (1997). *Material Constitution.* Rowman and Littlefield.

Sider, T. (2001). *Four-dimensionalism: an ontology of persistence and time.* Oxford University Press.

Simons, P. (1987). *Parts: A Study in Ontology.* Oxford: Clarendon Press.

Thomson, J.J. (1998) The Statue and the Clay. *Nous* 32: 149-173.

Unger, P. (1979). "I Do Not Exist". in *Perception and Identity* ed G. F. Macdonald. London Macmillan Press.

Unger, P. (1990). *Identity, Consciousness and Value*. New York: Oxford University Press.

Van Inwagen, P. (1981). «The Doctrine of Arbitrary Undetached Parts» *Pacific Philosophical Quarterly* 62 123-37 reprinted in M Rea. (ed). *Material Constitution.* Rowman and Littlefield 1997 pp191-208.

Van Inwagen, P. (1987). «When are Objects Parts?» *Philosophical Perspectives 1. Metaphysics:* 21-47;

Van Inwagen, P. (1990). *Material Beings.* Cornell University Press.

Van Inwagen, P. (1990). «Four-Dimensional Objects.» *Nous* 24: 245-255.

Van Inwagen, P. (2000). «Temporal Parts and Identity Across Time.» *The Monist* 83(3) 437-459.

Wiggins, D. (1980). *Sameness and Substance*. Oxford: Blackwell Press.

Zimmerman, D. (1996). «Persistence and Presentism.» *Philosophical Papers* 25: 115-126.

Kristie Miller
Department of Philosophy
University of Queensland
Brisbane Australia
<kristie_miller@yahoo.com>

SORITES (ΣΩΡΙΤΗΣ), ISSN 1135-1349
http://www.sorites.org
Issue #17 — October 2006. Pp. 49-55
Are Functional Properties Causally Potent?
Copyright © by Peter Alward and SORITES

ARE FUNCTIONAL PROPERTIES CAUSALLY POTENT?

Peter Alward

Jaegwon Kim has recently[1] argued that a solution to the exclusion argument against the intelligibility of mental causation is to be found if mental properties can be shown to be reducible to physical properties «in an appropriate way.»[2] In a departure from some of his earlier work,[3] however, Kim seems to recognize that reducibility by itself is not sufficient to rescue mental causation. In particular, he attempts to secure the efficacy of mentality by means of the deployment of the «causal inheritance principle» and the identification of instantiations of mental properties with instantiations of their realizing physical properties.[4]

In this paper, I wish to argue that Kim's putative solution to the exclusion problem rests on an equivocation between instantiations of properties as *bearers of properties* and instantiations as *property instances*. On the former understanding, the causal inheritance principle is too weak to confer causal efficacy upon mental properties. And on the latter understanding, the identification of mental and physical instantiations is simply untenable.

Recall: the exclusion problem arises for views according to which mental properties/events are (i) causally efficacious vis-à-vis physical events and (ii) non-identical to physical properties/events. If the physical domain is causally closed, then every (caused) physical event has a physical cause. And this physical cause threatens to exclude any mental cause of the physical effect in question.[5]

According to Kim, functional properties are 2nd order properties.[6] A 2nd order property is the property of having a (1st order) property which satisfies some specification or other. For example, my shirt has the 2nd order property of being my favourite colour because it has a colour property – blueness – which meets the condition of being my favorite. Functional properties are 2nd order properties for which the specification is that of occupying a certain causal role. So, for example, a functionalist might claim that being in pain is the property of

---

1. Kim (1997, 2000).

2. Kim (2000) p. 46.

3. See, e.g., Kim (1989).

4. Kim (2000) pp. 54-6. Note: strictly speaking, this strategy is designed only for those mental properties amenable to functionalization.

5. Kim (2000) p. 37.

6. Kim (1997) p. 290. See also Kim (2000) p. 20.

instantiating a property which is caused by tissue damage and causes winces and groans. In humans (as the philosophical literature would have it) the realizing property is that of C-fibre activation.

Kim's solution to the exclusion problem relies on the Causal Inheritance Principle and what might be called «Instantiation Identity.» Kim characterizes the Causal Inheritance Principle as follows:

> If a second-order property F is realized on a given occasion by a first-order property H …then the causal powers of this particular instance of F are identical with (or are a subset of) the causal powers of H (or this instance of H).[7]

According to Instantiation Identity, each instantiation of a (functionalizable) mental property is identical with an instantiation of the 1st order physical property which realizes it on the occasion in question; «…each instance of M is an instance of P_1, or of P_2, or …, where the P's are M's realizers.»[8] Kim utilizes these theses as follows. From Instantiation Identity it follows that mental causation does not involve two causes competing for efficacy. There is only one cause – the physical cause – of any given physical event. Nevertheless, the Causal Inheritance Principle entails that mental properties inherit the causal powers of their 1st order realizing properties.[9] The upshot is that «…functional mental properties turn out, on account of their multiple realization, to be causally heterogeneous but not causally impotent.»[10]

'Instantiation' talk is equivocal between talk of bearers of properties and talk of instances of properties. A particular shirt might be said to be a bearer of the property blueness, whereas the blueness-of-the-shirt is an instance of the property. Kim's use of the term 'instance' suggests that the latter is what he has in mind. But at one point, he remarks, «[we] may take «instances» or «instantiations» of properties as events, states, or phenomena,»[11] which suggests that property bearers are what are at issue. In order to avoid terminological confusion, I will henceforward articulate the distinction as one between property bearers and property *tokens*.

Now it might be thought that, given his analysis of events, Kim would argue that being a property bearer and being a property token amount to the same thing. After all, on Kim's view, an event just *is* a property token, a complex consisting of a substance x, a property P, and a time t – [x, P, t] – which exists just in case x has P at t.[12] Although tempting, this interpretation of Kim's background metaphysic should be resisted. Events cannot be identified with property tokens because events and property tokens differ in their modal profiles. Events are the relata of the causal relation, and need (or, perhaps better, have) essences commensurate with this role. Even if one rejects a counterfactual *analysis* of causation, the causal relation

---

7. Kim (2000) p. 54

8. Kim (2000) p. 111. See also Kim (1997) p. 295.

9. See also Kim (1997) p. 295 and Kim (2000) p. 116.

10. Kim (2000) p. 116.

11. Kim (2000) p. 41.

12. Kim (1999) p. 337.

remains counterfactual supporting (except in cases of causal over-determination, pre-emption, etc.). And Kim concedes that this requires treating the constitutive time of an event, and perhaps the constitutive property, as inessential to it.[13] At the end of the day, Kim is best thought of as identifying events with functions from possible worlds to substance-property-time complexes existing at those worlds, rather than with substance-property-time complexes *per se* (although Kim might eschew the possible-worlds formulation I've given here).

For expository purposes, I will assume that property tokens also are functions from worlds to substance-property-time complexes.[14] In my view, however, they are (typically) distinct functions. More to the point, what I want to argue is that *if* the constitutive property of an event is an inessential feature of it *then* that event is distinct from a token of the constitutive property. Even though the property token and the event share a manifestation at at least one world – that is, the value of each of the corresponding functions at that world is the same substance-property-time complex – they will have distinct manifestations at other worlds.

There are a couple of reasons for thinking that the constitutive property of a property token is an essential feature of it. First, intuitively, although a blue shirt, for example, is presumably only accidentally blue, the blueness of the shirt is essentially blue. Or again, suppose it is true of a walking event that was in fact a strolling that it might have been a striding.[15] Nevertheless, the strolling-ness of the event is, again intuitively, essentially a stroll. Second, in contrast to events, the modal profiles of property tokens are governed (in part) by the role(s) they play in property metaphysics. For example, in order for various reductive programmes[16] in metaphysics to be even minimally promising, the modal relation between property tokens and property bearers needs to systematically co-vary with the modal relation between properties proper (types) and their bearers. This means that at any world w_1 at which an object x has a property P at time t there must exist the corresponding property token – a complex consisting of x, P, and t. And at any world w_2 at which x lacks P at t, no such complex can exist. One might rejoin that this is compatible with the existence of the w_1-token at w_2, as long as we do not insist that being P is an essential feature of the w_1-token. But if type-token modal co-variance is to be sustained, this would seem to require that we take x to bear P at w_2, contra hypothesis.[17],[18]

Suppose we formulate Kim's putative solution to the exclusion problem in terms of property tokens. This would require that we reformulate the Causal Inheritance Principle and Instantiation Identity as follows:

---

[13]. Kim (1999) p. 344. Lewis (1986, p. 250) argues that even taking the constitutive substance to be essential is problematic.

[14]. They could, of course, be constant functions.

[15]. Lewis (1986) p. 251.

[16]. E.g., trope-theoretical attempts to re-construct properties (i.e., types) as classes of resembling tropes.

[17]. I suppose one could insist that x does bear P at w_2, but in a non-P-ish manner.

[18]. One might, of course, simply reject type-token modal co-variance and concede that any reduction of types to tokens, or *vice versa*, is a non-starter.

> CIP_T: If a second-order property F is realized on a given occasion by a first-order property H then the causal powers of this token of F are identical with the causal powers of this token of H.
>
> II_T: Every token of a functional mental property is identical with the token of the 1st order physical property which realizes it on the occasion in question.

Now CIP_T does seem to yield a promising basis for the causal efficacy of functional mental properties.[19] After all, if each token of a property has causal powers then the property itself does, even if its powers are highly heterogeneous. But it is hard to see why the F-token would inherit the causal powers of the H-token unless they were identical. As a result, on the token-formulation, the truth of II_T is required to underpin the transfer of causal power from realizing to functional properties, as well as to ensure that mental causes do not compete for efficacy with physical causes.

But II_T is simply untenable. The connection between functional mental properties and their 1st order realizing properties is contingent: not only could a functional property be realized by a number of distinct 1st order properties, a substance could bear one of these 1st order properties without bearing the functional property – Lewis's madman is a case in point.[20],[21] More to the point, a functional mental token cannot be identical to a realizing physical token because there are possible circumstances in which that very token occurs but fails to occupy the functional role at issue. If, as argued above, the constitutive property of a token is essential to it, the functional mental token in question could not exist in such circumstances. And since identity holds of necessity, this entails that the mental and physical tokens are distinct.[22],[23]

Perhaps Kim's solution does better if formulated in terms of property bearers. This would require that we again reformulate the Causal Inheritance Principle and Instantiation Identity:

> CIP_B: If a second-order property F is realized on a given occasion by a first-order property H then the causal powers of this bearer of F are identical with the causal powers of this bearer of H.
>
> II_B: Every bearer of a functional mental property is identical with the bearer of the 1st order physical property which realizes it on the occasion in question.

---

[19]. This general strategy is defended in Robb (1997) and Robb and Heil (2003), and is criticized in Noordhof (1998), although the issue is framed in terms of tropes rather than in terms of substance-property-time complexes.

[20]. Lewis (1980).

[21]. My focus here is on core realizers rather than total realizers. Presumably, distinct mental properties will often (normally?) share total realizers. As a result, they are not even candidates for standing in identity relations with mental properties.

[22]. True identity statements can, of course, be contingent, but not the identities themselves.

[23]. Ehring (1999, p. 24) argues that mental tokens and their realizing physical tokens cannot be identical on Kim's picture because the constituent properties of mental tokens are properties of events whereas the constituent properties of realizing physical tokens are properties of the constituent substances of these same events. Although this criticism is *prima facie* compelling, it can I think be met by insisting that the constitutive property of an event is automatically part of the character of that event.

Now II_B, unlike II_T, is more or less uncontroversial.[24] Moreover, as long as we assume that the only mental causes are the *bearers* of mental properties, II_B may well suffice to ensure that mental causes do not compete for efficacy with physical causes. Moreover, if II_B is true, then CIP_B trivially follows from it; if the bearer of a mental property just is the bearer of its realizing physical property, then of course the causal powers of the former and the causal powers of the latter coincide.

The trouble that arises for the bearer-formulation is that the truth of II_B and CIP_B does not suffice to confer causal efficacy upon functional mental properties. In order to do so, these theses would need to be supplemented with a principle to the effect that if all bearers of a property are causally efficacious, then the property itself is causally efficacious. However, this supplementation is untenable: it implies that any property whatsoever with at least one (causally efficacious) bearer is itself causally potent. But not only would this undercut Kim's own criticisms of anomalous monism,[25] it would entail that highly extrinsic/ relational properties are efficacious. The property of being seventy-three million light years distant from me as I write this sentence may well have a (causally efficacious) bearer – if it does not, I'll just choose another distance. Nevertheless, this property is not (thereby) efficacious in its own right.[26]

One final possibility would be to endorse a mixed formulation of Kim's solution to the exclusion problem, perhaps by combining the uncontroversial II_B and the promising CIP_T. One difficulty with this suggestion is that the falsity of II_T brings the truth of CIP_T into question. If a 2nd order token is distinct from its 1st order realizing token, it is unclear why the former should inherit the causal powers of the latter. Moreover, there seem to be clear counter-examples. Consider again my shirt, which has the 2nd order property of being my favourite colour because it has the 1st order property of blueness which meets the condition of being my favorite. Included among the causal powers of the blueness token would be certain photochemical powers. But insofar as the favourite-colour token is distinct from the blueness token, it would be implausible to suppose that it inherits these photochemical powers.[27]

There is, however, a natural rejoinder to this last point. Kim did not claim that instances of 2nd order properties inherit all of the causal powers of their realizing 1st order instances. He claimed instead that they inherit either all *or a subset* of these powers.[28] As a result, he could easily assert that the photochemical powers simply fall outside of the subset of powers that the favourite-colour token inherits from of the blueness token. But this response immediately raises the following question: exactly which of the causal powers of its realizing property token does a 2nd order property token inherit? And the answer is not hard to find: the powers specific to the condition that the 1st order token has to meet in order to realize the 2nd order

---

[24]. One might again worry that the bearers of mental properties are events and the bearers of their realizing physical properties are the constituent substances of events. But see note # 23 above.

[25]. Kim (1989).

[26]. One might attempt to avoid this latter worry by restricting the supplementation to intrinsic properties, but since functional properties are relational, this would not suffice to secure the efficacy of the mental.

[27]. Of course, the bearer of this 2nd order property will presumably have such powers.

[28]. Kim (2000) p. 54.

property. The favourite-colour token inherits from the blueness token exactly those powers it has in virtue of being a token of my favourite colour. And a functional mental token inherits from its realizing token those powers it has in virtue of meeting the functional specification at issue.

Now strictly speaking, this manoeuvre may well render the truth of CIP_T consistent with the falsity of II_T, even if a certain puzzlement remains as to why any inheritance of causal powers should occur, let alone such a tidy pattern of inheritance. But even so, it remains far from clear that the mixed-formulation yields a satisfactory solution to the exclusion problem. An adequate solution requires establishing that (i) functional mental properties are causally efficacious and (ii) mental causes do not compete for efficacy with physical causes. On the mixed-formulation, the latter is established by taking the bearers of mental properties to be the only mental causes, and identifying mental and physical bearers. But if mental bearers are the only mental causes, then mental tokens are not causes. Any suggestion that they are nonetheless causally efficacious borders on unintelligibility.

References

Alward, Peter, 'Excluding Tropes,' unpublished manuscript.

Davidson, Donald, 'Mental Events,' *Essays on Action and Events*, Oxford: Oxford University Press, 1980.

Ehring, Douglas, 'Tropeless in Seattle: the cure for insomnia,' *Analysis* 59: 19-24, 1999.

Kim, Jaegwon, 'Events as Property Exemplifications,' in Stephen Hales, ed., *Metaphysics: Contemporary Readings*, Wadsworth Publishing Company, pp. 336-47, 1999. Originally published in Myles Brand and Douglas Walton(eds), *Action Theory*, Dordrecht: D. Reidel, pp. 159-77, 1976.

————, 'The Myth of Nonreductive Materialism,' *Proceedings and Addresses of the APA*, Vol. 63, No. 3, pp. 31-47, 1989.

————, 'Does the Problem of Mental Causation Generalize?' *Proceedings of the Aristotelian Society*, 97: 281-297, 1997.

————, *Mind in a Physical World*, Cambridge, Mass.: The MIT Press, 2000.

Lewis, David, 'Events,' in *Philosophical Papers: Volume II*, Oxford: Oxford University Press, pp. 241-69, 1986.

————, 'Mad Pain and Martian Pain,' *Readings in the Philosophy of Psychology*, Vol., Ned Block, ed., Harvard University Press, pp. 216-222, 1980.

Noordhof, Paul, 'Do Tropes Solve the Problem of Mental Causation?' *The Philosophical Quarterly*, 48:221-226, 1998.

Robb, David, 'The Properties of Mental Causation,' *The Philosophical Quarterly*, 47:178-194, 1997

Robb, David and Heil, John, 'Mental Properties,' *American Philosophical Quarterly* 40: 175-196, 2003.

Peter Alward
Department of Philosophy
University of Lethbridge
4401 University Dr.
Lethbridge, Alberta
Canada T1K 3M4
<peter.alward@uleth.ca>

SORITES (ΣΩΡΙΤΗΣ), ISSN 1135-1349
http://www.sorites.org
Issue #17 — October 2006. Pp. 56-67
Subcontraries and the Meaning of «If…Then»
Copyright © by Ronald A. Cordero and SORITES

Subcontraries and the Meaning of «If…Then»

Ronald A. Cordero

---

0. Prefatory Note

Internet viewers should note that this paper uses symbols which may not display on all browsers. If the double-barred, right-pointing arrow (⇒), the horseshoe (⊃), the double-barred, double-headed arrow (⇔), the negation sign (¬), the black diamond (♦), the conjunction sign (∧) or the disjunction sign (∨) does not display on your browser, please download a PDF version of the paper.

1. Conditionals Composed of Subcontraries

Paradox seems to arise when conditional statements have subcontrary statements as antecedent and consequent. I am going to argue here, however, that these conditionals can in fact function as well as ordinary conditionals and that a careful consideration of such cases can both resolve the apparent paradox and lead to a better understanding of the meaning of «if…then» in general.

Suppose, for a first example, that we know that our friend Jan never serves strawberries. If we learn that she had guests for dinner last night, it would be perfectly possible for us to say meaningfully, «Well, if she served fruit, she didn't serve strawberries.» We may not know whether or not she served fruit, but we know what kind of fruit she *didn't* serve if she served any fruit at all. Now, the statements «She served fruit,» and «She didn't serve strawberries,» fit the definition of subcontraries: they could be true simultaneously, but they could not be false at the same time. She could have served fruit but not strawberries but could not have served strawberries but not fruit. So we have a conditional statement composed of subcontraries that we might very well use in replying to a question such as «If she served fruit, was it strawberries?» And anyone who remembered our reply and later learned that Jan did in fact serve fruit could reason by the axiom (rule of inference) known as Modus Ponens $(((p \supset q) \wedge p) \Rightarrow q)$ to the conclusion that she did not serve strawberries.

Or suppose we learn, for a second example, that a certain figure drawn on the sidewalk was either a triangle or a square. We of course know that if it was a square, it was not a circle. So does it not follow that if the figure wasn't a triangle, it wasn't a circle?

1. $T \vee S$	Given
2. $S \supset \neg C$	Analytic *a priori*
3. $\neg T$	Assumed for CP
4. S	3,1; Disjunctive Syllogism
5. $\neg C$	4,2; Modus Ponens

6. $\neg T \supset \neg C$	3-5; CP

Line 6 represents a conditional composed of subcontraries that could presumably be used to transmit useful information. If someone learns the truth of (6) from a dependable source, and later learns that the figure was not a triangle, they will know that it was not a circle either — even if they do not know what kind of figure it *was*.

It is worth noting that in the two examples considered so far, simultaneous falsity of antecedent and consequent is an *a priori* impossibility.

1. If Jan served fruit, she didn't serve strawberries.

2. If the figure wasn't a triangle, it wasn't a circle.

Because of what we mean by the terms «fruit» and «strawberries,» it cannot be that Jan failed to serve fruit but did serve strawberries. And because of the way we use the words «triangle» and «circle,» the figure cannot have been both. But not all cases of conditionals composed of subcontraries are like this. We can also encounter conditionals composed of statements that are *de facto* or *a posteriori* subcontraries. This occurs with subcontraries that are the contradictories of *de facto* contraries–statements which owing to some *a posteriori* fact of the situation cannot both be true but can both be false.

Suppose, for instance, that there is only room for one person to park in the drive. Then it cannot be true both that Jim is parked in the drive and that Mary is parked there too. But it can be the case that neither Jim nor Mary is parked there. It follows that the statements «Jim is parked in the drive,» and «Mary is parked in the drive,» are, in the circumstances given, *de facto* contraries. And this makes their respective contradictories *de facto* subcontraries:

Jim isn't parked in the drive.

Mary isn't parked in the drive.

In the circumstances specified, both can be simultaneously true, but both cannot be false at the same time.

Now imagine, for the sake of having an example parallel to those given earlier, that we learn that either Mary or Bill is parked in the drive. This means that if Mary isn't parked there, Bill is. But, of course, if Bill is parked there, then Jim (a third party) isn't — because of the limited space. So…if Mary isn't parked in the drive, Jim isn't parked in the drive. This last conditional is composed of subcontraries but is potentially much harder to recognize as such than conditionals composed of *a priori* contraries. Anyone who knows what triangles and circles are can see the subcontrariety of antecedent and consequent in «If the figure wasn't a triangle, it wasn't a circle.» But just knowing the meanings of the terms involved will not enable one to see the subcontrariety of antecedent and consequent in «If Mary isn't parked in the drive, Jim isn't parked in the drive.» To see *that* subcontrariety, one would have to have *a posteriori* knowledge about the situation (viz., the knowledge that there is just room enough for one person to be parked there).

2. Peculiarities

Thus there are cases in which we can meaningfully assert and reason from conditional statements with subcontrary antecedents and consequents. Still, it cannot be denied that there is something strange about conditionals of this sort. In fact, they turn out to have certain features that are hard to characterize as anything other than paradoxical.

One unusual feature of conditionals composed of subcontraries is that falsity of the antecedent requires truth of the consequent. This follows, of course, simply from the nature of subcontraries. Two subcontraries cannot both be false, so it the antecedent and the consequent are subcontraries and the former is false, the latter must be true. Consider our three examples:

1. If Jan served fruit, she didn't serve strawberries.

2. If the figure wasn't a triangle, it wasn't a circle.

3. If Mary isn't parked in the drive, Jim isn't parked in the drive.

With (1) if the antecedent is false–if Jan did *not* serve fruit, she certainly did not serve strawberries. And as for (2), if the figure *was* a triangle, it can't very well have been a circle. Nor is the case regarding (3) much more complicated. If Mary *is* parked in the drive and the circumstances are as originally described, space limitations make it impossible for Jim to be parked there too.

Admittedly, this is not the way normal conditional statements behave. Ordinarily, knowing that $p \supset q$ and learning that p is false does not enable us to conclude that q is true.

A second unusual feature of conditionals composed of subcontrary antecedents and consequents follows from the first: when such conditionals are true, they always have true consequents. As just seen, if the antecedent is false, the consequent is true. But if the conditional statement is true and the antecedent is true, the consequent must also be true (Modus Ponens). So whether the antecedent is true or false, the consequent is true. Consider the three examples once more:

1. If Jan served fruit, she didn't serve strawberries.

2. If the figure wasn't a triangle, it wasn't a circle.

3. If Mary isn't parked in the drive, Jim isn't parked in the drive.

If (1) is true, it is evident to anyone familiar with the meaning of «fruit» and «strawberries» that Jan must not have served strawberries: the true statement at hand asserts that she didn't serve any if she served fruit–and she obviously didn't serve any if she *didn't* serve fruit. So assuming (quite reasonably) that she either did or did not serve fruit, one can conclude that she didn't serve strawberries. Similarly, in the case of (2), the figure must have been a triangle or not. But then since being a triangle would have kept it from being a circle, and since not having been a triangle means it wasn't a circle, it can't have been a circle at all. The situation with (3) is essentially the same, in spite of the fact that the subcontraries involved are *de facto* rather than *a priori*. If Mary isn't parked in the drive and (3) is true, Jim is not parked there. But if Mary is parked in the drive, given the space limitations stipulated, it is also the case that Jim is not parked there. So granting that Mary either is or is not parked in the drive, Jim simply cannot be parked there.

Once again, this is obviously not a property shared by normal conditionals. Ordinarily, just knowing that $p \supset q$ does not enable us to conclude that q .

Perhaps these two properties of conditionals with subcontrary antecedents and consequents could be considered merely unusual rather than paradoxical, since they do not prevent this sort of conditional from being employed in the way other conditionals are. There is, however, another feature of this kind of conditional that really does border on the paradoxical: if the consequent of such a conditional is false, the antecedent has to be *true*. This is clearly the case, since two subcontrary statements cannot both be false. But this is definitely not the way conditionals are supposed to behave. Once more, the three examples:

1. If Jan served fruit, she didn't serve strawberries.

2. If the figure wasn't a triangle, it wasn't a circle.

3. If Mary isn't parked in the drive, Jim isn't parked in the drive.

If (1) is true and it turns out that Jan did serve strawberries, then she obviously served fruit. Or (2), if the figure was in fact a circle, it certainly wasn't a triangle. And as for (3), discovering that Jim *is* parked in the drive would mean under the circumstances stipulated that Mary isn't parked there–which is what the antecedent says.

Yet according to Modus Tollens $(((p \supset q) \wedge \neg q) \Rightarrow \neg p)$, falsity of the consequent is supposed to mean *falsity* for the antecedent–not truth. So it would seem that there is something seriously wrong with conditionals composed of subcontraries–unless in fact Modus Tollens does *not* apply to all conditionals.

Nor is the trouble limited to situations in which Modus Tollens would usually be thought to apply. With conditionals of the sort under consideration, it also turns out that Transposition $((p \supset q) \Leftrightarrow (\neg q \supset \neg p))$ cannot apply either. If p and q are subcontraries, a conditional of the form $p \supset q$ simply cannot be equivalent to $\neg q \supset \neg p$, since subcontrary statements are not capable of being false at the same time.

1. If Jan served fruit, she didn't serve strawberries.

2. If the figure wasn't a triangle, it wasn't a circle.

3. If Mary isn't parked in the drive, Jim isn't parked in the drive.

How could (1) be equivalent to «If Jan served strawberries, she didn't serve fruit,»? How could (2) be equivalent to «If the figure was a circle, it was a triangle,»? Or how, given the limited space in the driveway, could (3) equate to «If Jim is parked in the drive, Mary is parked in the drive,»? In each case, if we suppose the original statement to be true, applying Transposition takes us from something true to something false. And that is paradoxical enough to cause concern. Either Transposition does not apply to conditionals composed of subcontraries or else there is something really amiss with such statements.

3. The Possibility of Avoiding Conditionals Composed of Subcontraries

In the light of these considerations, conditional statements with subcontrary antecedents and consequents may seem to be so bizarre that one could be tempted to «handle» them by simply refusing to use them. One could, that is, decide to classify them as meaningless and decline to use them in reasoning at all. And yet, as already seen, there really do seem to be instances in which such conditionals are perfectly intelligible and do indeed permit valid

inferences to true conclusions. Moreover, it may not always be possible to recognize conditionals composed of subcontraries when they are encountered. One might, that is, encounter a conditional without realizing that it was of the sort that had to be considered as meaningless and therefore rejected. To see this, consider two new examples:

4. If Lisa is in France, she is not in Altkirk.

5. If Jan served fruit, she did not serve calamondins.

Regarding (4), it is clear that if I do not know where Altkirk *is*, I cannot tell whether the conditional statement is composed of subcontraries. So even if I want to avoid reasoning with conditionals composed of subcontraries, I will not know whether or not to avoid reasoning with (4). Yet I can clearly base valid inferences on the statement: if I learn that Lisa is indeed in France, I know that she is not in Altkirk–even without knowing where that is. And I can infer by «left-to-right» Material Implication ($(p \supset q) \Rightarrow (\neg p \vee q)$) that she is either not in France or not in Altkirk. The problem, of course, is that without knowing whether or not the conditional statement is composed of subcontraries I cannot tell whether or not the inference by Transposition to «If she is in Altkirk, she isn't in France,» is valid.

Since example (4) involves geographical location, it involves a *posteriori* truth: whether or not a particular city is in a particular country depends on national borders, and the location of *those* is an empirical fact, national borders being notoriously mobile. But any subcontrariety in example (5) could be an *a priori* matter: it could follow, that is, from the meaning of «calamondin». Suppose I have never heard of calamondins but am assured by a reliable source that if Jan served fruit she did not serve calamondins. I might well want to ask what calamondins are–but suppose that for some reason I cannot. If I subsequently learn that Jan did in fact serve fruit, can I not still validly infer that she did not serve calamondins–whatever they may be? And could I not also infer (by Material Implication) that Jan either didn't serve fruit or didn't serve calamondins? Again, however, unless I learn what calamondins are, I cannot know whether (5) is composed of subcontraries or not–and so cannot be sure about the inference by Transposition to «If Jan served calamondins, she didn't serve fruit.»

Thus even if we wanted to reject conditionals composed of subcontraries as meaningless or unserviceable for valid inference, we would have the problem of knowing when we were dealing with such conditionals. Sometimes we might not realize that we had encountered the sort of conditional we had decided to reject. Moreover, when we did succeed in avoiding them, we would lose the benefit of their use in cases in which valid inferences *could* be made. Ultimately, I submit, it may be best not to reject these conditionals but rather to admit that under certain circumstances certain axioms–such as Transposition–simply do not apply.

But such an approach raises serious questions about the nature of conditionalization–about the meaning of «if…then». How can it be that in the case of some true conditional statements, falsity of the consequent means falsity of the antecedent, while in the case of other true conditional statements it does not? Is Transposition wrong in its claim that «If a, then b,» is always equivalent to «If not b, then not a,»? I believe that a fairly simple explanation of this matter is possible, but I believe that the explanation requires a basic reconsideration of the nature of conditionalization in the light of what has been seen about conditionals composed of subcontraries.

4. Reconsidering the Meaning of «If…then»

What must «If a, then b,» mean if it *is* the case that falsity of the consequent sometimes requires falsity of the antecedent and sometimes requires truth? Certainly the meaning cannot be as symmetrical as is indicated by Transposition, which asserts that $(a \supset b) \Leftrightarrow (\neg b \supset \neg a)$. The relation between antecedent and consequent asserted in a conditional statement must involve more in one direction–so to speak–than it does in the other.

In 1891 in the first issue of *Rivista di matematica*, Giuseppe Peano introduced a symbol for conditionalization, writing that he would use «*a* [here he wrote a backwards «c»] *b*» to represent «*b* is a consequence of *a*,» «b can be inferred from a,» or «if *a*, then *b*.»[1] His symbol, a backwards «c» for *conseguenza*, later became « ⊃», the famous «horseshoe». I think it is quite plausible to say that when we assert that if a then b , we are asserting that b is a consequence of a , that b can be inferred from a . But exactly what does *that* mean? I am going to propose that it means that truth of a would permit a sound inference to b , in the precise sense of a valid inference from true premises to a true conclusion.

Consider the relationship between a conditional argument and the corresponding nonconditional argument.

a	
b	a
c	b
———	———
d	c ⊃ d

The argument on the right is a conditional argument simply because it has a conditional statement as its conclusion. It is like the nonconditional argument on the left except for the fact that c has become an antecedent in the conclusion, while d has become a consequent. If the nonconditional argument is valid, the conditional argument is valid too, and vice versa. A major advantage of the conditional argument is, of course, that its soundness does not depend on the truth of c . If we know that both arguments are valid, and we know a and b are true, we know that the conditional argument is sound, while we don't know whether the nonconditional argument is sound or not.

In general, if we find ourselves in a situation in which we can see that an argument is valid, but are uncertain about the truth of one of its premises…

e	T
f	T
g	?
———	
h	

[1]. «Principii di logica matematica,» *Rivista di matematica*, 1 (1891): 1-10. See also note 5 to the article.

we can go to the sound corresponding conditional argument, keeping as premises only the statements known to be true and concluding that truth of the (former) premise not known to be true would permit an inference to the (original) conclusion:

e T

f T

_____

g ⊃ h

In the conclusion of the example, we are saying that truth of g would permit a sound inference (valid inference from true premises) to the truth of h .

My point is precisely that this is *always* what we are doing when we assert a conditional statement–saying that the truth of one statement (the antecedent) would permit a sound inference to the truth of another statement (the consequent). This is what I believe it means to say, as Peano does, that the statement in the «then» part of a conditional statement is a consequence of the statement in the «if» part.

At this point a change in symbolization is in order. Although Peano may well have intended to represent the full sense of «if…then» by his backward «c», the horseshoe it evolved into represents only a disjunction between the consequent and the negation of the antecedent ((a ⊃ b) ⇔ (¬a ∨ b)) . Since I wish to represent the full sense of «if…then,» I am going to use a different symbol–the «number» sign («#») to indicate conditionalization. When I write «a # b,» I will be representing «if a, then b,» in what I take to be the full, ordinary sense of «if…then». My claim about conditionalization then is that in asserting a # b one is simply asserting that truth of a would permit a sound inference to the truth of b.

But this claim can be amplified. In saying that the truth of a would permit us to have a sound inference to the truth of b (and thus a sound argument with b as its conclusion), we are saying that a together with something already known to be true entails b . The meaning of conditionalization, that is, can be expressed in terms of entailment. A symbolized version, if one is wanted, might go something like this…

(a # b) ⇔ (∃(x)(Sx ∧ Tx ∧ (ax⇒b)))

with «Sx» meaning «x is a statement,» and «Tx» meaning «x is true.» Saying that truth of a would permit a sound inference to the truth of b is saying in effect that there is a true statement (It might of course be a lengthy conjunction.) which together with a would entail b . We can refer to this something known to be true as premise x:

x T

a ? x T

_____ _____

b a # b

In asserting that if a then b, we are saying that b is entailed by a and x, where x is something known to be true.

At this point concrete examples are needed. To begin with, let us consider a conditional statement that is analytically true:

6. If she drew a square, she drew a four-sided figure.

What I am proposing is that (6) is a claim to the effect that knowing that she drew a square would permit us to make a sound inference to the conclusion that she drew a four-sided figure–to have a sound argument with that conclusion. And this amounts to saying that there is a true statement (something we already know) which together with the statement that she drew a square would entail the conclusion that she drew a four-sided figure. In this case there is not much mystery about what that something (premise x) might be:

x T	Every square is a four-sided figure.	T
S # F	So if she drew a square, she drew a four-sided figure.	

The statement F is a consequence of S because F is entailed by the conjunction of S and the known fact (x) that every square is a four-sided figure.

Next consider a conditional statement that is not analytically true. Suppose for example we say…

7. If he was there, she was there.

On my analysis, statement (7) effectively asserts that learning that he was there would enable us to know that she was there–that the antecedent and something we already know to be true would entail the conclusion that she was there. But in this case it is not obvious what premise x might be:

x T	???	T
H # S	So if he was there, she was there.	

The true premise could, as a matter of fact, be a number of different things. We might know that they always go everywhere together. Or we might know that she promised to attend if he did and that she always keeps her promises. Premise x simply has to be something known to be true which, together with H, would entail S.

It might also be interesting to consider an example of a counterfactual conditional statement:

8. If we were in Tahiti now, we'd be warm.

I am saying that the claim in (8) is that truth of the statement about us being in Tahiti now (which is acknowledged not to be true) would permit a sound inference to the conclusion about us being warm. There is some true statement, that is, which taken together with the statement «We are in Tahiti now,» would entail «We're warm.» But as in the case of example (7), the actual nature of x could vary considerably. One possibility might be…

x T	It's 30° C in Tahiti now, and we're warm when it's over 27°.	T
T # W	So if we were in Tahiti now, we'd be warm.	

Other possibilities for x include «We are always warm when we are in Tahiti,» and «Everyone is warm in Tahiti.» The corresponding nonconditional argument (unsound because

of a false premise), would have neither the past subjunctive nor the conditional verb forms characteristic of counterfactual conditionals:

It's 30° C in Tahiti now.	T
We're warm when it's over 27°.	T
We are in Tahiti.	F

So we're warm.

And what of conditional statements composed of subcontraries? We can begin by considering example (1) yet again:

1. If Jan served fruit, she didn't serve strawberries.

According to the analysis being considered, (1) asserts that the truth of «Jan served fruit,» would permit a sound inference to the truth of «She didn't serve strawberries.» There is some statement already known to be true, that is, which together with «Jan served fruit,» would let us have a sound argument with the conclusion that Jan didn't serve strawberries. Here, as in the previous example, the nature of premise x could vary considerably. It might, for example, be something like…

		When Jan serves fruit, it's always citrus fruit,	
x	T	and strawberries aren't citrus fruits.	T
J # ¬S		So if Jan served fruit, she didn't serve strawberries.	

Or it might simply be «Jan never serves strawberries,» in which case the statement «Jan served fruit,» would indeed permit the sound inference–though only in the sense of not blocking it:

Jan never serves strawberries.	T

So if she served fruit, she didn't serve strawberries.

Or consider example (3) again: «If Mary isn't parked in the drive, Jim isn't parked in the drive.» Here the conditional statement is an assertion that truth of «Mary isn't parked in the drive,» would permit a sound inference to the truth of «Jim isn't parked in the drive,»–that «Mary isn't parked in the drive,» together with something already known to be true would entail «Jim isn't parked in the drive.» And as the example was presented, the something known to be true is a complex statement:

		There's only room for one person to park in the drive,	
x	T	and either Bill or Mary is parked there.	T
¬M # ¬J		So if Mary isn't parked in the drive, Jim isn't parked there.	

Here premise x is a conjunction. And the antecedent of the conclusion plays an active role in the inference to the consequent of the conclusion.

5. Resolving the Paradox

The crucial question now is whether or not this analysis of conditional statements in terms of possible sound inferences allows for an explanation of the peculiarities observed in connection with conditional statements composed of subcontraries. I believe that it does.

On the present analysis, to assert a # b is to assert that truth of a would permit a sound inference to b . It is, in other words, to assert that something already known to be true (premise x), taken together with a , would entail b :

$$\overset{T}{(a \wedge x) \Rightarrow b}$$

If the conditional statement a # b is true, x must be true, since the truth of x is part of what is asserted by the conditional statement. But then if b turns out to be false, it must be that a is false. There could be no other explanation for the falsity of b . (Compare this to the logic of a *reductio ad absurdum* proof, in which the falsity of the conclusion indicates the falsity of the premise assumed to be true. Or compare it to the testing of a theory, in which the falsity of a prediction indicates the falsity of some part of the theory.) This is, in fact, essentially the truth stated by Modus Tollens:

$$((a \# b) \wedge \neg b) \Rightarrow \neg a$$

If a conditional statement is true, and its consequent is false, its antecedent has to be false.

Yet with conditional statements composed of subcontraries, the consequent and the antecedent, because they are subcontraries, cannot both be false. If the consequent is false, the antecedent has to be true. But this means that if the consequent of a conditional statement composed of subcontraries turns out to be false, the conditional statement *itself* has to be false (because it has a true antecedent and a false consequent). As noted above, true conditional statements composed of subcontraries always have true consequents. So it can never be–when the conditional statement involved is composed of subcontraries–that $(a \# b) \wedge \neg b$. Thus Modus Tollens will never be applicable with conditionals composed of subcontraries: it will simply *never* be the case that the conditional statement and the negation of its consequent are both true at the same time.

1. If Jan served fruit, she didn't serve strawberries.

2. If the figure wasn't a triangle, it wasn't a circle.

3. If Mary isn't parked in the drive, Jim isn't parked in the drive.

If Jan in fact served strawberries, it cannot be that if she served fruit, she didn't serve strawberries. If the figure *was* a circle, it must be false that if it wasn't a triangle, it wasn't a circle. And if Jim really is parked in the drive (and no more than one person can be parked there), then it can't be the case that if Mary isn't parked there, Jim isn't either. In general, if a and b are subcontraries, and b is not the case, it cannot be that truth of a would permit a sound inference to b . Thus the peculiarities of conditionals composed of subcontraries do not require any restriction on Modus Tollens–since where such conditionals are involved, Modus Tollens can never apply. And this is, of course, true even when conditionals composed of subcontraries are not recognized as such:

4. If Lisa is in France, she is not in Altkirk.

5. If Jan served fruit, she did not serve calamondins.

Since Altkirk is presently in France, (4) will never be true when Lisa is in Altkirk. And since calamondins are a sort of citrus fruit, (5) cannot be true if Jan did in fact serve them.

With Transposition, however, the matter is different: some restriction on the use of the axiom may be required. To assert that a # b is to assert that truth of a would permit a sound inference to b . But according to Transposition as it is usually stated, asserting that a # b is equivalent to asserting ¬b # ¬a . Yet when a and b are subcontraries, ¬a and ¬b are contraries, so truth of ¬b cannot possibly permit a sound inference to ¬a . Evidently the claim of Transposition that (a # b) ⇔ (¬b # ¬a) cannot hold when antecedent and consequent are subcontraries.

On the analysis of conditional statements being proposed here, falsity of the consequent in the case of a conditional statement composed of subcontraries would mean (1) that the antecedent is true and (2) that the conditional statement is false. And that would indicate that the something else thought to be true (statement x) was not. Consider again one of the "fleshed-out" examples about Jan and the strawberries:

	When Jan serves fruit, it's always citrus fruit,
x	and strawberries aren't citrus fruits.
———	———————————————————————
J # ¬S	So if Jan served fruit, she didn't serve strawberries.

Here x and J together entail ¬S . If we discover that Jan did in fact serve strawberries, we know for sure that J is true (she did serve fruit), so we can conclude that x must be false. Perhaps she *doesn't* always serve citrus fruit. And that explains the falsity of the conditional statement: there turns out not to be something true which together with J entails ¬S . Truth of J would not permit a sound inference to ¬S .

In order to take all this into account, Transposition will have to be stated with a qualification preventing its application in such cases. And to allow for the inclusion of this restriction, the axiom will have to be formulated as a statement of one-way entailment with a reference to possibility:

$$((a \# b) \wedge \Diamond(\neg a \wedge \neg b)) \Rightarrow (\neg b \# \neg a)$$

Evidently the restriction is not particularly complicated: it simply rules out cases in which antecedent and consequent cannot both be false at the same time. If truth of a would permit a sound inference to b , *and* a and b can both be false at the same time, falsity of b would permit a sound inference to ¬a .

Actually, it may be best not to write the restricted axiom with the usual symbol for possibility. Since ◊ is commonly employed to indicate *logical* possibility, it may be better to use a different symbol, perhaps a black diamond ♦ , to indicate possibility in general:

$$((a \# b) \wedge \blacklozenge(\neg a \wedge \neg b)) \Rightarrow (\neg b \# \neg a)$$

Written with this symbol, the axiom screens out both cases involving *a priori* impossibility and cases involving *a posteriori* impossibility.

1. If Jan served fruit, she didn't serve strawberries.

2. If the figure wasn't a triangle, it wasn't a circle.

3. If Mary isn't parked in the drive, Jim isn't parked in the drive.

With the revised form of Transposition, (1) does not entail «If she served strawberries, Jan didn't serve fruit,» because it is impossible *a priori* that she didn't serve fruit but did serve strawberries. Nor does (2) entail «If it was a circle, the figure was a triangle,» since it is impossible *a priori* that the figure was both a triangle and a circle. And (3) does not entail «If Jim is parked in the drive, Mary is too,» because as the situation has been described it is impossible *a posteriori* that both are parked in the drive.

With the qualification indicated, Transposition does not have to be abandoned as a valid rule of inference. There is no need to question its ability to get us from truth to truth.[2]

But does this not leave us with a problem already raised–that of situations in which we do not *know* whether antecedent and consequent are subcontraries? Suppose we come to know somehow that…

9. If Jones didn't call, Smith didn't call.

But suppose we are ignorant of whether just one or more than one person called. We have no idea, that is of whether or not «Jones didn't call,» and «Smith didn't call,» are *de facto* subcontraries. What can we do? Does Transposition apply or not? Is there nothing to be inferred? I think the answer is clear from an alternative formulation of Transposition in its restricted form:

$$(a \# b) \Rightarrow (\blacklozenge(\neg a \wedge \neg b) \# (\neg b \# \neg a))$$

We can infer from (9) that if it is possible that both called, Jones called if Smith did:

1. $\neg J \# \neg S$

2. $\blacklozenge(J \wedge S) \# (S \# J)$ 1; Transposition and Double Negation

6. Conclusion

If conditional statements are understood as claims to the effect that truth of one statement would permit a sound inference to the truth of another, the fact that there are conditional statements with subcontraries for antecedents and consequents poses no insuperable problem for logical analysis.

Ronald A. Cordero
Department of Philosophy
The University of Wisconsin at Oshkosh
Oshkosh, WI 54901, USA
<cordero@uwosh.edu>

[2]. In this connection, see for example Donald Nute, *Topics in Conditional Logic* (Dordrecht: Reidel, 1980) 85.

SORITES (ΣΩΡΙΤΗΣ), ISSN 1135-1349
http://www.sorites.org
Issue #17 — October 2006. Pp. 68-80
Does Frege's Definition of Existence Invalidate the Ontological Argument?
Copyright © by Piotr Labenz and SORITES

DOES FREGE'S DEFINITION OF EXISTENCE INVALIDATE THE ONTOLOGICAL ARGUMENT?

Piotr Labenz

Affirmation of existence is nothing but the denial of number nought. Because existence is a property of concepts, the ontological argument for the existence of God breaks down.[1]

1. The purpose and arrangement of the paper

In his attempt to build a basis for mathematics, Frege proposed definitions of some very basic concepts that proved to be of import not only to the *Grundlagenproblem*, but to other areas of philosophy, ontology in particular, as well. Frege himself seems to have noticed that, as is indicated by his remark that the definition of existence he gave in the *Grundlagen der Arithmetik*[2] shows the invalidity of Saint Anselm's ontological argument for the existence of God. As often is the case with Anselmian problems, this claim seems — given the definition — obvious at first glance, but upon closer inquiry — quite philosophically perplexing and not obvious at all. Hence, in this paper we shall expound that definition and investigate how can it be used to criticise the ontological argument. In order to do this, we will also need to give some attention to the context of Frege's system, possible criticisms of his definition of existence, and logical structure of Anselm's argument.

To begin with, we will introduce some of the basic ideas of Frege's system, which form the rudiments of modern predicate calculus as well as of Fregean ontology. Of course we shall not attempt any interpretation of Frege's system as a whole in this paper, but rather adopt its standard account, and only focus on our subject[3]. (It seems acceptable to speak of 'Fregean ontology' as clearly Frege did conceive of the results of his linguistico-logical inquiries as applying to the real world, that is, describing not merely relations between expressions, but

---

1. Frege (1950: 65).

2. *i.e.* Frege (1950).

3. For a throughout interpretation of Frege, see e.g. Dummett's works (1981, 1983, 1991). For Frege's logic, see Bocheñski (1961: 291-292, 320-322 *et al.*). In this paper we will focus on the philosophical issue and not on exegesis of Frege's writings (which, even though clearly written, are obsolete and sometimes ambiguous, and hence prone to differing interpretations). Nor will we touch upon any related issues, such as whether Frege was a realist or a nominalist — see papers in Klemke (1968), Biriukov (1964), or for implications of the definition of existence for traditional metaphysics — see Angelelli (1967: 225-227).

between actual objects as well[4]. In any case, only this allows using a definition of existence stemming from pure language-analysis in discussing an ontological issue.)

Then, we will present Frege's definition of existence itself, together with arguments in support of adopting it; and next, its criticisms. This discussion will conclude with certain results that will be important for further analysis of how the definition relates to the ontological argument. Next, we will proceed to exposing the structure of the ontological argument for the existence of God and considering several questions significant in its analysis. Finally, we will put the results of the analysis together and look at what do they imply for the topic question of the paper, and conclude with an answer to it.

2. Frege's definition of existence

2.1. Object and concept

The crucial, for us, idea in Frege's system is the distinction of objects and concepts, and the latter of first and second order; or, more precisely, distinction of names of objects, names of first-order concepts and names of second-order concepts. We will follow Forgie[5] by abbreviating 'names of objects' as 'A-expressions', 'names of first-order concepts' as 'B1-expressions' and 'names of second-order concepts' as 'B2-expressions'[6]. An A-expression is such that can be the grammatical subject of an utterance, but cannot be the grammatical predicate; or which is a complete declarative sentence. The latter is because sentences, according to Frege, denote Truth or Falsity, which are objects, hence sentences denote objects, like other A-expressions, rather than as, loosely speaking, expressing facts (which is somewhat confusingly different from the nowadays-standard name-sentence distinction[7]. Examples of A-expressions: 'horse', 'Socrates', 'the teacher of Plato', 'God', '7', 'Socrates is mortal', '5+7=12'.

Now, A-expressions can serve as arguments for functions, that is, expressions having argument-places, such as: '—— is mortal', 'the capital of ——', '—— + —— =12' (where '——' is the argument-place) and so forth. If an argument, i.e. an A-expression(s) is (are) substituted for argument-place(s), an A-expression is obtained from the function (strictly speaking, from the name of the function). If the A-expression resulting from substituting an A-expression into a given name of function denotes Truth or Falsity, then the name of the function is a B1-expression, that is, a name of a first-order concept; e.g. 'is mortal', '…+…=12', but not 'is the capital of. (By substituting an A-expression into it, a saturated expression is obtained from an unsaturated B-expression; 'saturated' meaning complete, self-standing, able of being meaningful[8].)

---

4. This is proven by Wells (1954: 537 *ff*). It would suffice to support it by recalling the vast literature devoted to Frege's ontology, notably Cocchiarella (1972: 181 *ff*), Klemke (1968), and the monograph by Williams (1981).

5. Forgie (1972: 254-256) gives an exceptionally lucid account of this, which we will thus follow in this section. Also see e.g. Walker (1965: Ch. 2.), Grossmann (1969: Ch. 2.), Munitz (1981: 82-104). References to relevant passages in Frege can be found there.

6. Forgie (1972: 254). The following definitions of A-, B1- and B2-expressions are due to Forgie as well.

7. Which has been introduced by Ajdukiewicz (1935).

8. See e.g. Biriukov (1964: 25 *ff*) on saturation.

Finally, B1-expressions can be the arguments of second-order functions. If the A-expression resulting from substituting a B1-expression into a given name of second-order function denotes Truth or Falsity, then the name of this second-order function is a B2-expression. Examples of B2-expressions are adjectives of number: 'there are 460 of', 'there are as many…as' and[9], as will be shown, existence. They name second-order concepts, because these concepts are being assigned to another concepts, rather than no objects. Frege's illustration of this point is that whereas 'is thoroughbred' is a B1-expression, the argument of which is the name of an object, say 'horse', 'there are four' is a B2-expression, the argument of which is a concept, say 'thoroughbred horses'[10] [11].

2.2. Definition of existence

Now, Frege defines existence as the negation of number zero[12]. To say that *x* exists is to say that there is a nonzero number of *x*-s; that is, to say simply that there are *x*-s. Therefore, 'exists' is a B2-expression, meaning in fact 'there are more than zero of'. This is a key claim of Frege's, denying existence to be a first-order concept, which it might at the first sight appear to be.

A single argument for the claim that existence is a second-order predicate in Frege might be the weak natural-language-analogy argumentation for the claim that number in general is a second-order predicate[13]. However, we have proposed another argument on more ontological lines[14]. Now, let 'P' stand for the concept of 'there are 460 of'; what falls under it is, e.g. 'the members of the Polish Diet'; let 'Q' stand for the concept of 'there are 0 of'. In case of a parliamentary crisis leading to the dissolution of the Diet, Q would apply to 'the members of the Polish Diet'; and there would be no such members. If 'P', 'Q' were B1-expressions, then in that case 'Q' would have a nonexistent argument. This, however, would lead to the serious ontological problem of so-called 'Plato's Beard' — predication about nonexistent objects. Although this is not a proper place for discussing 'Plato's Beard', we can assert this difficulty should be avoided[15]. And this can only be done by treating 'P', 'Q', and hence also 'exists', as B2-expressions.

Moreover, let us remark that the second-order concept of existence applies (semantically) to the object, not to the first-order concept, under which that object falls[16]. So, if we

---

9. Munitz (1981:98-99) following Dummett (1973: 262).

10. Of course, 'thoroughbred horses' is a saturated concept, and an A-expression, obtained from the unsaturated first-order concept, the function ' —— is thoroughbred', which is a B1-expression.

11. Frege (1950: 59, 64).

12. Frege (1950: 65). See also wider exposition in Williams (1981: Ch. 3.) and comparison with other definitions of existence in Labenz (1999: 3-4).

13. Frege (1950: 59, 64).

14. Labenz (1999: 3).

15. For a good analysis of 'Plato's Beard' problem (which originates from Plato's *Parmenides*), see Jadacki (1981) and Williams (1981: 37-41).

16. This ought to be reflected in the model (of logic) of an ontology using this concept.

substitute 'thoroughbred horse' into ' —— exists', we assert the existence of a horse (and a thoroughbred one), and not of thoroughbredness. This is significant, as otherwise this second-order concept of existence would lead to difficulties with fictional entities. Let the first-order concept be that of a unicorn, the second-order that of negation of existence. Then, what is meant to be nonexistent is not the concept of unicorn, but unicorns — the object, not the first-order concept[17].

An opposite view is held by Munitz[18], supported by some evidence from Frege's writing. He claims that existence, being a second-order concept, applies to the first-order concept rather than to object, and is to be read: 'is instantiated', rather than 'exists'. Hence 'a thoroughbred horse exists' would be 'thoroughbredness is instantiated'; similarly, 'unicorns do not exist' would be 'being-a-unicorn is not instantiated'. This is to be so, because, according to Munitz[19], the B1-expression 'exists' is equivalent to quantifying existentially an A-expression; and what Frege means is to define existence in terms of the quantifier rather than as a predicate. But even if this interpretation is correct, still it is undeniable that what is concerned is the existence of the object, not merely non-emptiness of the concept. When we say 'a thoroughbred horse exists', we do not only say that 'thoroughbredness is instantiated', but that it is instantiated by a horse (rather than by, say, a hound, or a language[20]) as well. Therefore, the analysis holding the existential quantifier equivalent to second-order concept being generally correct[21], still the latter applies to objects the previous quantifies, and not to their properties — which are quite irrelevant for the quantifier, and hence must be so for the second-order concept of existence too. Thus Munitz is right (and quite insightful, perhaps) in that analysis, but he contradicts himself saying that existence applies to first-level concepts, not objects[22].

Finally, an issue that should be made clear is whether on Frege's definition existence is a predicate or not. On the face of it, Frege expressly and repeatedly says that it is a property[23], hence a predicate. However, it has been widely claimed — after Kant — that in fact it is essentially not a full-fledged, real predicate like 'thoroughbred', 'mortal' etc., but merely a logical (i.e., behaving like a predicate syntactically, but not being one semantically) and non-determining one (i.e., such that does not enlarge the argument's connotation[24]).[25] And this

---

17. Grossmann (1969: 69-70) recognizes the problem, claiming that Frege confuses the two possibilities: asserting the existence of a concept and of an object.

18. Munitz (1974: 78-80).

19. *Ibidem.*

20. Fowler in *The Modern English Usage* calls German a thoroughbred language.

21. An exception will be pointed at in the next section.

22. Munitz (1974: 78).

23. Frege (1950); see Labenz (1999: 1-3).

24. Like 'identical with itself', 'thoroughbred or not thoroughbred', etc. In Polish there is a proverbial expression for that: 'buttery butter'.

25. See Williams (1981: 17-41), Shaffer (1962: 309-311).

has been put forward as the gist of both Kant's and Frege's criticisms of the ontological argument[26]. Moreover, the second-level predicate has been interpreted as equivalent to first-order quantifier[27], thus further confusing the distinction between predicate and quantifier definitions of existence. The discussion on whether existence is a predicate by far exceeds the scope of this paper;[28] therefore, we should content ourselves with a following view, perhaps not very satisfactory, but seeming in accordance with most expositions. For Frege, then, existence is a second-order predicate — which may be understood as paraphrase of first-level quantifier — but not a first-order predicate. The latter claim will be discussed critically in the following section.

2.3. Criticism

However, there are arguments against treating existence as a second-order predicate. Firstly, there is a problem with the existence of individual objects — that is, such, that we do not need to assert any additional concept besides that of existence of them — such as, say 'Andrzej Gołota'[29]. It seems obvious that we can say 'Gołota exists' (even if not much more exciting could be said about him), and that there are not two concepts there, but one, that of existence, and it is a first-order concept applied to the object of Gołota. Perhaps, though, a Fregean would answer that 'Gołota' itself is a concept (however preposterous might that sound), and uttering 'Gołota exists', we actually say 'something, which is Gołota, exists', and existence remains a second-order predicate quite well[30]. That sounds somewhat odd, but might perhaps be agreed upon. However, let us put forward a weaker claim than about the existence of Gołota, namely: 'something exists'. Now, this is true (and entailed by the existence of Gołota, or of whatever), and cannot be analysed in terms of second-order concept of existence[31]. This precludes the attempt to eliminate the problem by the means of a theory of descriptions. While $(\exists x)\ \mathrm{P}(x)$ — where 'P' is the property of being a given individual, say, Gołota — could be treated as $\phi(\mathrm{P}(x))$ or so, $(\exists x)\ x$ cannot — we can only rephrase it to some $\mathrm{F}(x)$: a first-order predicate, that is, concept of existence is needed here (and similarly $(?p)\ p$; rephrasing into $(\exists x)\ x{=}p$ is of no help, and above-suggested rephrasing into $(\exists x)\ \mathrm{P}(x)$ is in fact doubtful, as will be shown below).

Therefore, it is impossible to dispense with a first-order concept of existence, because some utterances about existence cannot be formulated without it, but using only the second-

---

[26]. Commonly at least; and while rightly so about Kant, we will consider whether rightly about Frege, too.

[27]. Munitz (1974), Williams (1981).

[28]. A classic text on this widely-discussed issue is Moore (1936); a interesting treatment is given by Sommers (1973).

[29]. This objection has been raised by Forgie (1972: 259-261) and Grossmann (1969: 67-69). Walker (1965: 32) ignores it, apparently not regarding it as a problem at all, quite counterintuitively. Munitz (1974: 78-85) soothes the problem away, on the ground of quantifier interpretation of Frege's definition of existence, reducing it into the Russelian theory of descriptions.

[30]. Of course this would be an answer somewhat in the manner of Russelian theory of descriptions; Russell (1905). See Munitz (1974: 84-86).

[31]. One might try some exquisite word-constructions to save Fregean approach here, e.g. analyse 'something' as 'whatever thing', 'whatever ——' being a B1-expression. However, this seems quite unfeasible.

order one. Apparently, Frege himself has noticed it, but was not able to account for it[32]. Rather, he would say that it is meaningless to talk about the existence of individual objects; they can be 'real'[33], but cannot exist. To say that Gołota exists is, according to Frege, meaningless[34]. This is so, because 'Gołota' is not a property (i.e., ' —— is Gołota' is not a B1-expression); it does not make sense to talk about 'falling under «Gołota»' (meaning, of course, the concept of Gołota) in the same way as 'falling under «thoroughbredness»'. Therefore the existence of individual objects cannot be expressed by the means of a second-order concept of existence.

However, an attempt to relieve that problem has been made by C. J. F. Williams in his interpretation of the Fregean doctrine[35]. He claims that the solution is to treat individual objects as 'unique instantiations' of certain properties, or sets of properties that unambiguously point to these individuals[36] (for Gołota, these might be e.g. ' —— lost against Lennox Lewis's, ' —— lost against Mike Tyson' etc.). Then, in accordance with our above analysis of Frege, existence as second-order concept can be asserted of such individual. Though, we can easily see that this counter-argument is not much more than a simple negation of the claim that being an individual is not a property; it is to be, in fact, a property or conjunction of several properties that determine it in the above manner. Now, it seems that not much can be done about that: these are two opposing views and apparently there are no convincing arguments to falsify either[37]. Thus we might conclude by only recalling that, firstly, Frege himself held that to assert existence of individuals is meaningless and, secondly, there is no satisfactory account for 'something exists' in Fregean terms.

Moreover, even, if all propositions about existence were expressible in terms of Frege's definition, it still would be not a sufficient and compelling reason to accept it. As has been shown above, some utterances are better — more simply and intuitively — analysable using the first-order concept of existence. Now, there is apparently no good reason to discard first-order formulations in favour of second-order ones, which Frege would do. Different utterances can express the same thought by the means of quite different predicative structures[38]. Hence there is no good reason to restrict ourselves to second-order concept of existence, if some utterances have predicative structures better explicable by other means.

Finally, let us consider one more apparent objection. As we have already said, Frege's second-order concept of existence applies to objects rather than first-order concepts. But what, if we wanted to ascribe existence to a concept — for instance to say: 'the wisdom of the people exists', meaning the existence of the wisdom, not of the people? We would seemingly need

---

[32]. Forgie (1972: 260); the passage referred to there is Frege (1960: 108).

[33]. *Wirklich*.

[34]. Frege (1960: 50); see Grossmann (1969: 64-68) for a discussion of this view in relation to Russell and Moore.

[35]. Williams (1981: 81-107).

[36]. Williams (1981: 106).

[37]. As Leszek Kołakowski has once noticed, it is a common fate of all the philosophical problems of past twenty five centuries than no party is ever convinced by the opponents' arguments.

[38]. Forgie (1972: 259). Forgie names this claim 'principle P'.

to use a third-order concept to account for it, as the second-order concept ascribes existence to the object only, not to the concept describing it. However, according to the definition of A-expression, a saturated name of a concept (e.g., 'the wisdom of the people') can be perfectly well treated as an A-expression, and hence an argument of a B1-expression, to the referent of which existence can apply. Thus no higher-that-second-order concepts are needed here.

2.4. Conclusion

Therefore, we can say that Frege's doctrine of existence cannot be defended in its full strength. It cannot account for the sentence 'something exists', and deals rather inadequately with sentences about individuals. On the other hand, it disallows the use of first-order concept of existence, which would solve this problem. Of course this does not mean that Frege's definition of existence is thoroughly wrong. For instance, it might be enough to follow Munitz's approach and combine Fregean definition with a quantifier definition of existence in order to eliminate these difficulties. However, to do that would require exact and extensive analysis, being too ambitious task to be attempted here. For our purposes it will be enough to recapitulate the following about the Fregean definition. Firstly, it applies to objects characterized by some first-order concept. Secondly, it could be thus applied to individual objects, by the means of a theory of descriptions, but in a rather awkward manner and contrary to Frege's contention that is meaningless to do so. Thirdly, it claims existence to be a second-order predicate, which means it not to be a real predicate.

3. The criticism of the ontological argument

3.1. Formulation of the argument

To begin with, there is not a single ontological argument, but numerous versions of it, which are not necessarily equivalent. The inventor of the argument, St. Anselm of Aosta himself gave (at least) two logically distinct formulations of the argument[39], and other philosophers, from Descartes and Leibniz to Alvin Plantinga have put forward other formulations. Now, Frege in his brief remark does not refer to any particular version of the argument; therefore we will consider here the most well-known formulation, that is, that of *Proslogion*, Chapter 2, which is what he most probably meant when writing about 'ontological argument for the existence of God'.

Furthermore, even this single formulation of the argument — originally formulated in eleventh-century Latin — has indeed numerous paraphrases in terms of more modern technical philosophical vocabulary or various logical systems[40]. We will not attempt to offer an exact analysis of that sort; rather, as Frege probably intended his remark against the simple common explication of the argument, we will present such elementary, but still interesting and general enough, account. As our end is analytical rather than historical, we will generalize rather than follow Anselm's text exactly (this will be essential for further discussion). Hence, the argument has the following form:

> God is by definition the being than which no greater being can be thought of (or, conceived).

---

[39]. In *Proslogion* Ch. 2 and Ch. 3 — Anselm (1979); the distinctness of the proofs is shown by Malcolm (1960).

[40]. Some of these are Kołodziejczyk (1998), Kelly (1994), Tichý (1979), Adams (1971), Plantinga (1966).

A being, which is thought of and exists in reality[41], is greater than an otherwise identical being, which is thought of but does not exist in reality.

I think of God, so God is thought of.

If (a) He existed in reality besides being thought of, he would be greater, than if (b) he didn't exist in reality.

But He is the greatest being, so (a) is the case rather than (b), that is: God exists in reality. *Q.E.D.*

The key point as far as Fregean (and Kantian) critique is concerned is (2), and more specifically the claim that to exist is greater than not to exist, entailed in (2). In Anselm's text the argument is formulated in terms of adding another property, and is formulated more like: 'a being having all the God's properties except existence is less perfect than a being having all the God's properties including existence'. Then the critics straightaway claim that existence is not a perfection, that is, in more modern terms, a real predicate, that is, in Fregean terms, a first-order concept[42], so this step is, according to them, invalid and hence the argument fails.

However, we have seen, in the above formulation of the argument, no resort to the notion of God's properties. Obviously in intuitive terms, there is a notion of 'adding' or 'subtracting' existence from the set of properties of God in the argument. But it is not indispensable for the argument at all[43]. (It has been argued that the existential use of quantifier is excluded in the case of the ontological arguments, for it involves quantification over objects both existing really and only thought of, so it is necessary to use the existence predicate. Though, it is not a valid objection, as it seems enough to use predicates distinguishing real and intensional objects, without an existence predicate[44].) Therefore probably Frege was thoroughly incorrect in his remark, basing it on the mistaken belief that existence's being a property, and a first-order property, is essential for the argument[45]. (Besides, not uncommonly is the assertion that existence is not a predicate deemed to prevent us from defining God into existence[46]. However, it seems equally inappropriate to define, say Gołota into being victorious, or a horse into thoroughbredness; and it is not a reason to claim that being victorious and thoroughbredness are not predicates.) Still, it might be worthwhile inquiring whether Frege's critique would invalidate the argument if it did rely on the assumption that existence is a predicate; we will, then, try to apply Frege's definition to the argument and see whether it would result in showing the latter's fallibility.

---

41. As opposed to 'in thought', so simply — which exists.

42. Thus Plantinga (1966: 538).

43. This observation has been made by Forgie (1972: 251).

44. Then existence could be expressed by the quantifier, in the manner of Quine (1969), only the universe would have to include both real and intensional objects.

45. On the ground of the above-considered Frege's doctrine of existence, Plantinga's (1966: 54) 'desultory gesture' against Frege in terms of problems with non-existents is quite besides the point.

46. E.g. Allen (1961: 59).

3.2. Is 'God' a name or a predicate?

Apart from the above-granted (for the purpose of the inquiry only) proposition that the ontological argument relies on existence's being a predicate (we have not granted it must be first-order). Then, having in mind the above discussion, there seems to be a point worth consideration: is 'God' a proper name (an A-expression) or a predicate (a B1-expression)? In the first case we would run into all the above-mentioned difficulties with reconciling Frege's definition and existence of individuals; in the second, on the contrary, we might use the second-order concept of existence perfectly well.

It has been claimed problematic both to regard 'God' as a logically proper name, that is, name with reference but without sense, and as a predicate[47]. Of course the argument that to treat it as a name would be defining into existence misses the point, for there obviously are proper names of nonexistent objects as well, e.g. 'Gandalf'. Nor is the argument that existence cannot be asserted of the referents of proper names, because existence is a second-order property, sound — it would be a *petitio principii* to accept it here, of course.

However, it might be claimed[48] that 'God' could not be a property just because of what the ontological proof seems to rest on: that the concept of God involves necessary existence and certain properties (omniscience, omnipotence, benevolence etc.). Then, it seems unfeasible to say: '*x* is God iff *x* exists necessarily and is omniscient etc.', because it suggests that *x* has the properties of being omniscient etc., and of being God, too, which is obviously a misunderstanding. Thus, being God seems not to be a property (just like being Gołota, as has been indicated above), which agrees with the intuition rejecting predicates that have, by definition, only one instantiation.

Though still, these are not conclusive, however intuitively appealing, arguments either way. From a logical point of view — which is the decisive one — both solutions are possible; therefore we will consider both in further analysis.

3.3. Can second-order predicates be used freely?

An argument has been put forward[49] that second-order predicates are such that cannot be ascribed freely to objects — as some first-order predicates can — but are a matter of fact independent of the language-users' decisions. For instance, we can define a 'gavagai' to have the first-order property of being gray, but we cannot influence the second-order property of whether it exists, or of how many gavagais are there, etc. We can conceive of an object's having first-order predicates, but not second-order predicates (thus it is meaningless to say '*x* can be conceived as existing').

However, there are other accounts of second-order properties quite different from this. For instance, Cocchiarella[50], following medieval logicians, has proposed a logic in which first-order predicates (and relations) are such that entail existence of the object (so called 'e-

---

47. Allen (1961: 61-63). Unfortunately, most of his argumentation is based on premises we have not granted, or otherwise doubtful.

48. Somewhat inspired by Allen (1961: 62), but we have changed the argument significantly.

49. Mavrodes (1966).

50. Cocchiarella (1969).

attributes'), and second-order predicates are such that do not: for instance, respectively, 'is thoroughbred' and 'is thought to be thoroughbred'. Now, of course, this assumes a quite different interpretation, or rather use of second-order predicates, and entirely different approach (e.g., fictional objects on this account have — and necessarily so — only second-order properties, while on the previous they have only first-order properties).

Therefore, we can see that the account claiming second-order predicates not to be freely ascribable to objects is not compelling. It is possible to adopt a contrary position; both can be well formulated in logical terms. This points to a more general conclusion. It is not unusually the case that there are several distinct, and often mutually contradictory, possibilities of formulating a philosophical point. There might be a heated discussion over these, involving arguments in favour and against particular solutions of the problem. However, as long as a solution is not proven to be either self-contradictory or contradicting something we otherwise hold — all arguments can be at most suggestive, and not conclusive. As long as a solution can be consistently formulated, there is no compelling reason for rejecting it. This conclusion obviously applies to several above-discussed issues, too; hence we will now not attempt defending particular solutions of these, but rather try to see how the various possibilities influence the ontological argument.

3.4. Application of the results to the argument

In order to present the results of the above analysis, we will collect them in the form of the following table, showing possible outcomes. It has to be noted that the table has been constructed in a simplified way, outright excluding some impossible combinations (e.g. that existence cannot be a predicate and first-order predicate can express existence).

<table>
<tr><td colspan="3">(1) Is existence's being a property essential for the ontological argument?</td></tr>
<tr><td colspan="2">Yes. (2) Can existence be a predicate (real or merely logical — i.e., of any order)?</td><td>No. The whole critique is besides the point.</td></tr>
<tr><td colspan="2">Yes. (3) Is 'God' a name or a first-order predicate?</td><td>No. The whole critique is besides the point.</td></tr>
<tr><td>A name. (4) Can a first-order predicate express existence?</td><td>A first-order predicate. (5) Can second-order predicates be used freely?</td><td></td></tr>
</table>

Yes. The argument holds, critique fails.	**No.** The proof is fallacious . (*)	**Yes.** Then the critique fails, the argument is not invalidated.	**No.** The critique is right, the argument is invalidated.

Now, we have established that (1) is false, but we have suspended that result so that further inquiry would be possible. The answer to (2) has been shown to be 'yes'. The answers to (3) and (5) have been shown to be possible either way. It has been shown, too, that answer to (4) is possible either way, and that Frege's answer was 'No'. And, moreover, Frege would also (need to) answer to (3) that 'God' is a first-order predicate, for, as it has been shown, existence, according to his doctrine, applies to objects characterized by a first-order concept (here: ' —— is God'). Needless to say, he would say 'No' to (5).

(A short comment should be made on the case (*). If 'God' is a name, and first-order predicates do not express existence, and existence can be expressed by a predicate, then existence must be expressed by a second-order predicate. But then, the first-order predicate is not the concept of God, for it would be redundant to predicate it of an object named 'God' — though, perhaps, sill possible, but then the case would fall under ' «God» is a predicate'. Then, it must express something else; we do not want to engage in philosophical fiction and speculate, what. In any case, then the argument would aim at the existence of that mysterious concept rather than God, and be thus fallacious. Therefore we will neglect the case (*).)

Therefore, we can conclude the following. Granted the false assumption that existence's being a property is essential for the ontological argument, and granted the assumptions, for which no conclusive proof is offered, that 'God' is a first-order predicate and that second-order predicates cannot be used freely — indeed, then, Frege's definition of existence invalidates the ontological argument for the existence of God. Hence in order to uphold this critique one would have to make the case for all the assumptions, which would be quite an ambitious task, especially as far as the problem whether it is indispensable for the ontological argument that existence were a predicate is concerned. The assumptions present interesting problems in themselves, and imply several other problems, e.g. whether a first-order predicate must be a real predicate etc. However; if all the mentioned assumptions are not granted — and, let us repeat, seemingly no convincing reason for doing so has been given — then the critique falls short of its objective, and Frege's definition of existence is quite unharmful to the ontological argument for the existence of God.

Bibliography

R. M. Adams, 'The Logical Structure of Anselm's Arguments', *The Philosophical Review*, LXXX, 1 (Jan., 1971)

K. Ajdukiewicz, 'Die syntaktische Konnexität', *Studia Philosophica*, I (1935)

R. E. Allen, 'The Ontological Argument', *The Philosophical Review*, LXX, 1 (Jan., 1960)

I. Angelelli, *Studies in Gottlob Frege and Traditional Philosophy*, Reidel, Dordrecht 1967

Anselm of Aosta [of Canterbury], *Proslogion with A Reply on Behalf of the Fool*, tr. and ed. M. J. Charlesworth, Univ. of Notre Dame Press, Notre Dame 1979

B. V. Biriukov, 'On Frege's Works on Philosophical Problems of Mathematics', [in:] *idem*, *Two Soviet Studies on Frege*, tr. and ed. I. Angelelli, Reidel, Dordrecht 1964

I. M. Bocheñski, *A History of Formal Logic*, Univ. of Notre Dame Press, Notre Dame 1961

N. Cocchiarella, 'A Second Order Logic of Existence', *Journal of Symbolic Logic*, XXXIV, 1 (Mar., 1969)

———, 'Properties as Individuals in Formal Ontology', *Nous*, VI, 2 (May, 1972)

M. Dummett, *Frege: Philosophy of Language*, 2nd ed., Harvard Univ. Press, Cambridge 1983

———, *Frege: Philosophy of Mathematics*, Harvard Univ. Press, Cambridge 1991

———, *The Interpretation of Frege's Philosophy*, Harvard Univ. Press, Cambridge 1981

J. W. Forgie, 'Frege's Objection to the Ontological Argument', *Nous*, VI, 3 (Sept., 1972)

G. Frege, *The Foundations of Arithmetic*, tr. J. L. Austin, Blackwell, Oxford 1950

———, *The Translations from the Philosophical Writings of Gottlob Frege*, ed. and tr. P. T. Geach, M. Black, Blackwell, Oxford 1960

J. Grossmann, *Reflections on Frege's Philosophy*, Northwestern Univ. Press, Evanston 1969

J. J. Jadacki, 'On the being of what seems not to be', *Dialectics and Humanism*, VIII, 4 (1981)

C. J. Kelly, 'Circularity and Amphiboly in Some Anselmian Ontological Proofs: A Syllogistic Inquiry', *Nous*, XXVIII, 4 (Dec., 1994)

E. D. Klemke (ed.), *Essays on Frege*, Univ. of Illinois Press, Urbana 1968

L. A. Kołodziejczyk, 'O tak zwanym ontologicznym dowodzie istnienia Boga uwag kilka' [Some Remarks on the So-Called Ontological Proof for the Existence of God], *Filozofia Nauki*, 23-24 (3-4/1998)

P. Labenz, 'Definicje istnienia' ['Definitions of Existence'], *Filozofia Nauki*, 33 (1/2001)

N. Malcolm, 'Anselm's Ontological Arguments', *The Philosophical Review*, LXIX, 1 (Jan., 1960)

G. I. Mavrodes, 'Properties, Predicates and the Ontological Argument', *The Journal of Philosophy*, LXIII, 19 (Oct., 1966)

G. E. Moore, 'Is Existence a Predicate?', [in: W. Kneale, G. E. Moore, 'Symposium: Is Existence a Predicate?'], *Aristotelian Society: Supplementary Volume*, XV (1936)

M. K. Munitz, *Contemporary Analytic Philosophy*, Macmillan, New York 1981

———, *Existence and Logic*, New York Univ. Press, New York 1974

A. Plantinga, 'Kant's Objection to the Ontological Argument', *The Journal of Philosophy*, LXIII, 19 (Oct., 1966)

W. V. O. Quine, 'Existence and Quantification', [in:] *idem*, *Ontological Relativity and Other Essays*, Columbia Univ. Press, New York 1969

B. Russell, 'On Denoting', *Mind*, XIV, 56 (Oct., 1905)

J. Shaffer, 'Existence, Predication and the Ontological Argument', *Mind*, LXXI, 283 (Jul., 1962)

F. Sommers, 'Existence and Predication', [in:] M. K. Munitz (ed.), *Logic and Ontology*, New York Univ. Press, New York 1973

P. Tichý, 'Existence and God', *The Journal of Philosophy*, LXXVI, 8 (Aug., 1979)

J. D. B. Walker, *A Study of Frege*, Cornell Univ. Press, Ithaca 1965

R. D. Wells, 'Frege's Ontology', *The Review of Metaphysics*, IV (1951) [reprinted in Klemke (1968)]

C. J. F. Williams, *What is Existence?*, Clarendon, Oxford 1981

Piotr Labenz
Institute of Logic, Language and Computation
University of Amsterdam
<piotr@fido.pl>
<www.labenz.prv.pl>

SORITES (ΣΩΡΙΤΗΣ), ISSN 1135-1349
http://www.sorites.org
Issue #17 — October 2006. Pp. 81-84
Why Prisoners' Dilemma is Not a Newcomb Problem
Copyright © by P. A. Woodward and SORITES

WHY PRISONERS' DILEMMA IS NOT A NEWCOMB PROBLEM

(It's Not Even Two Newcomb Problems Side by Side.)

P. A. Woodward

In a brief discussion David Lewis argues that «[c]onsidered as puzzles about rationality, or disagreements between two concepts thereof…» Newcomb's Problem is «…one and the same problem…» (Lewis, p. 235) as that posed by the Prisoners' Dilemma.[1] «Prisoners' Dilemma,» he claims, «*is* a Newcomb Problem — or rather, two Newcomb Problems side by side, one per prisoner» (Lewis, p. 235). Lewis concludes his discussion with the following paragraph:

> Some have fended off the lessons of Newcomb's Problem by saying: «Let us not have, or let us not rely on, any intuitions about what is rational in goofball cases so unlike the decision problems of real life.» But Prisoners' Dilemmas are deplorably common in real life. They are the most down-to-earth versions of Newcomb's Problem now available (Lewis, p. 240).

This paragraph makes it clear that Lewis thinks that we can learn what is rational in «common» Prisoners' Dilemma decision situations by studying Newcomb's Problem.

To show that the Prisoners' Dilemma (PD) is a (pair of) Newcomb's Problems (NPs) Lewis lists the three elements which, «in a nutshell» capture the «decision problem» faced by each prisoner in the PD (Lewis, p. 236). Two of the three elements are, he claims, the same for the decision problem faced by the agent in the NP, only one of the elements differs, and he attempts to show that it differs only in its «inessential trappings» (Lewis, p. 235). Only slight modifications to the element not in common with regard to those inessential trappings are required to show that the two problems are the same problem. It is assumed, in Lewis's discussion and in most discussions of PD and NP, that each prisoner in PD and the player in the NP is an egoist. Thus, what counts as «rational» is what maximizes the prisoner's or the player's own self interest.

Let's consider Lewis's modifications to the decision element not shared by the puzzles. The three decision elements in the PD are as follows:

(1) I [one of the prisoners] am offered a thousand [dollars] — take it or leave it. [Taking it amounts to confessing in usual presentations of PDs.]

(2) Perhaps also I will be given a million [dollars]; but whether I will or not is causally independent of what I do now. Nothing I can do now will have any effect

---

[1]. Page references to Lewis are to David Lewis, «Prisoners' Dilemma Is a Newcomb Problem,» *Philosophy and Public Affairs,* 8, No. 3 (1979): 235-240.

on whether or not I get my million. [In typical PDs, a reduced sentence is analogous to getting a million dollars.]

(3) I will get my million if and only if you [the other prisoner] do not take your thousand [dollars] (Lewis, p. 236).

Lewis thinks that (1) and (2) are shared by the agent in a Newcomb Problem, but that (3) is replaced by

(3') I [the agent] will get my million [dollars] if and only if it is predicted that I do not take my thousand [dollars] (Lewis, p. 236).

Lewis points out that it is inessential whether or not the prisoners (in PD) choose simultaneously, or one after the other (assuming that no information regarding the choices is shared until after the choices have been made), or whether the prediction (in NP) has been made before, during, or after the one faced with the problem (the agent) decides to takes his thousand dollars or forego it, again assuming that the agent's prediction plays no role in the agent's decision (see Lewis, pp. 236-237).

Lewis also points out that it is inessential to the NP that «…any prediction…should actually take place. It is enough that some potentially predictive process should go on, and that whether I get my million is somehow made to depend on the outcome of that process» (Lewis, p. 237). Thus, he claims, NP is characterized by (1), (2), and

(3'') I will get my million if and only if a certain potentially predictive process (which may go on before, during, or after my choice) yields the outcome which could warrant a prediction that I do not take my thousand (Lewis, p. 237).

But, claims Lewis, that «potentially predictive process» could be a replica of the agent (i.e., Lewis himself) thus (3'') is correctly replaced by

(3''') I will get my million if and only if my replica does not take his thousand (Lewis, p. 238).

The Predictor in NPs is usually taken to be nearly perfect at making this type of prediction, thus a replica of the agent that matches the agent perfectly in respects relevant to the decision «…will have more predictive power than a less perfect replica…»(Lewis, p. 238). But, as Lewis points out, a nearly perfect predictor is not necessary to the problem. «The disagreement between conceptions of rationality that gives the problem its interest arises when the reliability of the predictor, as estimated by the agent, is quite poor — indeed even when the agent judges that the predictive process will do little better than chance» (Lewis, p. 238).

The «replica» may be simply another person placed in a similar situation as the agent facing the NP. Thus, (3''') can be replaced by

(3) I will get my million if and only if you [i.e., the other person in a similar situation] do not take your thousand (Lewis, p. 239).

Thus, argues Lewis, «[i]nessential trappings aside, Prisoners' dilemma is a version of Newcomb's Problem, *quod erat demonstrandum*» (Lewis, p. 239).

Some who discuss Newcomb's Problem, claims Lewis, think it rational to decline the thousand if the predictive process is reliable enough — and some who discuss Prisoners Dilemma think it rational to not take the thousand they are offered, if the two partners are enough alike. These are, according to Lewis, two statements of the same view, a view often

labeled «expected utility.» In following this strategy the agent maximizes his expected utility. Lewis claims that he thinks it rational to take the thousand in both problems because no matter what the predictor does, and no matter what his partner does, he would be better off than if he didn't take it — better off by a thousand dollars. This is the «dominant strategy.» Following a dominant strategy, if there is one, the agent performs that action which will maximize his utility whatever the other agent does (or whichever possible situation turns out to be actual).

Since, thinks Lewis, in NPs the dominant strategy seems to be (more) clearly what is rational for an egoist, and since the two problems are (according to Lewis) the same problem, we ought to accept the dominant strategy as being more rational in the all too common PDs we run into in real life; this is the claim that Lewis's last paragraph (quoted above p. 80) amounts to.

But notice, in typical presentations of NPs the predictor is said to be very good, and evidence of that success is drawn from the fact that he (or it) has been nearly flawless in the past when he (it) has made similar predictions. As Nozick (in an early discussion of NPs) describes the predictor

> you know that this being has often correctly predicted your choices in the past (and has never, so far as you know, made an incorrect prediction about your choices), and furthermore you know that this being has often correctly predicted the choices of other people, many of whom are similar to you, in the particular situation to be described below [i.e., a familiar Newcomb Problem situation].[2]

Given Nozick's telling of the story, which is consistent with Lewis's version, the NP is really the last of a series of NPs. The PD, as usually described, and as Lewis describes it, is taken to be a single playing of the game. The partners in the PD are usually given a onetime opportunity to make a decision, the results of which will involve more or less jail time. Described as the last of a series of NPs the game has a unique character in which the dominant strategy has a certain strong appeal; and that appeal may transfer over to a single play of the PD.

Lewis has noted that PDs are «deplorably common in real life» (Lewis, p. 304, quoted above, p.80). Robert Axelrod has claimed that the

> Prisoner's Dilemma is simply an abstract formulation of some very common and very interesting situations in which what is best for each person individually leads to mutual defection, whereas everyone would have been better off with mutual cooperation.[3]

Such situations include international trade situations in which two nations must decide whether to erect trade barriers; situations in which legislators must decide whether to support other legislator's bills; situations in which corporate executives must decide whether to cooperate with other executives; and situations in which manufacturing companies (with but one competitor) must decide on a price for their products (see Axelrod, Part I). Gregory Kavka has noticed that situations in which two nations must decide whether to maintain an expensive

---

[2]. Robert Nozick, «Newcomb's Problem and Two Principles of Choice,» in *Paradoxes of Rationality and Cooperation: Prisoner's Dilemma and Newcomb's Problem*, ed. Richard Campbell and Lanning Sowden (Vancouver: The University of British Columbia Press, 1985), p. 107.

[3]. Robert Axelrod, *The Evolution of Cooperation* (New York: Basic Books, Inc., Publishers, 1984), p. 9. References to Axelrod are to this volume.

and dangerous arsenal of nuclear weapons, or to disarm, can be described as a PD.[4] Virtually any situation in which an individual must decide how much to exploit, for personal gain, a commonly held resource (such as pasture land, the air, rivers, etc.) can be described as a PD.

What is common to these «real life» PD situations is that they are not single play games. They are situations in which the PD is faced numerous or an indefinite number of times by each player, often with the same «partner.» They are «iterated PDs.»[5]

It's clear that in an iterated NP, in which it is not known how many times the agent will face the decision, if the predictor is a little better than chance at making the prediction, the agent is better off foregoing the thousand each time he plays then he would be by taking it each time. Moreover, it is clear that the better the predictor is the better off the agent is by foregoing the thousand (on each play) compared with how well he would be by taking it (on each play). The agent would do better by taking his thousand only if he could correctly predict when the predictor will be wrong.[6] Thus, following the dominant strategy, which was so attractive to Lewis, is not in the player's best interest in iterated PDs. Hence, the common PDs are not (one play) NPs – not even two such NPs side by side. Further more, if the NP were «iterated» the situation would not be similar to the situation faced by someone playing iterated PD because, although in PD both players have a rational egoistic rank ordering of possible outcomes and can gain mutual benefit by cooperating with each other, the predictor in NP does not have such a rank ordering of possible outcomes, and it's not clear what counts a benefiting the predictor — he seems not to be an egoist. The best that we can do as far as figuring out the predictor's preference ordering is to conclude that he prefers that the agent get something rather than nothing, but he prefers that the agent not get everything. Whether the agent gets $1 million or $1 thousand does not seem to matter to him, as long as the agent does not get $1,001,000. We should not, therefore, be too quick to follow the dominant strategy in «common» iterated PD situations.

P. A. Woodward
East Carolina University
<woodwardp@ecu.edu>

4. Gregory Kavka, «Space War Ethics,» *Ethics* 95 (1985): 673-91.

5. It should be noted that national disarmament of nuclear weapons is a process, when it disarms, a nation «builds down» its nuclear arsenal. Such a process can be reversed, thus a nation disarming in not similar to, e.g., a cornered outlaw «throwing out his weapon» to the surrounding police. The latter is, perhaps, the last play of a game, the former involves numerous plays, it is similar to an iterated PD. The importance of this point was suggested to me in discussion with my cousin, economist Peter Woodward.

6. For example, if the agent makes the decision 10 times, each time following Lewis's strategy of taking the thousand and the predictor is 60% accurate, the player will receive $4 million, 10 thousand dollars. But if the player foregoes his thousand each time and the predictor is 60% accurate, the player will receive $6 million; that is $1.99 million more. If, on the other hand, the predictor is 90% accurate, the player will receive $7.99 million more by foregoing the thousand each time then he would by following Lewis's strategy and taking it.

SORITES (ΣΩΡΙΤΗΣ), ISSN 1135-1349
http://www.sorites.org
Issue #17 — October 2006. Pp. 85-94
A Paradox Concerning Science and Knowledge
Copyright © by Margaret Cuonzo and SORITES

A PARADOX CONCERNING SCIENCE AND KNOWLEDGE

Margaret Cuonzo[*]

Introduction

As a means of clarifying a particularly vexing philosophical issue, it is often helpful to put that philosophical problem in the form of a paradox. This is so for Quine's and Duhem's problem regarding the «laying of blame» that occurs when an experimental result conflicts with a scientific hypothesis. The Quine/Duhem problem is easily translated into a standard version of a philosophical paradox, and the various approaches to the problem correspond to unique solutions. Moreover, the paradox involving isolating the faulty assumption(s) when there is a result that conflicts with a hypothesis is a specialized case of a more general paradox, the skeptical paradox discussed by, among others, Rene Descartes in his *Meditations on First Philosophy*. As I'll show below, both the famous skeptical paradox of Descartes' Meditations and the Quine/Duhem paradox have a similar type of solution.

Watchmakers, Doctors, and Scientists: The Quine/Duhem Problem

Pierre Duhem and Willard Quine raise a problem for what is traditionally known as the «hypothetico-deductive model» of scientific hypothesis testing. On this traditional model, a scientific hypothesis is tested by deducing an observable consequence of the hypothesis, and then empirically observing whether this consequence actually is the case. That is,

1) $H \rightarrow e$

2) Not e

3) Therefore, Not H

On this model of scientific testing, a logical consequence e is derived from the hypothesis H, and then e is observed. In the event that e turns out to not be the case, then on this model, the hypothesis is shown to be false. The relevant rule of inference here is *modus tollens*. Here's a rough example of the kind of reasoning involved. Assume that I am a scientist and my hypothesis H is that drinking coffee causes cancer.[1] A logical consequence of my hypothesis is that, when a group of people with similar health histories and habits are divided into the

---

[*]. This article is the result of research done at an NEH Summer Seminar at Virginia Tech, 1999. Special thanks are due to Deborah Mayo and the NEH Summer Seminar participants. I also thank Long Island University for granting me released time to write this article. In addition, an early version of this article was presented at Long Island University's Faculty Forum. I thank the faculty members present for their comments.

[1]. This example of an experimental hypothesis is admittedly rough. A more precise hypothesis is that coffee drinkers are more likely to develop cancer. I phrase the hypothesis this way for effect. If this is troubling to some readers, they can substitute the cube-shaped earth hypothesis discussed later in the paper.

coffee drinkers and non-coffee drinkers, there will be a significantly higher occurrence of cancer in the coffee drinkers than the non-coffee drinkers. The e in this case is the claim that there will be a significantly greater occurrence of cancer in the coffee drinkers than in the non-coffee drinkers. Suppose then I do the experiment and discover no significant difference. On the traditional hypothetico-deductive model of scientific testing, this evidence proves conclusively that the hypothesis that coffee causes cancer is false. If, though, a significant difference is shown, this does not conclusively prove the truth of the hypothesis. It only shows that the hypothesis has passed one test. This is because, strictly speaking, there could be some other factor that brings about the greater occurrence of cancer than the drinking of coffee.

Pierre Duhem made the following critique of this model of scientific testing:

> The [scientist] can never submit an isolated hypothesis to the control of experiment, but only a whole group of hypotheses. When experiment is in disagreement with his predictions, it teaches him that one at least of the hypotheses that constitute this group is wrong and must be modified. But experiment does not show him the one that must be changed (185).

Duhem's problem is with the first part of the model, (1). His claim is that no hypothesis can be separated from an indefinite set of auxiliary hypotheses. In our coffee example, an auxilary premise might be that the test was done on a group of people with similar health histories, or that there was no mistake in the counting of the instances, etc. Taking into consideration this indefinite set of auxiliary premises, we then have:

1) {H, (A1, A2, A3, … , An)} → e

2) Not e

3) Not {H, (A1, A2, A3, … , An)}

If Duhem is right, then all that the conflicting result shows is that one of the set of the main and auxiliary hypotheses is mistaken. What the result does not show any longer is Not H. In our example, the lack of a significant difference is no longer conclusive grounds for rejecting the hypotheses that coffee causes cancer.

Duhem sometimes explained his problem by comparing the scientist to a doctor, and contrasting the scientist with a watchmaker[2]. A watchmaker, when faced with a watch that does not work, can look at each part of the watch in isolation, going from piece to piece, until the defect is detected. The doctor, on the other hand, cannot examine each of the parts of an ailing patient's body in isolation. Instead she must detect the seat of the illness only by inspecting the effects produced on the whole body. Similarly, the scientist cannot separate out each of an indefinite set of auxiliary premises to test each in isolation. From this, though, a paradox arises, one concerning how it is reasonable to «lay blame» on a main scientific hypothesis or one of its auxiliaries.

The Paradox

On its standard definition, a paradox is a deductive argument with seemingly true premises, employing apparently correct reasoning, with an obviously false or contradictory conclusion. Consider, for example, a version of the famous skeptical paradox:

1) I can know that I live in Brooklyn, only if I can know that I am not a brain in a vat.

---

[2]. See, for example, the discussion in Mayo (1997).

2) I cannot know that I am not a brain in a vat.

3) Therefore, I cannot know that I live in Brooklyn.

This is an argument with seemingly true premises, employing apparently correct reasoning, but with what looks like an obviously false conclusion. Premise one merely states that it is a precondition for my knowing that I live in Brooklyn that I know a more fundamental truth, namely that I am not a brain in a vat. If I were a brain in a vat, then I would not necessarily be in Brooklyn. Premise two is the claim that I cannot know that I am not a brain in a vat. No evidence I could find would count as completely convincing evidence for the hypothesis that I am not a brain in a vat, because it is possible that the evil scientist who has been keeping me in this vat has produced in me the experience of getting this evidence. Notice that this is not the claim that my being a brain in a vat is likely, but rather a claim about the remote possibility that this is so. In addition, the reasoning involved in the skeptical paradox is straightforward. The argument has the form:

1) P, only if Q

2) Not Q

3) Therefore, Not P

However, the conclusion is implausible. The paradox could be, and often is, phrased as precluding all knowledge, even of the most obvious truths. Since the premises are seemingly true, the reasoning is straightforward, and the conclusion seems obviously false, the skeptical paradox meets each of the requirements for being a philosophical paradox.

Now consider the following simplified form of an argument I will flesh out below:

1) No hypothesis can be tested in isolation from an indefinite set of auxiliary hypotheses.

2) In order to show that a hypothesis is mistaken, it is necessary to isolate that hypothesis from its set of auxiliary hypotheses.

3) Therefore, no hypothesis can be shown to be mistaken.

I will call the above argument the «simple Quine/Duhem paradox.» The first premise of the argument is the claim that whenever a test of a hypothesis is made there is an indefinite set of auxiliary hypotheses that must go along with the hypothesis. For another example, imagine an experiment is designed to test the hypothesis that the earth is a cube by observing the shadow it casts during an eclipse. The hypothesis is that the earth is a cube, and an entailment of this is that the earth will leave a square or diamond-shaped shadow. But the earth's shadow is an entailment only if certain other preconditions are met. For example, the experimenter assumes that: the light will not be such that it turns the shadows of cubes into circles; the instruments used to identify the shadow are functioning properly; we're all not brains in vats; etc. The first premise implies that the cube hypothesis, in order to be tested, must accompany these and a potentially infinite set of other hypotheses.

The second premise is a statement of the moral of the Quine/Duhem problem:

1) {H, (A1, A2,…,An)} -> e

2) Not e

3) ~{H, (A1, A2,…,An)}

The above argument is not a paradox in itself, but rather an illustration of the kind of deductive reasoning available for «laying blame» on the hypothesis. As the argument states, the negative experimental result (2) only shows that there is something wrong with the set of hypotheses (H, A1, A2,…,An) and not necessarily with H itself. It is this type of argument that licenses premise two, the statement that there must be some way of isolating H if one is going to be able to show it mistaken. Premise two implies that for the cube hypothesis to be shown mistaken, the hypothesis must be separated from its auxiliary premises. Assume that the cube-shaped earth experiment is performed and the shadow is circular. In this case, the circular shadow only shows that one of the set of hypotheses that includes H and an indefinite set of auxiliary hypotheses is mistaken. What it does not show is that H is mistaken. The conclusion of the simple form of the paradox is that no hypothesis can be shown to be mistaken. In the case of the cube hypothesis, this hypothesis cannot be shown to be mistaken either.

Using the cube hypothesis, we have the following version of the paradox:

1) The hypothesis that the earth is a cube cannot be tested without being conjoined to an indefinitely large set of auxiliary hypotheses.

2) If the hypothesis that the earth is a cube cannot be tested without being conjoined to an indefinitely large set of auxiliary hypotheses, then the hypothesis that the earth is a cube cannot be shown to be mistaken.

3) The hypothesis that the earth is a cube cannot be shown to be mistaken.

The conclusion is intuitively implausible given the obvious falsity of the hypothesis. Moreover, in the simple form of the paradox, the conclusion is that no hypothesis can be shown to be mistaken. This is even more implausible.

The last thing to consider in respect to my showing that this is a genuine paradox is the reasoning employed. In both the cube version and the simple form of the paradox the reasoning is straightforward. In the cube version we have a standard use of *modus ponens*. In the simple version, we have an argument of the form: No S is P; All Q are P; Therefore, No S is Q. Nothing is out of line here. Thus, the Quine/Duhem Paradox meets all the requirements of a standard philosophical paradox: it has apparently true premises; its conclusion is highly implausible; and the reasoning involved is straightforward.

The Quine/Duhem problem, phrased as a paradox, is really a special case of the skeptical paradox discussed earlier. The skeptical paradox claims that the incredibly strong precondition for my knowing p cannot be attained, and hence I cannot know p. For the Q/D Paradox, the set of auxiliary premises has the same function as the precondition in the skeptical paradox: because they cannot be ruled out, they keep us from knowing the status of the hypothesis. The conclusion of the skeptical paradox is that we cannot know some obvious hypothesis (we can't prove H), while for the Q/D paradox, the conclusion is that no hypothesis can be shown to be mistaken (we can't prove Not H).

The many solutions to the Quine/Duhem problem can be seen as solutions to the Quine/Duhem paradox. For brevity's sake, I am going to restrict my discussion to the most famous and/or the most plausible solutions. One famous response to the Quine/Duhem problem is given by the popular Kuhnian approach. On this account the moral of the problem raised by Quine and Duhem is that it is only whole theories, systems, or what Kuhn terms «paradigms» that are shown to be mistaken. The Kuhnian account, in other words claims that the conclusion of the simple Quine/Duhem paradox is true, and that no hypothesis can be

conclusively shown to be the one at fault. Only whole theories broadly construed, or paradigms, are open for rejection. And a major factor in the choice of one paradigm over another is the opinion of the scientific community itself. In The Structure of Scientific Revolutions, Kuhn maintains that:

> As in political revolution, so in paradigm choice — there is no standard higher than the assent of the relevant community. To discover how scientific revolutions are effected, we shall therefore have to examine not only the impact of nature and logic, but also the techniques of persuasive argumentation within the quite special groups that constitute the community of scientists (1962: 94).

Only whole paradigms get accepted or rejected based upon the assent of the scientific community. We mistakenly think that the conclusion «No hypothesis can be shown to be mistaken» is false, when in fact it is true. Only whole theories can be rejected in the way we normally think that hypotheses are rejected.

There are reasons for avoiding this kind of approach. The first is that the response is too drastic. Consider the cube-shaped earth hypothesis again. Does it really make sense to say that such an obviously mistaken hypothesis cannot be shown false? Commonsense and the obvious falsity of the hypothesis suggest that a solution to the paradox should be looked for elsewhere. Another reason for looking elsewhere is that the successful account of this problem is going to give some kind of analysis of the concepts involved. The «whole systems» theorist, by taking the stance that it is only whole theories that are capable of being rejected, does not address the issue of what happens to the particular hypothesis, except perhaps by saying that as a result of the paradigm shift, it would be accepted or reject. So the approach switches the issue from the evaluation of hypotheses to the evaluation of theories. More generally, a criticism often leveled against the Kuhnian approach is that it reduces theory-choice to a kind of «mob psychology,» where what counts as successful is determined by sociological and not logical or evidential factors.

Bayesianism

Another place to look for an account of evidential appraisal is statistics. In fact, a group of philosophers of statistics claim to have a solution to the Quine/Duhem problem. These philosophers, known as «Bayesians,» get their name from the statistician Thomas Bayes. According to the Bayesians, an answer to the Quine/Duhem problem can be given if the hypothetico-deductive model of scientific testing is replaced with another model. On the Bayesian model, evidence e confirms a hypothesis H to the extent that a scientist's degree of belief in H is higher given evidence e than what it was or would be without this evidence. Probability is a measure of the subjective degree of belief ranging from «0,» complete disbelief, to «1,» complete certainty. The scientist's degree of belief in the hypothesis without the evidence is called the «prior probability» of the hypothesis, and the scientist's degree of belief in the hypothesis after the evidence is called the «posterior probability.» So if the posterior probability of H is greater than the prior probability of H, the extent to which H is confirmed is the difference between the posterior and prior probabilities. To figure out the posterior probability of H, Bayesians use a version of Bayes' Theorem:

$$P(H \mid e) = \frac{P(e \mid H)\, P(H)}{P(e \mid H)\, P(H) + P(e \mid \text{not-}H)\, P(\text{not-}H)}$$

This is read, «The probability of H, given e, is equal to the probability of e given H times the probability of H, over the probability of e given H, times the probability of H, plus the probability of e given not H times the probability of not H.» Certain factors need to be known before the «laying of blame» can take place: (i) the prior probabilities in H and not-H; (ii) the likelihood, which is P(e | H); and (iii) what's called the Bayesian «catchall factor,» which is P (e | not-H). Once you have these, then you just plug them into Bayes' theorem to get the posterior probability.

Here's an example: Consider a situation in which an experiment is done and the result seems to contradict the hypothesis in question. One response to this negative result would be to reject the hypothesis. Think back to the coffee example. Another response would be to look at the auxiliary premises. Suppose for simplicity's sake that there is only one auxiliary premise, that the subjects in the study have similar health histories. In this case, the main hypothesis H is that coffee causes cancer, and the auxiliary hypothesis A is that a test of the hypothesis will involve people who have similar health histories. In this simplified example, hypothesis H and auxiliary A entail e, a significant difference in cancer occurrence, but not-e is observed. The Bayesian account shows when A is more likely to be blamed than H, or vice versa. Assume that there is a great deal of evidence for H, that there is hardly more evidence for the truth of A than there is evidence for A's falsity. In our example, perhaps the health histories of the subjects weren't checked very thoroughly so it is possible that the coffee drinkers also smoke, while the non-drinkers don't. This is a situation in which it is more likely that A is the where the problem lies, rather than H. Bayesians solve this type of problem by plugging in values into Bayes' theorem. (i) First, they assign a lower prior probability to A than to H. For example, A, being only slightly more probable than Not-A, it would have a prior probability of around .6. H, on the other hand, would have a very high probability, say .9. (ii) With regards to the likelihood, the Bayesians assign a far greater likelihood for the negative result to happen when not-A is true rather than not-H. For example, P(not-e | a) = x, and P (not-e | not-a and H) =50x, and P(not-e | not-a and not-H) = 50x. I'll spare you the calculations[3]. The result is that after plugging these numbers into Bayes' theorem, the probability of H is only slightly decreased, going from .9 to .897, whereas the probability of A plummets from .6 to .003. So, given their prior probabilities, and the likelihood of getting the not-e result when either A or H is not true, it follows that the scientist has good reason to reject A, while still preserving H.

In a nutshell, the Bayesians, by analyzing the subjective degrees of belief of the scientists, and plugging these probabilities into Bayes' theorem, attempt to give an account of when the rejection of the main hypothesis is warranted, and when, instead an auxiliary premise is what must be rejected. The Bayesians solve the Quine/Duhem paradox by rejecting the second premise, the one which claims that in order to show that a hypothesis is mistaken, it is necessary to isolate that hypothesis from its set of auxiliary hypotheses. As long as we know the prior beliefs in the auxiliary premises then we can determine whether they should be rejected.

Although this is the standard view of scientific reasoning about Duhemian problems in the philosophy of statistics, the Bayesian account has certain problems. The most important objection concerns the Bayesians' reliance on the prior degree of belief of the scientist in his or her hypothesis before the hypothesis is tested. Assuming that scientists have such degrees

---

[3]. The appendix of this article has a step-by-step explanation of these calculations. These are also worked out in Mayo (1997) and Dorling (1979).

of belief, and also assuming that these beliefs can be quantified into degrees, it is undesirable that the prior beliefs be taken as central to reasoning in science. Such subjective beliefs are highly variable, changing not only from person to person, but in addition, in the same person from moment to moment. For example, if a scientist's belief varies even slightly during a day, the justification for the acceptance or rejection of a hypothesis will be altered. Something seems not right with this subjectivist account. The problem, I suspect, lies in the conflation of a scientist's confidence in his or hypothesis with the evidence that it is true. As Deborah Mayo asks in the title of an article critiquing the Bayesian approach, «What's Belief Got to Do with It?» Mayo claims that:

> …scientists do not succeed in justifying a claim that an anomaly is due not to H but to an auxiliary hypothesis by describing the degrees of belief that would allow them to do this. On the contrary, scientists are one in blocking an attempted explanation of an anomaly until and unless it is provided with positive evidence in its own right. And what they would need to show is that this evidence succeeds in circumventing the many ways of erroneously attributing blame (1997: 228-229)

Here Mayo is critiquing the «white glove» treatment given by the Bayesians as to how to solve such problems. To determine when an anomolous result requires that the main hypothesis or some auxiliary hypothesis to be rejected requires more than the subjective degrees of belief of the scientist prior to the experiment. What is required is evidence that the auxiliary is the faulty assumption, and an account of why this evidence isn't mistakenly taken as evidence that the auxiliary is to blame.

Another Approach: Error Statistics

So far we have discussed two approaches to the Quine/Duhem problem, the Kuhnian and the Bayesian account. Both approaches have serious problems. Like the Bayesian account, the solution I'll argue for rejects the hypothetico-deductive model of explanation and instead gives a probabilistic account of scientific reasoning. This approach takes as its starting point something Deborah Mayo in Error and the Growth of Experimental Knowledge calls, «error statistics,» which includes everyday concepts in statistics like significance tests and confidence intervals.

On the error statistical account of hypothesis testing:

> Data e produced by procedure ET provides good evidence for hypothesis H to the extent that test ET severely passes H with e.

And:

> H's passing test ET (with result e) is a severe test of H just to the extent that there is a very low probability that test procedure ET would yield such a passing result, if hypothesis H is false.

Instead of focusing on the probability of the hypothesis itself, the error statistician focuses on the reliability of the test of the hypothesis, particularly the probability that the test would pass H if H were false. If there is a low probability that a test would pass a hypothesis when that hypothesis is false, then passing that test is a good indication of the truth of the hypothesis.

To criticize attempts to explain away anomolous results, the error statistician employs «blocker strategies.» These strategies criticize such attempts on the grounds that (a) such explanations fail to pass severe tests; or, worse, (b) their denials pass severe tests. In addition, an anomolous test result may be legitimately blamed on an auxiliary hypothesis A by showing that Not A passes a severe test.

Consider, again, the example of the hypothesis about coffee and cancer, and the anomolous result that there was no significant difference between the coffee drinkers and non-coffee drinkers. In order to successfully blame the anomolous result on the auxiliary hypothesis that the subjects in the experiment have the same health histories and habits, the scientist would have to severely test the denial of the auxiliary premise. In this case, a severe test must pass the hypothesis that the two groups don't have similar health histories or habits. If there were a strong probability that the two groups were radically different in health habits, then the auxiliary premise should be blamed and not the hypothesis.

Getting Back to the Quine/Duhem Paradox

Mayo seems to claim that the error statistical approach solves the Quine/Duhem problem. This claim, I fear, is not completely correct. The moral of the Quine/ Duhem problem is that there is no complete guarantee of when the main hypothesis is to be rejected or when an auxiliary is at fault. And even on Mayo's model of hypothesis testing there is no such guarantee. As is the case with all statistical accounts, there remains the (admittedly remote) possibility that a false hypothesis passes a severe test. This is admittedly not likely, but all that is needed to run into trouble with the Quine/Duhem problem is a non-zero probability that a hypothesis could be passed by a severe test. This should not be a surprise, given that the Quine/Duhem Paradox is a special case of the skeptical paradox.

Although it was not intended this way, the error statistical account can be turned into a more restricted solution to the paradox. On this solution, the paradox arises because of a faulty conception about evidence. The assumed feature of evidence which leads to paradox is its conclusiveness, that is, that the evidence provides complete proof of the falsity of an empirical hypothesis. No conclusive grounds can be given to reject any empirical hypothesis. What can be given, though, is overwhelming good reason to do so. In fact, in the case of some evidence, it would be irrational not to accept this evidence as cause for the rejection of an hypothesis. Notice that this is a restricted solution because the claim is that there can be no new notion of evidence appraisal that provides certain grounds for rejecting an empirical hypothesis. The claim is that an alternative notion of evidential appraisal should be given, one that gives up the idea of complete proof and instead provides indefinitely high probabilities about the truth or falsity of a claim.

Here is a summation of my response to the Quine/Duhem paradox. Unlike the Bayesians and (I believe) error statisticians, I claim that there can be no thoroughgoing solution to the paradox, because to give one would involve showing, with Cartesian certainty, where to lay blame when an experimental result conflicts with a scientific hypothesis. This, I submit, cannot be done. What can be given is an alternative version of what counts as good evidence. And it is here where the error statistical approach is most useful. Moreover, such an account is all that is really needed as an account of where it is best to lay blame.

Application to the Skeptical Paradox

Earlier, I claimed that the Quine/Duhem Paradox is a special case of the more famous skeptical paradox. If this is so then the solution to one paradox will provide a solution to the other. Applying the solution to the skeptical paradox involves giving up the Cartesian ideal of certainty, at least with respect to empirical truths. Knowledge of the truth of the proposition «I live in Brooklyn,» if that is to mean certain knowledge, cannot be attained. What can be attained is overwhelming proof to that effect. A more informal application of error statistics

is relevant here. On this account, we can derive overwhelming evidence of the truth or falsity of our beliefs by submitting these beliefs to severe tests as well.

For example, consider my belief that the blue patch on my hand yesterday was caused by touching a rail in the subway that had wet paint on it. In this case, there is a fairly reliable test of whether this in fact is so. I can go to the subway station and check to see if the rail is freshly painted, and if the color matches the color on my hands. The test is reliable because there is a low probability of there being fresh paint of exactly the color on my hands, while I acquired the paint stain elsewhere. Yes, it is in principle possible that I got the stain another way, perhaps there's a mailbox on my corner that's just been painted as well. But the probability of this is quite small. Notice the claim is not that there is conclusive proof of where I received the stain, but rather overwhelming proof. And this, generally, is all an ordinary notion of proof that is needed. So, like the solution to the Quine/Duhem paradox, the solution to the skeptical paradox is a restricted one. There is no successful account of knowledge that assumes that we can have certain knowledge of empirical truths. However, there can be overwhelming evidence of such truths. And this is all that is needed of an account of empirical knowledge.

Conclusion

In sum, the Quine/Duhem Paradox, and by extension, the skeptical paradox have a restricted solution, one the gives up the Cartesian ideal of complete certainty and conclusive proof. Our ordinary notions of proof and knowledge are problematic. However, alternative notions to evidential appraisal and knowledge can be given. These more restricted notions do all that is needed of our ordinary notions.

Appendix: Explanation of Calculations for the Bayesian Solution

It is given that A and H entail e, but not-e is observed. Also the probability of observing not-e, while A and H are true is 0. That is, P(not-e | A and H) = 0

We assigned H a very high probability, P (H) = .9, whereas we have assigned A a prior probability which makes it only slightly more likely than not. P (A) = .6. We also assumed that H and A are statistically independent. That is, the probability of H does not change the probability of A, or vice versa.

With regards to the assumed likelihoods, the probability of not-e being observed, given that A is true and not-H is assumed to be a very small number, x (for example, .001). That is, P(not-e | A and not-H) = x. On the other hand, we assumed the likelihood of not-e being observed given not-A being the case is assumed to be 50 times more likely, 50x. So: P(not-e | not-A and not-H) = 50x and P (not-e | not-A and H) = 50x.

We then plug these numbers into a simplified form of Bayes' Theorem:

P (H | not-e) = P (not-e | H) P (H)

P (not-e)

P (not-e) = P (not-e | H) P (H) + P (not-e | not-H) P (not-H)

P (not-e | H) = P (not-e | A and H) P (A) + P (not-e | not-A and H) P (not-A)

= 0 + 50x (.4)

= 20.6x

P(not-e) = 20x (.9) + 2.06x = 20.06x

For the posterior probability of H,

P (H | not-e) = 20x (.9)

_____ = .897

20.06x

For the posterior probability of A,

P(A | not-e) = P(not-e | A) P (A)

P (not-e)

P (not-e | A) = P (not-e | A and H) P (H) + P (not-e | A and not-H) P(not-H)

= 0 + x (.1) = .1x

P (A | not-e) = .06x

_____ = .003

20.06x

Whereas the probability of H is hardly changed, the probability of A plummets.

Works Cited

Descartes, René. (trans. 1980). *Meditations on First Philosophy*, trans. Cress. Indianapolis: Hackett.

Dorling, John. (1979). «Bayesian Personalism, the Methodology of Research Programmes, and Duhem's Problem.» *Studies in the History and Philosophy of Science*. vol 10; pp. 177-187.

Duhem, Pierre. (trans. 1954). *Essays in the History and Philosophy of Science*, trans. Ariew and Barker. Indianapolis: Hackett.

Kuhn, Thomas. (1962). *The Structure of Scientific Revolutions*, first ed. Chicago: University of Chicago Press.

Mayo, Deborah. (1997). «Duhem's Problem, the Bayesian Way, and Error Statistics: What's Belief Got to Do with It?» *Philosophy of Science*, vol. 64; pp. 222-244.

Mayo, Deborah. (1996). *Error and the Growth of Experimental Knowledge*. Chicago: University of Chicago Press.

Margaret Cuonzo
Department of Philosophy
Long Island University, Brooklyn Campus
<margaret.cuonzo@liu.edu>

SORITES (ΣΩΡΙΤΗΣ), ISSN 1135-1349
http://www.sorites.org
Issue #17 — October 2006. Pp. 95-103
Between Platonism and Pragmatism: An alternative reading of Plato's *Theaetetus*
Copyright © by Paul F. Johnson and SORITES

BETWEEN PLATONISM AND PRAGMATISM: AN ALTERNATIVE READING OF PLATO'S *THEAETETUS*

Paul F. Johnson

I was in a camp near Bayeux after the Normandy landing. A letter from Wittgenstein telling me he was reading Plato's *Theaetetus*: «Plato in this dialogue is occupied with the same problems that I am writing about.»

— M. O'C. Drury,

Whether it is entirely fair to appropriate the work of the late Wittgenstein for the pragmatic tradition, as contemporary writers such as Richard Rorty and Robert Brandom have tried to do, is an interesting and important question. Whether a place can be found in the pragmatic tradition for Plato is a question less frequently raised and may seem bizarre given the the historical dislocalities it involves. But if Wittgenstein could claim to have been working on the same problems as Plato, and if Wittgenstein can be claimed to have been working in the pragmatic tradition, perhaps it is worth the effort of trying to describe the general contours of the problems in the *Theaetetus* in a way that might have piqued Wittgenstein's interest, and to articulate by this means a philosophical theme which could be seen to stretch from one end of our tradition of discourse to the other. This is what I shall attempt in this paper.

There are two claims about the *Theaetetus* which I shall need to assume as generally accepted among scholars today which provide the basis for my argument, both of which are neatly expressed by Robin A.H. Waterfield in the interpretive essay which accompanies his translation of the text. «No scholar would today deny,» writes Waterfield in 1987, «that *Theaetetus* is one of Plato's later compositions … and indeed belongs to a period when [he] was having doubts about some of his earlier ideas and assumptions.» (1987, p. 132) Despite the consensus that it is a later work, the *Theaetetus* shares with virtually all of the early, Socratic dialogues a sort of ceremonial throwing up of the hands at the end with the dull acknowledgement that no positive result has been achieved. Here is the closing exchange between Socrates and Theaetetus (210a8 − b12):

> SOCRATES: And nothing could be sillier than for us, who are engaged in an inquiry into knowledge, to say that it is correct belief accompanied by knowledge (of uniqueness or whatever). Therefore, Theaetetus, knowledge can be neither perception, nor true belief, nor true belief with the addition of a rational account.
>
> THEAETETUS: Apparently not.
>
> SOCRATES: Well, are we still pregnant? Is anything relevant to knowledge still causing us pain, my friend, or have we given birth to anything?

> THEAETETUS: *I* most certainly have: thanks to you, I've put into words more than I had in me.
>
> SOCRATES: And does our midwifery declare that everything we produced was still-born and that there was nothing worth keeping?
>
> THEAETETUS: Absolutely.

The interlocutors claim to have reached no other result than to realize how little they really know about the topic they were talking about, and it seems odd that Plato, in a late dialogue, would revert back to the aporetic mood of the earlier ones. But it is highly significant, in connection with the second of Waterfield's claims about Plato having second thoughts about the Forms, that there is no mention anywhere in *Theaetetus* of the Forms, the quintessential platonic doctrine which provides the center of gravity for so much of what is taken to be Plato's settled position on epistemological and metaphysical issues generally. Now, a facile, but not implausible reading of the dialogue would urge us to put these two features of the dialogue down next to each other and draw the conclusion which is then only a short step away: it is precisely *because* there is no mention of the Forms that Socrates and his friends must reach their inconclusive, aporetic result, and it is precisely to reinforce the centrality of the Forms in his theory of knowledge that Plato leaves Socrates and Theaetetus in the lurch once more.

I think we can do better than this. Let us accept the authority of Waterfield and suppose for the sake of argument that the *Theaetetus* is indeed a later composition and the lack of any mention of the Forms is indicative of Plato's own misgivings about the whole Theory of Forms. On these terms and conditions, I think it is possible to reach a much less aporetic result and a far more constructive set of claims concerning Plato's thoughts on the nature of knowledge. I propose a reading of the dialogue in which Plato can be seen to be developing an alternative line of approach to the question of knowledge. I shall argue that various features of this approach bear a striking resemblance to a contemporary school of thought loosely affiliated under the term «pragmatism» and associated with the work of such prominent contemporary philosophers as Robert Brandom, Richard Rorty and Jürgen Habermas. I also find a strong thematic resonance between the results obtained from this alternative reading of the *Theaetetus* and prominent features in the work of Wittgenstein. I'll build my case for a pragmatic reading of the dialogue by showing the affinity with some claims of Wittgenstein as interpreted by Brandom. These lines of affinity could be extended to include features of the work of Rorty and Habermas but that is work for another day.

The first two thirds of the dialogue is given over to a discussion of Theaetetus's first attempted definition of knowledge, that knowledge is perception. Socrates praises Theaetetus for his boldness in asserting his best opinion, but he is worried that this thesis, simple though it is to state, is really an expression of a whole vast theoretical position that it will take some trouble to articulate. In order to contextualize this thesis in its broader theoretical setting, Socrates enters into a long discussion of what he takes to be the metaphysical background against which the claim can be made proper sense of. Socrates achieves this broader theoretical perspective by combining the doctrine of Heraclitus — that everything is flux — with the doctrine of Protagoras — that man is the measure of all things. This conflation of doctrines is famously controversial, and it is a fair and important question to ask whether the argument which ultimately defeats the «identity thesis» (that knowledge and perception are the same thing) would go through if we were more careful than Socrates is to separate the distinctively Heraclitean from the Protagorean claims. The reason for his running the two together is

perhaps not hard to specify. Protagoras offers a theory about the nature of human understanding and knowledge, and it is essentially Protagoras' theory of knowledge that Theaetetus introduces; in order for that theory to be fully intelligible, we should also need some account of the sort of world we are living in so that we can say what it is we have knowledge *of*, and how that world calls forth or instigates the peculiar form of knowledge we humans are subject to. Heraclitus provides this second theoretical desideratum. The two parts of the account work beautifully together to provide something like a totalizing theory about what knowledge is (perception) in the context of a world of flux (that which is to be known).

Rather than concentrate on the argument which Socrates pursues to show that the identity thesis is mistaken, I would like to highlight what may appear to be a minor complaint voiced by Socrates against the more comprehensive theory that we get when we run Heraclitus and Protagoras together as Socrates does. It would be a minor complaint except that Socrates returns to it several times in the discussion, and frequently enough to suggest that Plato intends us to take it more seriously than the sometimes flippant, sometimes ironic tone would otherwise warrant. I am talking about the frequent mention of the language we use in common life, the language we use in casual conversation or in the marketplace; and the language we must unavoidably invoke in order to get a philosophical discussion of knowledge off the ground in the first place. Socrates points out over and again, that if Protagoras is right in his ideas about knowledge, then ordinary speech is grossly inadequate to the task of expressing or capturing knowledge. After explaining how Protagoras would account for our perception of things which are large or white or warm, Socrates says (154b) that «everyday speech, my friend, carelessly uses words which, from the Protagorean viewpoint and others which approximate to it, are extraordinarily absurd.» A little later he claims that if Heraclitus is right then «the verb 'to be' should be deleted from all contexts, despite the fact that habit and ignorance often force us to employ it, and did so even in our recent discussion.» (157b) Socrates puts into the very mouth of Protagoras, in the famous speech he presents on the great sophist's behalf, the claim that the «habitual use of words and expressions … are the means by which most people confuse one another in all sorts of ways, because they can be manipulated at will.» (168b) And reverting back to the Heracliteans he says (183b) that «those who hold this theory need to set up another language since at present they don't have expressions which fit the theory, except 'not like this either'.»

Leaving aside the question of how appropriate it is to combine the Heraclitean metaphysics with the Protagorean epistemology, or whether the successful attack upon the latter would be effective if the former elements were excised from the theory, what seems clear is that either theory separately, or both of them combined produce a result which conflicts with our ordinary way of talking. We have nouns which help us to identify perduring objects in space; predicate terms which enable us to impute essential and accidental properties to such objects. And we get on pretty well with the world and with one another by invoking the ordinary words we inherited and learned how to use at our mother's knee, quite bereft of the benefits of abstruse philosophical theory. What the discussion of Heraclitus and Protagoras puts before us is the possibility that the language and parlance of common life is wholly mistaken in the representations of the world which it makes available to us. The combined theory, if correct, would require a wholesale revision of ordinary language, a sort of linguistic legislative omnibus bill that would purge, innovate, twist and leverage our vocabularies into a better fit with the world as it is disclosed to us through the more accurate lens of philosophical theory. On my alternative reading of the *Theaetetus* in which this seemingly minor complaint is brought into the foreground, we may interpret Plato as raising the question

whether any such global revision of ordinary language is even conceivable, and, by extension, as testing the possibility that ordinary language is basically alright just as it is, and that it provides the unavoidable starting point for any inquiry into the nature of knowledge. There is, at any rate, something seriously wrong with any theory of knowledge that would require us to abjure the language we toss around between ourselves in our comings and goings in the affairs of daily life. Surely we make mistakes in our quotidian dealings with one another, but can we be wholly mistaken?

The identity thesis is defeated, however, on altogether different grounds which lie to the side of our present concerns (they are normative grounds, and a separate case could be constructed to account for the force of Socrates' argument which would reinforce the pragmatic reading of the dialogue I am attempting here). A second, very important segment of the dialogue follows hard upon the collapse of the identity thesis in which the linguistic issues are taken an important step further. What the foregoing discussion raises is the possibility that the world could be, in its reality, altogether different from the way we represent it in our language. Each one of us believes any number of distinct things about the world — that today is Thursday, that the earth revolves around the sun, and that the sun will rise tomorrow — and most of these beliefs, at least the ones we have occasion to make explicit to ourselves, are available to us in the form of sentences in the language we speak. But if, as the Heraclitean/ Protagorean theory seems to imply, our language is systematically and globally distorting of the truth about the world, then all the beliefs we entertain in the terms of that language are also distorted, and probably wrong. This next segment of the dialogue is devoted to just this topic — the possibility of false belief — and Socrates confesses that it is a topic which has puzzled him for a long time. In working through this socratic puzzlement, Plato may be seen to be testing an epistemological hypothesis, exploring a line of approach to the question of knowledge that is very different from the the one which issues in his Theory of Forms during his middle period. It is also a line of approach that has much in common with what is discussed by recent authors under the rubric of formal pragmatics. The contemporary pragmatists that I have in mind are Robert Brandom and Jurgen Habermas, but I'll confine my attention to Brandom's brand of pragmatism, about which, more in a moment.

At the heart of Socrates' bewilderment, in his initial expression of it, there lies an equivocation between two different ways of talking about beliefs. In the argument which plays out between 187e and 189c, the objects of belief are described as both «the way things are,» and «items of knowledge,» or, as we might put it, the facts out there in the world and the propositions we use to express them. Now, in order for the argument to go down the track it does and reach the conclusion that «it is not possible to believe what is not, either about anything which is or in any absolute sense,» and that therefore «false belief is different from believing what is not,» we need to ascribe the same form of «being» to both the «things that are» — that is, objects in the world, the facts which they constitute — and the «items of knowledge» which are the objects of our beliefs — the propositions in which the facts are expressed. The proposition itself has to *be* something in order to be an object of belief. Owing to the equivocation between facts and propositions, it appears impossible to say that there could be propositions to which no facts correspond, or propositions which represented non-being. The question, «How can one believe what is not?» is the question, «How can one have nothing (non-being) as an object of belief?» When I believe something false, surely there is *some* object before my mind. So how can that something not-be, that is, be false?

The assumption which guides the first leg of the argument is «for each and every item, that it is either known or not known.» The problem which the argument discloses arises

through our «platonizing» of propositional contents, imputing to propositions themselves a form of being which is the same as the being of ordinary objects or facts. The assumption that every item is either known or not known posits a set of «items», some of which are known, some of which are unknown, but all of which have being. This assumption is shown in very short order to lead to unsatisfactory results, and Socrates proposes to replace the assumption with another one, to «conduct the inquiry not on the basis of what is known and unknown, but on the basis of what is and what is not.» This is progress, or at least an open possibility because we here resolve the conflation of ontological and epistemological posits in favor of an unequivocally ontological way of putting things. But even this won't work because it requires us to say that false belief occurs «when someone thinks and what he thinks is not true.» (188e1) Even if we grant the reality of the proposition one holds before one's mind in a state of belief, making sense of false belief still engenders the gap between thinking a thought which «is» (in the ontological sense) and thinking a thought which «is not true.» What someone thinks — the thought or belief or proposition, whatever you want to call it — has being, but this account of false belief requires us to attach the property of falsity to an existent entity. But truth and falsity are not ontological properties at all: we cannot speak of true being or false being. So, putting our feet firmly on the side of ontology will not allow us to make sense of *false* belief because falsity cannot be given an ontological rendering.

This is no trifling matter for Plato. The Theory of Forms posits a realm of being precisely for the sake of giving an account of genuine knowledge — as opposed to the lesser grades of cognition like understanding and imagination and perception. In his middle period, Plato resolves the epistemological question by moving quite deliberately onto ontological grounds. The Forms are real — more real than the things we can perceive with our senses — and knowledge consists in the mind's putting itself in contact with these entities (to use a deliberately vague locution). In a series of dialogues from *Meno* to *Sophist* to *Parmenides*, Plato raises a whole range of problems which the Theory of Forms must address if it is to be fully satisfactory and prevail against the skeptical and relativistic position of the sophists — people like Protagoras and Gorgias and Thrasymachus and Callicles — whom Plato regarded as a desperate threat to the viability of the Athenian polity. Many of the problems associated with the Theory of Forms come to this: as long as there is a gulf between human cognitive capacities — and language as an essential feature of those capacites — on the one hand, and the reality of the world on the other — whose ontological status is utterly indifferent to language; as long as there is a gulf between the domain of truth and the domain of being, there will remain the possibility that our language simply does not get us over to reality, that it in fact constitutes an unbridgeable gap, and that knowledge is impossible. This is not a conclusion that Plato could countenance. Perhaps by the time of his writing the *Theaetetus* — and again assuming that it is indeed one of his later works — Plato was ready to entertain a different approach to the question of knowledge, an approach which circumvents the ontological issues altogether and goes, rather, to the heart of the matter: the question of language.

Notice what happens next in the dialogue. Notice, in particular, the subtle shift of terminology which occurs at 189e − 190a. Thinking is described here as a discussion that the mind has with itself, and a belief is called «a statement, but one which is not made aloud and to someone else, but in silence to oneself.» Something vitally important has happened here. The question of knowledge had hitherto taken the form of a relation that could be expressed in various ways: between the mind and the forms; between «items of knowledge» and «the things that are», between thoughts or beliefs and the world. The question of knowledge is posed here in terms of a relationship between a speaker and an auditor — both of whom in this

preliminary redescription of the nature of thought happen to be the same person. Rather than testing for the truth of our beliefs by holding them up to the world, and thereby requiring us to compare one thing which is inherently linguistic in nature with something else which is inherently non-linguistic in nature, we may test for the truth of a belief, now described as a statement one makes to oneself, by placing it within the context of the other beliefs we hold, the other statements we are prepared to assert — to ourselves or to others. Knowledge does not consist in the mind's taking possession of something external to itself, and the mark of truth is not the correspondence of a belief to a fact but the consistency of one statement with a collection of other statements. Socrates asks Theaetetus (190c) «Do you think that anyone, sane or insane, seriously *says* to himself and tries against the odds to convince himself that what is a cow is a horse and that what is two is one?» (Emphasis added.) No, he continues, «on the assumption that believing is making an internal statement, no one whose mind has a grasp on both of two things, and who therefore makes statements — that is, has beliefs — about both, could state and believe that what is different is different.» The impossibility of believing that a horse is a cow has nothing to do with the fact that the inherent properties of the one are ontologically incompatible with the inherent properties of the other; the point is that you cannot *say* that a horse is a cow, either to yourself in the private inner dialogue of thought or to anyone else in public discourse because to do so would be to violate the protocols of speech, contradict the way we do, as a matter of fact, use these words in the parlance of common life. Plato puts into the mouth of Socrates the recurrent complaint that the abstruse theories of Heraclitus and Protagoras do violence to our ordinary ways of talking; he seems now to be flirting with the possibility that the ordinary ways of talking have a certain authority and firmness about them and may serve as a sort of testing grounds for the tenability of any given statement that one has come to hold as a belief. I must reject as false any statement which is inconsistent with other statements to which I am already committed or with statements that other people may be able to convince me I should be committed to. The internal logic of our language — or rather the common life speech practices that we all fully well know how to engage — provides all the criterion we should ever need to gauge the veracity of our beliefs. A false belief might then be characterized as a statement I had had occasion to assert to myself provisionally but one which, unbeknownst to me prior to my testing the statement in thought or in discourse with others, was inconsistent with other statements to which I was more deeply committed.

This interpretation is compatible, indeed supportive, of what Socrates goes on to say a little later in the dialogue, at a point where he and Theaetetus feel compelled to acknowledge their failure to get through to an adequate statement of what false belief consists in. But haven't I just said what a false belief would be on the assumptions that Socrates has given us to work with? Not quite. All we've got at this point is an indication of the *method* we should have to deploy in order to test the veridicality of any of our beliefs. We cannot determine which of our beliefs are false one-by-one, or simply by inspection because falsity is not a quality a belief has all by itself. The falsity is only something that comes out in the process of discussion, as part of an activity that people engage in, either individually or in groups. What Socrates says later on in the dialogue is this: «The fact is that a satisfactory understanding of knowledge is prior to the possibility of knowing about false belief.» (200d) What I should like to suggest now is that Plato has in fact given us that «satisfactory understanding of knowledge,» but not in the form that we may have expected to find it, given all the talk about «definitions of knowledge» in the early going of the dialogue, and all the labored efforts by the droves of philosophers in our own day to identify Plato's «theory of knowledge.» Plato does not give us a theory of knowledge, he gives us a method for its

pursuit; he does not *say* what knowledge is, he *shows* us how it may be attained. The dialogue itself is an illustration of the method, an argument by exemplification. At the end of the dialogue, Socrates and Theaetetus concede that they have not reached any acceptable characterization of knowledge, but clearly they have *learned* something. And that, as Socrates says, is itself a «handsome reward.» (187c)

Putting the matter as I have, claiming that Plato does not say, but only shows us what knowledge — or at least the pursuit of it — consists in, is intended to resonate with the language of Wittgenstein's great *Tractatus*. One of the most important teachings of that work is that we cannot explicitly say or articulate wherein consists the power and authority of the logic which structures our language, we can only show it in the use we make of that language. We cannot expect a fully explicit theoretical statement of the nature and workings of logic because we cannot use the language which presupposes and is built upon a consolidated logical superstructure to represent in linguistic terms the very nature and design of that superstructure. In a sort of adumbration of Gödel, Wittgenstein maintains that any such logical theory would be either incomplete or self-referentially incoherent. Plato seems to be hovering in the same general vicinity with his claim, in the *Theaetetus*, that we should have to have *some* understanding of what knowledge is before we could even undertake an inquiry into the nature of knowledge or, more explicitly, that we should need to have a «satisfactory understanding of knowledge» before we can construct an account of what false belief is. And the two books have a similar paradoxical ending: Socrates and Theaetetus conclude that they do not know what knowledge is, but they have learned something worthwhile along the way to finding out even that much; Wittgenstein tells us that he has not really given the reader a clear statement of what logic is or what it does, but anyone who has followed his meaning will have got the message anyway, and can toss the ladder away.

My intention here, however, is not simply to point out interesting similarities between the claims of these two great thinkers, but to try and say something interesting about the nature of knowledge itself. It is actually Plato who has, I think, said something intensely interesting about the nature of knowledge. But I have advertised an intention to show the transition from platonism to pragmatism. That Plato has moved away from platonism is at least suggested in the lack of any mention of the Forms in *Theaetetus*, and, I hope, in the significance I have imputed to that lack in the foregoing discussion. But where is the pragmatism in any of this?

Let me note, first of all, that a charge of platonism is frequently alleged against the Wittgenstein of the *Tractatus*, and also against Wittgenstein's inspiration for that work, Frege. In the case of the early Wittgenstein, the platonism consists in the claim that the logical structure of our language which manifests itself in our talk is just sort of *there*, and is, in some unspecified, and perhaps unspecifiable sense, real. The same transition that reveals itself when we read the *Theaetetus* as one of Plato's later works in relation to his more dogmatic middle period would provide a nice template for describing Wittgenstein's development from his own early work to the later. That is a topic for another day. But in order to characterize the end point of the emerging trajectory as, in some sense of the word, «pragmatic,» let me defer once more to the authority of people who have thought long and hard about these topics, and who claim, and argue at length, that Wittgenstein's later position may be described in decidedly pragmatic terms. Richard Rorty and Robert Brandom have both claimed the late Wittgenstein for the pragmatic tradition, and have teased out certain aspects of his work to incorporate into their own, more clearly defined pragmatic positions. I shall draw on several aspects of Brandom's position, as laid out in his important book, *Making it explicit* (1994), to sketch out

one conception of pragmatism that is current today, the one that I think can be seen lurking in the *Theaetetus* according to the reading that I recommend. Brandom constructs this conception of pragmatism on the basis of several doctrines and arguments he draws from the late Wittgenstein.

To arrive at his own understanding of Wittgenstein, Brandom presents an extended analysis of the argument of Saul Kripke in the latter's by now classic study of «Wittgenstein on Rules and Private Language.» According to Brandom's Kripke, Wittgenstein's discussion of rules in relation to our everyday linguistic practices leads us to a dilemma: in our attempt to show how our practices are rule-governed we are either driven into an infinite regress — we need not only rules to structure our moves in the language game, but rules to show us how the rules are to be applied, and so on up — or forced to construe the rules so loosely as to permit virtually any move in the game to count as complying with them. On either horn of the dilemma there is no good way to show how the rules govern the behavior. Kripke is pleased to settle for a «skeptical» resolution of the problem: there is no way to know, in his famous example of the mathematical operator «quus,» whether a given individual is applying the rules we would all accept as the ones which govern arithmetic or some bizarre permutation on those rules whose bizarreness is concealed only by the fact that the individual seems to get the same results we do when we apply the rule «plus.» Reading Wittgenstein through this Kripkean lens, Brandom draws the conclusion that the practices of everyday life — including both arithmetic and ordinary conversational practice — have a certain intuitive clarity and authority about them which stand in no need of validation by our teasing out the rules which govern them. We can, to be sure, articulate and «make explicit» to ourselves the general forms and the rules which are implicit in our discursive practices, forms like the conditional statement and rules like modus ponens. The mistake is only in thinking that these general forms and rules are somehow prior to, or enjoy a privileged status over the practices themselves. No, the practice is there first, practice has precedence over logic. If we try to think of logic, or mathematics as revealing of a rational structure which is simply «there», a structure possessed of some kind of ontological reality to which our thought, and our language and our knowledge must be made to conform, we are well on our way to committing the same sort of metaphysical, platonizing excess which Plato may, in the *Theaetetus*, have had occasion to regret in his own earlier work.

This, Brandom argues, is the proper way to understand Wittgenstein's teaching in the *Investigations*, and, I would add, it is an interpretation which is reinforced by what Wittgenstein says in *On Certainty*. Sooner or later our attempts at ever more basic explanations come to an end; somewhere, as Wittgenstein says, «our spade is turned.» Somewhere we just have to say: this we understand well enough to get on with, this we may use as our beginning point for further explanations if we will. We have a pretty sure grip on how to use the word «knowledge» in our every day comings and goings, even if we cannot give a theoretically satisfactory account of what it is. So much the worse for theory. We are perfectly justified in taking our linguistic practices as a starting point in our philosophical inquiries, and accepting their normal, effective operation as explanatorily basic.

This claim constitutes one of the most important features of the new pragmatism, and it is also, I submit, an important part of the argumentative strategy which is trying to emerge in the course of Socrates' discussion with Theaetetus. Rather than look for explanatory closure in any metaphysical or transcendental domains, we ought to content ourselves with explanations which incorporate and legitimate the practices which everyone understands well enough, and which only a philosopher or a madman would suggest are so seriously in

disrepair as to make them unsuitable for service. The theories of Heraclitus and Protagoras throw our ordinary language into confusion, Socrates says, and to accept their theories would require us to revise our normal ways of talking. But, Socrates also seems to suggest, you, Heraclitus and Protagoras, have given us no independent grounds for thinking that your theories are so much to be preferred as to warrant the massive effort that would be required to wrangle our linguistic practices into line with them. What Brandom imputes to the Wittgenstein of the *Philosophical Investigations* is a compelling argument which demonstrates that no such independent grounds can ever be found. Socrates, and Wittgenstein, are calling us back from the etherial heights of philosophical cloud-cuckooland and inviting us to begin our philosophical inquiries at a point where we may expect to get real traction with problems that actually matter to us, and within a context which precludes our going off the rails and making all kinds of wild and exaggerated claims that only make us look ridiculous. This contempt for the excesses of metaphysical speculation and disdain for the pretensions of theory and its presumption to instruct us about how we ought to talk, is what gives the scoring rasp to Socrates' ironic and sarcastic tone of voice in the *Theaetetus*. It also motivates the painstaking and fiercely analytical researches of Wittgenstein in the *Investigations*. And the recommendation that we come back down to earth and reinstitute philosophy as an instrument for practical research, that we eschew and resist the temptations and blandishments of metaphysical abstraction, is at the heart of the new pragmatism as elaborated by Brandom.

References

Rush Rhees (ed.), 1981. *Ludwig Wittgenstein: Personal Recollections*. Totowa, NJ: Rowman and Littlefield.

Plato's *Theaetetus*, translated and with an essay by Robin A.H. Waterfield. Penguin Books. 1987.

Wittgenstein, L., 1922. *Tractatus Logico-Philosophicus*. C.K. Ogden (trans.). London: Routledge & Kegan Paul.

_____, 1958 (2nd ed.). *Philosophical Investigations*. G.E.M. Anscombe and R. Rhees (eds.), G.E.M. Anscombe (trans.). Oxford: Basil Blackwell.

_____, 1969. *On certainty*. G.E.M. Anscombe and G.H. von Wright (eds.), Denis Paul and G.E.M. Anscombe (transs.), Oxford: Basil Blackwell.

Kripke, S., 1982. *Wittgenstein on rules and private language*. Cambridge, MA: Harvard University Press.

Brandom, R., 1994. *Making it explicit*. Cambridge, MA: Harvard University Press.

Paul F. Johnson
St. Norbert College
De Pere, WI 54115
<paul.johnson@snc.edu>

SORITES (ΣΩΡΙΤΗΣ), ISSN 1135-1349
http://www.sorites.org
Issue #17 — October 2006. Pp. 104-131
Blob Theory: N-adic Properties Do Not Exist
Copyright © by Jeffrey Grupp and SORITES

BLOB THEORY: N-ADIC PROPERTIES DO NOT EXIST

Jeffrey Grupp

---

1. Introduction

Discussion of, and reference to, *properties* pervades contemporary metaphysics, physics (e.g., the electron has *charge*), and ordinary language (the lion is *sublime*). But only a specialized group of a few hundred philosophers discuss the very specific details of what is involved in *a particular having a property*. Discussion of properties in the literature is of course ubiquitous, as when physicists discuss the properties of space or particles, or when philosophers discuss modal properties, mental properties, the properties of God, the properties of space and time, the properties of matter or ordinary objects, and so on. And discussion of the nature of properties — are they universals or tropes, platonistic or non-platonistic, physical or non-physical? — is of course also common in the literature. But discussion of *the very precise details of what exactly is involved in a property's being possessed by a particular* is restricted to a minority of philosophers. Examples of a few of the philosophers who are involved in the discussion of the philosophy of property possession are Bertrand Russell, D. C. Williams,[1] A. J. Ayer, D. W. Mertz,[2] David Armstrong,[3] Michael Loux,[4] Hector-Neri Castañada, and Keith Campbell,[5] George Bealer,[6] Doug Ehring,[7] Reinhardt Grossman,[8] Kristopher McDaniel,[9] Dean Zimmerman,[10] E.J. Lowe,[11] John O'Leary-Hawthorne and Jan

---

1. Williams, 1998.

2. Mertz, 2003.

3. Armstrong, 2001, 1997, 1989.

4. Loux, 2001, 1998.

5. Campbell, 1990, 1981.

6. Bealer, 1982.

7. Ehring, 2001.

8. Grossman, 1992.

9. McDaniel, 2001.

10. Zimmerman, 1997.

11. Lowe, 2002, 2001, 1998.

Cover,[12] Panyot Butchvarov,[13] J. P. Moreland,[14] James Van Cleve,[15] Albert Casullo,[16] William Vallicella,[17] Peter Simons,[18] Michael Jubien,[19] John Lango,[20] Arda Denkel,[21] H. H. Price,[22] Nicholas Wolterstorff,[23] Francesco Orilia,[24] M. Glouberman,[25] Cody Gilmore,[26] Chris Swoyer,[27] and Jonathan Schaffer,[28] to name a few.

If the arguments I give in sections 2 - 4 of this paper are correct, they may lead to vindication of a position that has been called «blob theory»: there are no n-adic properties. The point of this paper is to show that blob theory may be the correct account of reality, due to hitherto undiscussed problems that I will point out to do with property possession in bundle theory and substance theory,[29] and that are so serious that I do not see a way to avoid blob theory.[30]

---

[12]. O'Leary-Hawthorne and Cover, 1998.

[13]. Butchvarov, 1979.

[14]. Moreland, 2001.

[15]. Van Cleve, 2001.

[16]. Casullo, 2001.

[17]. Vallicella, 2002.

[18]. Simons, 2000.

[19]. Jubien, 1997.

[20]. Lango, 2002.

[21]. Denkel, 1997.

[22]. Price, 2001.

[23]. Wolterstrorff, 1970.

[24]. Orilia, 1998.

[25]. Glouberman, 1975.

[26]. Gilmore, 2003.

[27]. Swoyer, 1999.

[28]. Schaffer, 2003.

[29]. I will use «substance» in this paper to denote any ordinary object that is not a property, that is not a bundle, and which exemplifies n-adic properties.

[30]. In addition to vindicating blob theory, the arguments of this article may vindicate a sort of atomism similar to the atomism that some of the ancient Greek philosophers might have been arguing for, where atoms were considered to be without attributes, without intrinsic nature, numerically distinct but metaphysically indiscernible.

In this paragraph I will give a brief synopsis of how I argue that problems to do with the theories of property possession lead to blob theory. As I will discuss in later sections, a property must be a property *of something*. There cannot be properties that are not possessed by something that they are *properties of*, for if there were, they would be properties that are not properties of anything (they would be properties that are not properties). That is how I come to the conclusion that properties do not exist, for the following reasons. If it could be argued that there are no currently available coherent theories of property possession, then the best account of reality we have is one where particulars do not have properties. If that is the case, then if there are any properties, they can only be properties that are not properties of any particular. But if there cannot be any such properties, as just mentioned, and as will be argued below, then there cannot be any properties *whatsoever*. Therefore, by focusing on problems to do with property possession, I am able to come to the conclusion that properties do not exist.[31]

Before discussing problems with property possession, in this introduction I will give some introductory comments about blob theory (subsection 1.1), I will discuss the non-commonsensical nature of blob theory (subsection 1.2), and I will discuss property possession in theories of objects as given to us by metaphysicians (subsection 1.3).

1.1 Blob Theory

Blob theory follows from what some have called «*extreme* nominalism»:[32] n-adic properties do not exist. According to blob theory, reality is unstructured (it is an unstructured *blob*). Moreland lucidly describes blob theory:

> Among other things, EN [extreme nominalism] is what has been called a blob theory regarding concrete particulars. A blob theory of ordinary concrete particulars is consistent with a mereological analysis of those particulars as wholes constituted by separable parts; but a blob theory renders concrete particulars structureless entities with no internal differentiation of properties and relations within those concrete particulars. In this sense, EN treats concrete particulars as simples and thereby fails to acknowledge that the

---

If properties do not exist, then minds must invent experiences of properties in the mind in order to account for the experience of a reality one might believe to have properties. To my knowledge, this idea—the idea that the ordinary, commonsense, macroscopic reality of surfaces and patches of color is largely an invention of the mind in its incorrect representations of particulate reality—is in line with quantum theory, since quantum theory is mostly about empty space between particles, point-masses (which have no size, and thus no color), and so on.

Furthermore, on this account, any mind, also being a propertyless item, would be an atom (or an activity of a number of numerically distinct atoms, if propertyless atoms can be involved in activities.) The idea that a mind is a philosophic Greek atom is suggested by (though apparently not strictly argued for) by Yandell (1999, 114).

I will discuss these issues a bit more in parts of this article below, especially the conclusion.

[31]. It may be the case that some time down the road a philosopher will develop an entirely new theory of property possession which my arguments do not attack and thus blob theory's correctness is not vindicated after all. But since there is, to my knowledge, no such alternative theory of property possession in the works, I ignore this possibility in this article.

[32]. What I mean by *extreme nominalism* (EN) is given by Armstrong:

> There are a number of varieties of Nominalism, but a useful broad division of Nominalisms is into the extreme and the moderate varieties. *An **extreme** Nominalist denies that there are universals, and furthermore denies the existence of objective properties and relations*. The *moderate* Nominalist agrees that there are no universals, but does hold that there are properties and relations. They are particulars. (Armstrong, 1997, p. 21.)

> redness, circularity, size and other features of [for example, a red ball] are real entities that are neither identical to each other nor to [the ball] as a whole.[33]

(Extreme nominalism is not identical to Quinnean nominalism. The primary difference between the two is that extreme nominalism is identical to blob theory, and blob theory implies that, as I will discuss in subsection 1.2, nearly all our statements are false, whereas this is not the case at all in Quinnean nominalism.)

In sections 2 - 4, I discuss hitherto unnoticed problems to do with substance and bundle theories. I do not discuss blob theory in detail. Rather, my goal is only to argue for it by revealing hitherto unnoticed problems to do with property possession in analytic metaphysics.

1.2 Blob Theory in Opposition to Common Sense and Macroscopic Perception

Maddy writes that it is «quite clear» that blob theory does not describe our world:

> …[A] purely physical world… lacking all… properties… is a world entirely without individuating structure: The Blob. Even if such a world is possible, it seems quite clear that it is not our world, and thus, that it would be of no particular interest to the physicalist.[34]

In opposition to Maddy, I will present novel arguments which indicate that (i) metaphysicians apparently have not presented an account of property possession that is coherent, and for that reason, (ii) the position that *there are no properties* may be the best theory of reality we currently have. I will also argue in the conclusion, and in opposition to Maddy, that blob theory may be of utmost interest since it may be supported by theories of philosophic atomism.

Extremely counterintuitive theories of reality, arriving at conclusions similar blob theory have been discussed or argued for by many philosophers from Parmenides up to the present. For example, in an excellent paper, O'Leary-Hawthorne and Cortens discuss philosophical positions similar blob theory:

> In this paper, we wish to motivate a radical cluster of metaphysical pictures that have tempted philosophers from a variety of traditions. These pictures share one important theme — they refuse to accord countable entities any place in the fundamental scheme of things. Put another way, they all suggest that the concept of an object has no place in a perspicuous characterization of reality. Such pictures suffer from a number of fairly obvious *prima facie* difficulties. They seem to fly in the face of common sense. They seem to suggest that just about everything we say is false. They seem to gesture at a noumenal reality that human language is unable to describe. And so on. Our aim is to meet such difficulties head on and, by doing so, vindicate this sort of radical picture as one that deserves to be taken seriously.[35]

In Unger's earlier works, he also has argued for positions that arrive at conclusions much like blob theory:

> My main aim in this paper is to help foster a positive attitude toward a thesis of *radical nihilism*. According to this thesis, none of the things which, it seems, are most commonly alleged to exist do in fact exist: neither rocks nor stones, not tables nor chairs nor even people; perhaps most

---

[33]. Moreland, 2001, 74. Notice that Moreland refers to concrete particulars as *simples* in blob theory. This will be discussed more in the conclusion where I discuss that blob theory leads to a specific sort of philosophic atomism.

[34]. Maddy, 1990, 273.

[35]. O'Leary-Hawthorne and Cortens, 1995, 143.

> importantly, neither you nor I exist. The positive attitude toward this thesis is that it is worthy of serious consideration.[36]

If the reader is dubious about the project undertaken in this paper, due to the obvious disagreement that blob theory has with ordinary experience, I suggest that the reader still consider the arguments of this paper, for reasons I discuss next.

Serious consideration of accounts of reality that are entirely against our ordinary macroscopic experience of reality (perhaps even to the point of resembling a philosophy of the blob) is not uncommon in quantum physics, especially in theories of quantum gravity (string theory, M-theory, loop quantum gravity, etc.). (Quantum gravity theorists are not to be equated with quantum theorists *in general*, but rather they are to be thought of as a very specific subgroup of quantum theorists). Many theories of quantum physics, especially quantum gravity, are very much at odds with our commonsense understanding of reality, and our macroscopic ordinary perception of reality, including being in direct opposition with the rarely questioned and entirely commonsensical classical concepts of *distance*, *time*, *space*, *motion*, and so forth.[37] On this issue, Petitot and Smith write:

> The rise of mathematical physics has long been seen by many as dictating a dismissal of the phenomenal world — the world of macroscopically organized in objectual forms, shapes, secondary qualities and states of affairs — from the realm of properly ontological concerns and as dictating a concomitant 'psychologization' of phenomenal structures.[38]

Things are apparently so counterintuitive at the most fundamental quantum domain of the Planck scale that many quantum gravity theorists are now telling us that at the fundamental level nature is «timeless» and «spaceless». Consider what Greene, a leading quantum gravity theorist, tells us about noncommutative geometry, the mathematics that in the future might be found to describe the *smallest* level of reality that physicists study: «On scales as small as the Planck length a new kind of geometry must emerge, one that aligns with the new physics of string theory. This new geometrical framework is called *quantum geometry*.»[39] Greene continues:

> …[R]esearch on aspects of M-theory… has shown that something known as a *zero-brane* — possibly the most fundamental ingredient of M-theory, an object that behaves somewhat like a point particle at large distances but has drastically different properties at short ones — may give us a glimpse of the spaceless and timeless realm… [W]hereas strings show us that conventional notions of space cease to have relevance below the Planck scale, the *zero-branes* give essentially the same conclusion but also provide a tiny window on the new unconventional framework that takes over. Studies with these branes indicate that ordinary geometry is replaced by something known as *noncommutative geometry*… In this geometrical framework, the conventional notions of space and of distance between points melt away, leaving us in a vastly different conceptual landscape.[40]

---

[36]. Unger, 1980, 517.

[37]. For a discussion on many of these issues to do with the opposition quantum physics has with the concepts of space, time, distance, and motion, see Quentin Smith (2003). Also, the theory of atomism I argue for late in this article may also not involve time, space, distance, and motion.

[38]. Petitot and Smith, 1997, 233. In their article, Petitot and Smith attempt to argue *against* the position that quantum mechanics is strongly opposed to common sense.

[39]. Greene, 1999, p. 232.

[40]. Greene, 1999, p. 379

If reality is propertyless, then it is *unstructured* (undifferentiated) since, to give just one example, without part-whole relations (which are polyadic *properties*) there are no parts and wholes, and without parts and wholes, there is only one entity.[41,42] The account of reality at the quantum domain given by Greene more closely resembles an unstructured reality more than it resembles a reality with structure. For this reason, the philosophy of blob theory *may* (notice I wrote «may») be a description of reality *more* in accord with the fundamental quantum domain than the metaphysical realist[43] descriptions of reality are. Greene's passage of course *does not* establish that quantum reality = propertyless reality. Greene's passage only perhaps *suggests* that a description of quantum reality may be more like a propertyless reality than it is like a structured reality. This may be an important point for readers who are dubious about blob theory, since despite the obvious conflict with commonsense, ordinary perception, and our macroscopic understanding of reality that blob theory involves, there may nevertheless be reasons for the reader to consider the philosophy of the blob, since, at the very least, blob theory might be an account of reality that is aligned more with the fundamental level of reality than any metaphysical realist account is.

I will not discuss quantum theories in this paper further than the comments just given, other than one more comment in the next paragraph. The goal of this paper is only to argue that blob theory is a serious theory that deserves consideration due to the novel arguments I present in sections 2 – 4 against the established theories of property possession. In this paper, I only discuss problems with property possession, and I make no attempt to describe *how or why* humans experience an ordinary, common sense reality of properties if blob theory is the correct account.[44] I do not discuss why or how, if reality is propertyless, humans have experiences of properties, and have the experience of a world composed of properties grouped in a way where the properties give rise to ordinary objects. This paper is not about any issues except hitherto unnoticed problems to do with property possession in theories of ordinary objects.

The disagreement that blob theory has with common sense perception may appear to be a large issue to pass over, but I do not consider it so, for the following reason. Since quantum mechanics is entirely unable to explain why humans experience the commonsense macroscopic world of color patches and solid surfaces as they do, but is taken seriously, this

---

41. Or, as I will argue in the conclusion, there are numerically distinct unstructured (propertyless) entities that are metaphysically indistinguishable—such as in some ancient accounts of atomism.

42. I argue for the position that Western metaphysics leads to the position that reality can only be composed of one entity in two other articles (Grupp forthcoming), and where I use entirely different arguments than those used in this paper.

43. In the *Cambridge Dictionary of Philosophy* (Cambridge University Press, 1995) pp. 562-63, Butchvarov describes what is meant by «metaphysical realism»:

> Metaphysical realism, in the widest sense, [is] the view that (a) there are real objects (usually the view is concerned with spatiotemporal objects), (b) they exist independently of our experience or our knowledge of them, and (c) they have properties that enter into relations independently of the concepts which we understand them or of the language with which we describe them. *Anti-realism* is any view that rejects one or more of these theses, though if (a) is rejected the rejection of (b) and (c) follows trivially…
>
> In discussion of universals [properties], metaphysical realism is the view that there are universals…

44. See endnote 30.

appears to be evidence that fundamental reality is in opposition to commonsensical macroscopic reality, and thus in addition to quantum physics, blob theory should *also* be taken seriously. Since quantum experimental and empirical evidence leads to doubt about the correctness of our commonsense macroscopic perception of reality, it appears that if quantum physics is on track, we should be at ease when our philosophical reasoning leads to the position that our ordinary, commonsensical, macroscopic view of reality is *incorrect*. And it appears that we should be leery of theories that imply our ordinary, commonsensical, macroscopic view of reality is correct. This appears to imply that model of reality put forth by blob theory can be trusted *more than* the ordinary, commonsensical, macroscopic view of reality, due to the fact that blob theory may be more in line with an anti-commonsensical view of reality that denies ordinary perception and our macroscopic view of reality. Quantum theorists also ubiquitously *avoid* discussion of *how or why* ordinary common sense reality appears the way it does in light of the highly counterintuitive quantum theories.[45] Quantum theories are taken seriously even though they have enormous disagreement with commonsense, ordinary, macroscopic reality. Since quantum theories show that reality at the fundamental level might be largely unstructured, then I see no reason why blob theory, which arrives at a similar picture of reality, *cannot also be taken seriously*.[46] If my arguments in this article are correct, then blob theory is not only more in accord with the most progressive areas of quantum reality (namely quantum gravity), it is also more coherent than the metaphysical realist theories since my arguments in sections 2 – 4 apparently show metaphysical realism to be *incoherent*.

1.3 Substances that are Bundles, and Non-Bundle Substances

Before moving to my arguments, I will briefly discuss theories of ordinary objects, according to the metaphysical realist account. In this subsection, I will discuss that according to metaphysical realism, objects are *substances* or *bundles*: perduring or enduring particulars that *exemplify* properties, or bundles of *compresent* properties. These are the two available analytic metaphysical realist theories of ordinary objects that are considered by the contemporary philosophers who describe and discuss in great detail the nature of property possession by ordinary objects. (I do not discuss Quinnean nominalism since Quinnean nominalism involves some sort of property possession — all particulars possess the polyadic property, *set membership* — and for that reason, the problems I discuss to do with bundle theory and substance theory apparently also apply to Quinnean nominalism.)

When one looks out into the world, as it is given to phenomenal consciousness, one is presented with attributes, and they come in *groupings* which the metaphysical realist typically calls «substances», «bundles», «ordinary objects», or «things». For example, the lion

---

[45]. One article, by a philosopher, that discusses issues to do with the conflict disagreement quantum theories and ordinary experience, is Quentin Smith, 1997.

[46]. A second reason why I consider my passing over any discussion of the issue that the philosophy of propertylessness is weakened by its disagreement with common sense reality, or by its inability to explain how humans have experiences of objects that have properties, is given as follows. Similar to the philosophy of propertylessness, it is widely discussed in the literature that philosophers of mind (connectionism, dualism, identity theory, etc.) cannot explain specifically why or how humans have experiences of properties—for example, it is not known how neural mechanics can give rise to qualia. For this reason, there is no reason to consider the position that there are no n-adic properties as weakened any more or less than any of the philosophies of mind due to this lack of explanation. The problem that blob theory is apparently unable to describe how or why humans seem to have experiences of ordinary objects that have properties is no more a problem for any of the philosophies of mind that it is for blob theory.

(substance) is a grouping of attributes: felinity, four-leggedness, goldenness, sublimity, ferocity, etc. The metaphysical realist's task is to figure out *how* it is the case that properties can amass, conglomerate, bundle, or group to coherently (non-contradictorily) give rise to objects. In other words, the metaphysical realist is very concerned with the question: If we know that properties exist, then how do properties interrelate, interconnect, hold together, or tie together, to give rise to objects, where objects in turn give rise to nature? This comprises a major principle of the metaphysical realist: To understand reality, one must understand how reality is composed of *objects*, where objects can be considered *groupings*, *collections*, *assemblages*, or *sets* of attributes that are coherently interrelated and connected either to each other (this is called the bundle theory, which I discuss below), or to an item that holds the properties together (this is the non-bundle substance theory, which I discuss below).

The metaphysical realist tells us that the difference between attributes and ordinary objects which are not attributes, is: ordinary objects *have* (*possess*) attributes (the lion *has* ferocity, the electron *has* structurelessness,[47] a galaxy might *have* the property of being a quasar); and an object is not *had* (*possessed*) by anything else (this will be discussed in more detail in later sections).[48]

There are two major theories of objects: bundle theory and substance theory. According to the bundle theory, properties *are tied to one another*. According to substance theory, properties *are tied not to one another, but rather are tied to an entity that is a non-property*. Many metaphysical realists use the word «substance» to denote either the *substances* of substance theory, or the *bundles* of the bundle theory of objects.[49] Bundles are often called «substances that are bundles of properties»; and substances are often merely called «substances», but I will call them «non-bundle substances». The non-property item that properties tie to in non-bundle substance theory will also be discussed in detail in sections below; for now, it can be called *a thin particular,* or an *internally bare particular*.[50] Armstrong discusses what is meant by «internally bare particular», or «thin particular»:

> Here is a problem that has been raised by John Quliter (1985). He calls it the «Antinomy of Bare Particulars.» Suppose that particular *a* instantiates property F. *a* is F… *a* and F are different entities, one being a particular, the other a universal. The 'is' we are dealing with is the 'is' of instantiation — of the fundamental tie between particular and property. But if the 'is' is not the 'is' of identity, then it appears that *a* considered in itself is really a bare particular lacking any properties. But in that case *a* has not got the property F. The property F remains outside *a*…[51]

(I will discuss in section 2 that many metaphysical realists hold that properties of the non-bundle substance are *not* tied to a bare non-property (internal bare particular or thin

---

[47]. This is the way physicists often refer to the electron or quark, as being structureless, since they have no evidence for its having any parts, or, as they say, they have no evidence for it having any internal structure. See Kane, 2000, 22.

[48]. See Lowe, 2001 for discussion on properties as «ways».

[49]. For a good example of a philosopher that makes a point of talking about bundles as *substances*, see Glouberman, 1975.

[50]. If the properties of the non-bundle substance were not tied to a non-property, then they would be tied to a property, and the non-bundle substance would be a bundle. So on the non-bundle account, the properties must be held by a non-property.

[51]. Armstrong, 2001, 78-79.

particular), but rather are tied to what they call a «thick particular». I will give an argument showing that this position is apparently incorrect, where my argument is based on the issue that the definition of «thick particular» has not been outlined specifically by metaphysical realists. Often the issues of bare or thick particulars are not addressed in the literature, and rather than specifying if the thin or thick particulars are of concern when talking about property possession, philosophers will merely write that «particulars exemplify properties» («x has F») (e.g., an electron has charge, Jones is present, God is omnipresent, etc.) without discussing the issues that those who are specialists in the philosophy of property possession bring up to do with bare or thick particulars.)

Properties are held *to the thin particular* in the case of substance theory, or *to one another* in the case of bundle theory, *by special ties*, often referred to as «predicating ties». The tie in substance theory (where properties do not tie to one another, but tie to the internally bare particular) is called the *exemplification tie*; and in bundle theory (where properties tie to one another) the tie is called the *compresence tie* (or it is sometimes called the compresence *relation*). These ties are discussed more in sections below.

Bundle theories, and non-bundle substance theories, are the only theories given to us by metaphysical realists. Loux discusses how there are very few theories of ordinary objects offered to us by metaphysical realists:

> If we follow bundle theorists and substratum theorists [substratum theorists are bare particular theorists] in holding that any metaphysician who concedes that concrete objects have some sort of ontological structure must endorse one of the two theories we have so far discussed, we are likely to conclude *that few options are genuinely viable… By any standards, the list of available options is depressingly short*; its brevity is especially depressing for the philosopher who has sympathies with metaphysical realism… (Emphasis added.)

> But not all metaphysicians agree that the substratum theory and the bundle theory are the only accounts of concrete particulars available to the philosopher who attributes an ontological structure to familiar objects. According to a very old tradition, ontologists have another option: they can take concrete particulars themselves, or at least some among them, to be basic or irreducibly fundamental entities.[52]

What I want to point out about these passages, is how he discusses that there so «few options» for theories of property possession by ordinary objects, and that the options *only consist of bundles or non-bundle substances*. In the above passage, Loux mentions bundle theory, Aristotelianism, and substratum theory (the latter two are non-bundle substance theories). In a passage I cite next, Loux mentions the remaining major branch of metaphysical realism, which is the *platonistic* account of property possession by ordinary objects (platonists are either bundle theorists[53] or non-bundle substance theorists).

> What are the issues separating the Aristotelian realists from Platonists? … Aristotelians typically tell us that to endorse Platonic realism is to deny that properties, kinds, and relations, need to be anchored in the spatiotemporal world. As they see it, the Platonist's universals are ontological «free floaters» with the existence conditions that are independent of the concrete world of space and time. But to adopt this conception of universals, Aristotelians insist, is to embrace a two-worlds» ontology… On this view, we have a radical bifurcation of reality, with universals and concrete

[52]. Loux, 1998, 117-118.

[53]. See Oaklander, 1978 for a paper that discusses bundle platonist theories.

> particulars occupying separate and unrelated realms… [T]here [is a] connection between spatiotemporal objects and beings completely outside of space and time.[54]

In sections 2 - 4, I discuss hitherto unnoticed problems to do with substance and bundle theories. I do not discuss blob theory in detail. Rather, my goal is only to argue for it by revealing hitherto unnoticed problems to do with property possession in analytic metaphysics.

2. Any Non-Bundle Substance Involves an Internally Bare Particular

In this section I will find that, contrary to what many metaphysicians typically tell us, non-bundle substances can only be considered in terms of a *bare particular*: the properties of a non-bundle substance attach to a *non-property:* an *internally bare particular*.

Since not all non-bundle substance theorists hold that there are such bare and thin particulars, in this section I present an argument for the position that *any non-bundle substance can only involve an internally bare thin particular*. (I will discuss in more detail what is meant by «internally bare particular» in section 3. But in section 3, I will *not* be primarily concerned with the problems to do with bare particulars that are typically discussed in the literature, such as: How can an entity be (internally) *propertyless*?) If this reasoning is correct, I will discuss in the next section that there are hitherto unnoticed problems for the tying of (exemplifying of) properties to internally bare particulars. But it is a long while until I arrive at that conclusion; many issues need to be discussed before that.

In showing that any non-bundle substance can only be considered in terms of bare particular, I will discuss the exemplification tie (subsection 2.1), thin and thick particulars (subsection 2.2), the nature of properties (subsection 2.2), and property possession (subsection 2.3). As I discuss these issues, my arguments that any non-bundle substance can only be described in terms of a bare particular will be revealed. After this, in section 3, I will be able to discuss the specific problems to do with property possession in non-bundle substance theory.

2.1 The Exemplification Tie

In this section I will discuss the non-relational tie of *exemplification* that holds a property and particulars together in the non-bundle substance account of property possession by ordinary objects. (In this subsection of this section, I will refer to the «particular» rather than the «bare particular», or «thin particular», as the item that exemplifies properties on the non-bundle account of substances; and only after I establish that only bare particulars can be the items that exemplify properties on the non-bundle account of substance will I refer to all particulars as «bare particulars».) On the non-bundle substance account, properties do not *directly* attach to the particular. Rather, I will discuss in this subsection that metaphysical realists tell us there is a tie, called *the exemplification tie*, acting as an intermediary between properties and particulars. In other words, properties do not directly attach to particulars, but rather the intermediary of the exemplification tie directly attaches to the properties and particulars. Loux lucidly explains these issues (and he discusses a few other issues to do with the details involved in the exemplification tie being an intermediary between particular and properties, which I will discuss after Loux's passage):

---

[54]. Loux, 1998, 46. There is one more major branch of analytic metaphysics, which is the trope bundle theory. But I did not make mention of it above, since I already made mention of bundle theory, and the majority of bundle theorists are trope theorists.

> According to the realist, for a particular, *a*, to be *F*, it is required that both the particular, *a*, and the universal, *F-ness*, exist. But more is required; it is required, in addition, that *a exemplify F-ness*. As we have formulated the realists theory, however, *a*'s exemplifying *F-ness* is a relational fact. It is a matter of *a* and *F-ness* entering into the relation of exemplification. But the realist insists that relations are themselves universals and that a pair of objects can bear a relation to each other only if they exemplify it by entering into it. The consequence, then, is that if we are to have the result that *a* is *F*, we need a new, higher-level form of exemplification (call it exermplification$_2$) whose function it is to insure that *a* and *F-ness* enter into the exemplification relation. Unfortunately, exemplification$_2$ is itself a further relation, so that we need a still higher-level form of exemplification (exemplification$_3$) whose role it is to insure that *a*, *F-ness*, and exemplification are related by exemplifiaction$_2$; and obviously there will be no end to the ascending levels of exemplification that are required here. So it appears… that the only way we will ever secure the desired result that *a* is *F* is by denying that exemplification is a notion to which the realist's theory applies.
>
> The argument just set out is a version of the famous argument developed by F.H. Bradley. Bradley's argument sought to show that there can be no such things as relations… Realists claim that while relations can bind objects together only by the mediating link of exemplification, exemplification links objects into relational facts without the mediation of any further links. It is, we are told, an unmediated linker; and this fact is taken to be a primitive categorial feature of the concept of exemplification. So, whereas we have so far spoken of exemplification as a relation tying particulars to universals and universals to each other, we more accurately reflect the realist thinking about the notion if we follow realists and speak of exemplification as a 'tie' or 'nexus' where the use of these terms has the force of binging out the *nonrelational* nature of the linkage this notion provides.[55]

(Note that Loux mentions that the exemplification tie is to be considered ontologically *primitive*. This issue is not important to the reasoning of this paper since I do not make any attempt to analyze the exemplification tie (I only inquire in 3.2 as to whether or not the tie has properties), but it is interesting to note that, at least to my knowledge, specifically why the tie is to be considered primitive has never been argued for, but rather it has merely been assumed by many philosophers that the tie is not to be analyzed. This assumption arose after Bradley's regress revealed problems to do with the theories of property possession. Placing an unanalyzable tie into the metaphysics of property possession removes the regress, but this, it could be objected, is merely an ad hoc solution, perhaps covering up deeper problems with the currently accepted theories of property possession. I discuss such deeper problems in much more in three recent papers (2003, 2004a, 2004b). But more importantly, my reasoning in this paper about problems with theories of property possession *follow whether the exemplification tie is primitive or not*.)

On the non-bundle substance account, properties are considered to *not* involve a relational or direct attachment to the particulars that exemplify them. If they did, a Bradley-esque regress would ensue. Rather, properties, and the particulars that exemplify them, according to non-bundle substance theories, are typically considered to be *mediated* by a non-relational tie, called the *exemplification tie*, and for that reason, Bradley's regress is avoided.

There are two types of attaching that metaphysical realists are concerned with when they discuss the property possession of substances: (i) *intermediary attachment*, which is the sort of attachment between property and particular by way of the non-relational intermediary tie of exemplification, and (ii) *unmediated attachment*, which is the sort of attachment between the exemplification tie and property, and the exemplification tie and the particular. The non-relational exemplification tie stands between property and particular, mediating the particular

---

[55]. Loux, 1998, 38-41.

and its properties, and for that reason, the attachment between property and particular is an *intermediary attachment*. *Unmediated attachment* is a kind of attachment that entities are involved in where an *intermediary* is not involved. Let «unmediated attachment» denote the way that the exemplification tie attaches to both the property and particular. Unmediated attachment is an attachment that is not a relation that the exemplification tie has with the property and particular. Unmediated attachment does not involve any sort of entity (intermediary) that is *between* the exemplification tie and the property, or that is *between* the exemplification tie and the particular. Rather, properties and particulars each involve an unmediated attachment to the non-relational exemplification tie, and the exemplification tie, in turn, involves an unmediated attachment to the particular, and to the properties that the particular exemplifies.

2.2 Properties are *Ways*

In the next two subsections I discuss properties. Specifically, I will inquire as to *what* properties *are*, and *what*, exactly, properties tie to (via the exemplification tie) when they are exemplified by a particular. In other words, I will be concerned with the issue of specifically *what* it is about a non-bundle substance that the exemplification tie involves an unmediated attachment with in its unmediated attaching to a particular.

A property is a *way* any substance (bundled or non-bundled substance) is: a property is *what a substance is like*. In discussing substances (Heil uses the word «objects» instead of the word «substances»), Heil discusses the differences between properties and the objects that have them:

> …[O]bjects are bearers of properties. When we consider an object we can consider it as a bearer of properties, itself incapable of being borne as a property, or we can consider its properties… A property is nothing more than an object's being a particular *way*.[56] (Emphasis added.)

Armstrong also discusses how properties are *ways* objects (substances) are:

> Properties are ways things are. The mass or charge of an electron is a *way* the electron is… Relations are *ways* things stand to each other.
>
> If a property is a way that a thing is, then this brings the property into very intimate connection with the thing, *but without destroying the distinction between them*.[57] (Emphasis added.)

I have italicized the last sentence of Armstrong's citation to stress that, aside from the exemplification tie, there are *two distinct entities* (in the broadest sense of the word «entity») that must be involved when a particular exemplifies a property: there is (1) the *property*, and there is (2) some *other* entity that the property is a property of. If it were not the case that property possession involved two *distinct* entities — property, and the particular that the property connects to (via the exemplification tie) — *a property would not be a way a particular is*. A property *not* connected to another entity (via the exemplification tie) is an impossible entity:[58] it is a way that is *not* a way a particular is.[59] For there to be properties,

---

[56]. Heil, 1998, 177-78.

[57]. Armstrong, 1989, 96-97.

[58]. Here I am referring to properties as «entities». I mean to use the word «entity» in the broadest possible sense, and in the way that many other realists refer to n-adic properties as entities (for example, Moreland (2001, 13), Lowe (2002, 16), and many others).

there must be *two* entities (in the broadest sense of «entity») that are non-identical, where one is tied to (linked to,[60] borne by) the other. This issue, which is integral in my arguments in this article, has been ignored by philosophers — especially substance theorists who assert that property and particular are not necessarily distinct.

2.3 What *Specifically* Do Properties Attach to (Via the Exemplification Tie)?

On the non-bundle substance account, since, as discussed in the last subsection, there must be two distinct items involved in property possession (a *property* tied to a *particular* that is entirely distinct from the property), there must be a specific entity that the exemplification tie is involved in an unmediated attachment with. In this subsection, I inquire as to *what* properties of a non-bundle substance are connected to (via the exemplification tie). I consider this a rather simple inquiry to make, for one reason: *any of the first-order*[61] *properties of a non-bundled substance must attach to some entity, but if they attached to each other, the substance would be a bundle, thus first-order properties must attach to a non-property.* (This issue, which is integral in my theorization in this article, has been ignored by metaphysical realists.) If a substance is not a bundle, there must be something about the non-bundle substance that is *not a property*, and it is that «something» that the first order properties attach to (via the exemplification tie).

Many metaphysicians who are non-bundle substance theorists tell us that non-bundle substances do not involve a bare particular. They tell us that we «cannot get below the concept of a concrete particular».[62] On the Armstrongian account of non-bundle substances,[63] some Aristotelian accounts of non-bundle substances, and platonistic accounts of non-bundle substances, properties are widely held to be properties of *thick* particulars,[64] as when we say: «the lion (thick particular) is sublime (property)»,[65] since «lion» may

---

[59]. Platonistic properties can allegedly be unexemplified (unborne). It is unclear to me how they can be unborne and yet be *ways*.

[60]. Loux discusses the connection between property and particular using the word «link» in Loux 1998, 38-41.

[61]. First-order properties are not properties of other properties, but are properties of things. It is the first-order properties of non-bundle substances that tie to an internally bare particular in order to constitute a thing (lion, planet, etc.). And it is the first-order properties of a bundle that tie to one another to give rise to a substance that is a bundle.

[62]. Loux, 1998, 118.

[63]. Armstrongian substances are widely discussed substances involving spatiotemporal, physical universals that are exemplified by a thick particular.

[64]. A thick particular is the entire complex of exemplified properties that constitute a substance. Armstrong: «Consider now a particular, not a particular considered in abstraction form all its properties, but the particular taken along with its non-relational properties. (This is a *thick* particular…) Let it be a particular that changes over time.» (Armstrong, 1997, 100)

[65]. Loux writes:

> According to a very old tradition, ontologists have another option: they can take concrete particulars themselves, or at least some among them, to be basic or irreducibly fundamental entities. On this view, having complexity of structure is compatible with being a basic or underived entity. The tradition is one that can be traced back to Aristotle… [A]t least some concrete particulars, living beings—plants, animals, and persons—[are considered by this tradition] as fundamental entities that cannot be reduced to more basic

appear to refer to a complex of properties, and not just to the non-property entity that properties tie to. («…is…» denotes the *exemplification* of the property.) Loux discusses this:

> …Aristotelians [and Armstrongians]… find an important insight in the substratum theory. They agree that the attributes associated with a concrete particular require a subject, but they take the substratum theorist to be wrong, first, in construing that subject as a *constituent* of the concrete particular, and second in characterizing it as bare. Aristotelians insist that it is the concrete particular itself that is the subject of all the universals associated with it; it is what literally exemplifies those universals. But… Aristotelians contend that the concrete particular is, in virtue of belonging to its kind, a thing with an essence, so they reject the central assumption of the substratum theorists' account of subjects, that, for any attribute, the thing that exemplifies or exhibits it is something with an identity independent of that attribute… We have a subject whose essence or core being does not include the attribute for which it is the subject…
>
> …[T]he kinds to which concrete particulars belong represent irreducibly unified ways of being. The Aristotelian wants to claim that because they do, the particulars that belong to them can be construced as basic entities. What a concrete particular is,… is simply an instance of its proper kind…[66] (Emphasis added.)

It is fair to say that most non-bundle substance theorists who are not bare particular theorists are not entirely clear on *specifically which* non-property entity it is in non-bundled substance theory that properties are connected to (via the intermediary tie of exemplification). Consider a passage from Armstrong's widely discussed book, *A World of States of Affairs*:

> When we have talked about particulars up to his point, the tacit assumption has usually, though not always, been that we are talking about the particular in abstraction from its properties… It is, of course, a controversial question in metaphysics whether there is such a thing as a particular in this sense… If properties are not so much *thingy* entities, but rather are *ways* that things are (something that in no way derogates from their mind-independent reality,…), then we cannot dispense with particular in this sense, with what can be called the *thin* particular…
>
> The thinness is the trouble. It seems so thin that we think it cannot be what we meant when we talk about particulars… [W]e might explain our revulsions from the thin particular as no more than the mind easily sliding away from it to the full-blooded thick particular. Even if the particular be but an unimportant stone, we are not in the ordinary way interested in its bare particularity, something every particular has, but rather in what *sort* of thing it is.[67]

Armstrong continues over the next several pages without telling us, or even hinting to us, what *specifically* it is about the thick particular that any first-order property of a thick particular attaches to (via exemplification). Consequently, no definition of *what* specifically the exemplification tie attaches to via unmediated attachment is found, and it appears that regardless of Armstrong's motivations, the thick particular can only involve a thin particular and the exemplification tie being involved in an unmediated attachment.

The reasoning above, if correct, indicates that on the non-bundle account of substance, there must be an entity that is not a property, that has no properties in itself, and which all

---

> entities. Philosophers in this Aristotelian tradition reject the constructivist approach to concrete particulars that underlies both the substratum and bundle theories. As they see thing, the ontologist is not to construct the concept of a concrete particular from antecedently given materials… On this view, the ontologist cannot get below the concept to of a concrete particular, and both the substratum theorist and bundle theorist are mistaken in thinking that they succeed in doing so. (Loux, 1998, 117-118)

66. Loux, 1998, 120-21.

67. Armstrong, 1997, 123-125.

the first-order properties of the non-bundle substance tie to. Non-bundle substance theorists who are not bare particular theorists however not only fail to tell us what that entity is, but they also inform us that there is not an internally bare non-property involved with any substance, such as the sort of internally bare particular Loux discussed in an above passage. Non-bundle substance theorists who are not bare particular theorists, such as Davis and Armstrong, do not include a bare particular, and thus their account appears to be incorrect, if my reasoning above is correct.

A synopsis of the argumentation I have given in this section is as follows. The first-order properties of *any* non-bundle substance must be tied to an internally bare particular. The internally bare particular cannot be composed of properties, for if it were, the non-bundle substance would be a bundle. A property is a *way* some *other* entity is, which is to say that the property must be *tied* some *other* entity. In the case of a first-order property in non-bundle substance theory, the other entity that a first-order property is linked to apparently can *only* be a thin particular that is internally bare. Any non-bundle account of a substance is a bare particular account. For these reasons, I will hereafter only discuss bare particular accounts of non-bundle substance.[68]

3. The Unmediated Attachment of Propertyless Entities

In this section I next discuss problems with the unmediated attachment of an *internally* bare particular and the exemplification tie. I will discuss that this unmediated attachment is an unmediated attachment of propertyless entities (in the broadest sense of the word «entity»), which leads to serious problems for non-bundle substance theory. Since the exemplification tie is considered to be unanalyzable, this unmediated attachment between the internally bare

---

[68]. Another passage from Loux, where he uses different reasoning than I have used above, shows that a *thin* particular account of non-bundled substances must be an internally *bare* particular account.

> [W]hat kinds of things function as constituents of concrete particulars? We have already mentioned the attributes—the properties or tropes—that are associated with a concrete particular as its constituents. Is there anything else that enters into the constitution of a concrete particular? One influential view insists that among the constituents of any concrete particular there is a quite different sort of thing—something that is not an attribute, but functions as the literal bearer, possessor, or subject of the attributes associated with the concrete particular. On this view, then, there are two different kinds of entities that enter into the constitution of any concrete object: the various attributes associated with the concrete object and something that functions as the literal bearer or possessor of those attributes…
>
> …[N]either the attributes that actually are nor those that could have been associated with [a concrete particular, such as, a] ball [call it s,] can figure in the identity of s. Might some other attributes do so? If they do, they must be attributes related to s in the way that the attributes associated with the ball are related to the ball, as constituents to wholes. But, then, these new attributes need a subject or bearer; and just as the ball could not be a subject for these new attributes. What we need, then, is a subject in our subject, a constituent of s, that will function as literal bearer of the attributes that are supposed to fix s*s identity. But what attributes will fix the identity of our new subject (s*)? Obviously, not the new attributes for which it is subject. It looks as though the only way attributes could fix the identify of s' is for s' to be a further whole made up of still further constituents; and obviously we are off on an infinite regress, a regress that can be avoided only by conceding that there are subjects for attributes whose identity involves no attributes whatsoever. And since we must concede that subjects whose being the things they are involves no attributes make their appearance at some point in our analysis, we are best advised to make this concession for s itself and thereby eliminate the need for new and intrusive subjects like s* and its descendants. But if we do, we are committed to the view that each familiar concrete object is a whole whose constituents include, first, the attributes whose «being» or identity involves no attributes. Philosophers have given a special name to this subject; they call it *bare substratum*… The points of the label should be clear. The constituent in question stands under or supports attributes, but its being the thing it is involves no attributes. (Loux, 1998, 95-97)

particular and the exemplification tie is typically also considered to be unanalyzable. Moreland writes that «[i]t is a primitive fact that properties are tied to [bare particulars] and this does not need to be grounded in some further capacity or property within them.»[69] In writing about this passage from Moreland, Davis has claimed that «[b]y embracing 'tied to' predication we have averted both the incoherence and infinite regress objections [that have been posed against bare particulars] in one stroke».[70] But if my arguments in this section are correct, there is an apparently fatal problem that is not addressed in the literature regarding the primitive unmediated attachment between the internally bare particular and the exemplification tie. Regardless of whether or not such an unmediated attachment is primitive or not, my argumentation will show that the mere issue of there being an unmediated attachment between the internally bare particular and the exemplification tie lead to apparently fatal problems for property possession in non-bundled substance theory and the bundle theory of substance.

I will first discuss what has been called the «internal nature» of bare particulars (3.1). Then I will discuss the whether or not the exemplification tie itself has properties (3.2). Those issues will enable me to discuss whether or not the exemplification tie can coherently be involved in an unmediated attachment with the internal nature of the bare particular (3.3). I will find that it cannot, and I will discuss that for that reason, the non-bundle account of property possession by ordinary objects is impossible.

3.1 Bare Particulars

Bare particular theorists commonly tell us that the bare particular is *internally* bare, not *externally* bare: *it has no properties in itself, but it is tied to properties that are distinct from it*. Moreland and Pickavance write:

> Advocates of bare particulars distinguish two different senses of being 'bare' along with two different ways something can have a property. In one sense, an entity is bare if and only if it has no properties in any sense. There is another sense of 'bare', however, that is true of bare particulars. To understand this, consider the way a classic Aristotelian substance has a property, say, some dog Fido's being brown. On this view, [unlike a bare particular,] Fido is a substance constituted by an essence which contains a diversity of capacities internal to the being of Fido. These capacities are potentialities to exemplify properties or to have parts that exemplify properties… When a substance has a property, that property is 'seated within' and, thus, an expression of the 'inner nature' of the substance itself…
>
> By contrast, bare particulars are simple and properties are linked or tied to them. This tie is asymmetrical in that some bare particular x has a property F and F is had by x. A bare particular is called 'bare', not because it comes without properties, but in order to distinguish it from other particulars like substances and to distinguish the way it has a property (F is tie *to* x) from the way, say, a substance has a property (F is *rooted within* x). Because bare particulars are simples, there is no internal differentiation within one of them.[71] (Underlining added.)

Bare particular theorists discuss an *internal* and *external* nature of the bare particular. The external nature is not propertyless; the internal nature is propertyless. A non-bundle substance might be considered in terms of the following diagram, where a non-bundle

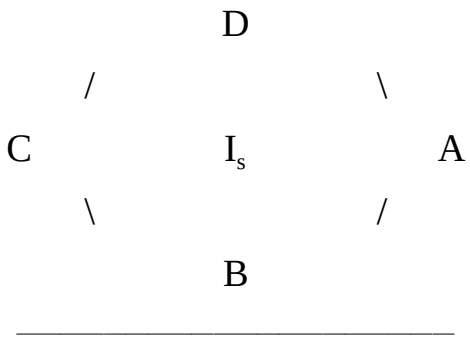
---

69. Moreland, 2001, 155.

70. Davis, 2003, 538.

71. Moreland and Pichavance, 2003, 3-4.

substance consists of an internally bare particular, I_S, which exemplifies the properties A, B, C, and D:



A, B, C, D are first-order properties

I_S is the internal nature of the bare particular

We can consider (i) the *entire* non-bundle substance, which is the bare particular *along with* the properties the bare particular has. This is the internal *and* external nature of the bare particular, which is, of course, not a propertyless item. But since the bare particular must be distinct from the first-order properties of the non-bundle substance, we can consider (ii) the bare particular's internal nature, represented by the encircled «I_S» at the center of the above diagram. I_S, in itself, is propertyless (where «propertylessness» somehow does not denote the property, *propertylessness*), and is entirely distinct from A, B, C, and D. Armstrong discusses (i) and (ii):

> The thin particular is *a*, taken apart from its properties (substratum). It is linked [tied] to its properties by instantiation, but it is not identical with them. It is not bare because to be bare it would have to be not instantiating any properties. But though clothed, it is thin…
>
> This is the thick particular. But the thick particular, because it enfolds both thin particulars and properties, held together by instantiation, can be nothing but a state of affairs.
>
> Suppose that *a* instantiates F, G, H,… They comprise the totality of *a*'s (nonrelational) properties. Now form the conjunctive property F&G&H. … Call this property N, where N is meant to be short for *a*'s nature. *a* is N is true, and *a*'s being N is a (rather complex) state of affairs. It is also the thick particular. *The thick particular is a state of affairs*. The properties of a thing are «contained within it» because they are constituents of the state of affairs…
>
> Therefore, in one sense a particular is propertyless. That is the thin particular. In another sense it enfolds properties within itself. In the latter case it is the thick particular and is a state of affairs.[72]

The «internal» nature (I_S), to use the word Moreland used in a passage above, is what I am concerned with. In this section, I am concerned specifically with the issue of the bare particular's being involved in an unmediated attachment with the exemplification tie.

I_S is the literal possessor of first-order properties, and I_S is tied to first-order properties of the non-bundled substance via the exemplification tie. Regardless of whether or not the exemplification tie has properties, I will discuss that the unmediated attachment of the exemplification tie with I_S will involve *an unmediated attachment of propertyless items*. It is

[72]. Armstrong, 2001, 79.

this sort of unmediated attachment that I will be concerned with near the end of this section. I will argue that this unmediated attachment leads to a fatal problem for property possession in non-bundle substance theory. Before discussing this unmediated attachment, I will discuss the issue of whether or not the exemplification tie has properties.

3.2 Does the Exemplification Tie have Properties?

If the exemplification tie were also propertyless, the unmediated attachment of I_S and the exemplification tie would be an unmediated attachment of propertyless items, which is an unmediated attachment I will later describe as fatal for metaphysical realism. If this is the case, it may be better for the metaphysical realist to consider the exemplification tie to have properties.

If the exemplification tie *did* have properties, it would be a *substance*, for the following reasons. The exemplification tie is not a property of a substance (it is not a *way* that a substance *is*), and for that reason, it is unexemplified. *Entities that are not exemplified, but which also have properties, are primary substances*. If the exemplification tie is a primary substance, it would have an internally bare particular that its first-order properties tie to. I will call the exemplification tie's internally bare particular, I_E. In being involved in an unmediated attachment with a property *and* with I_S, for reasons I discuss in the remainder of this subsection, it is not the *entirety* of the exemplification tie (I_E and all its non-relational properties) that is involved in an unmediated attachment with I_S. Rather, it is *merely* I_E that involves an unmediated attachment with I_S, rather than the *entire* exemplification tie substance (I_E + all non-relational properties I_E has). I will next explain this.

In being involved in an unmediated attachment with I_S, we can ask: *What is it about the exemplification tie that is involved in an unmediated attachment with* I_S? As discussed, the way properties attach or contact other items is apparently only by their being *tied* to other items. Items that properties tie to (are exemplified by) are *made a certain way* by being tied to the properties. The apple is red because the apple's internally bare particular (call this $I_{S\text{-}apple}$) is tied to the property, *redness*. In considering the case where the red apple is on the brown table. The *redness* does not tie to the brown table's internally bare particular (call this $I_{S\text{-}table}$), since *redness* is only tied to the apple's I_S, in this situation, and assuming the table has no red in it at all. Since an item contacting the property will be the *way* the property makes it, if the apple touches the table, it cannot be the *properties* of the apple or the table that are involved in the touching when the apple and table touch. If the properties of the apple and table were the items that are in contact with the table when the apple and table touch, then the brown (not-red) table could «touch» *redness*, and the table would be brown (not red) and red. If the table touches the apple, it cannot be any of the properties of the table or apple that are involved in the act of touching, and for that reason, it is only the inner natures of the bare particulars of the apple and table, $I_{S\text{-}apple}$ and $I_{S\text{-}table}$, that touch in the case where a table touches an apple. (Notice that this is an unmediated attachment of propertyless entities, which is the sort of unmediated attachment I am concerned with in this section, and which I am going to show is apparently problematic for non-bundle substance theory.)

For reasons just given, it is apparently only the internal bare particularities of the table and apple ($I_{S\text{-}apple}$ and $I_{S\text{-}table}$) that «touch» when objects, such as tables and apples, touch. For the same reasons, the unmediated attachment of the exemplification tie and I_S is an unmediated attachment that does not involve any of the properties of the exemplification tie, or of the non-bundle substance, since properties are not the items that are involved in unmediated attaching when a particular has an unmediated attachment with a particular.

Rather, it is only I_S and I_E are involved in an unmediated attachment in the case where I_S is tied to a property.

3.3 The Unmediated Attachment of I_S and I_E

I will continue discussing the unmediated attachment of the exemplification tie and I_S, which is an unmediated attachment between I_S and I_E. In linking the property to I_S, if the exemplification tie is a primary substance, it is only I_E that is involved in an unmediated attachment with property and with I_S. *This would be an unmediated attachment of propertyless entities*;[73] an unmediated attachment between the propertyless inner natures of two bare particulars. It is this sort of an unmediated attachment, one between propertyless entities, that I will be concerned with for the remainder of this section.

If all my reasoning to this point is correct, property possession in non-bundle substance theory must involve an unmediated attachment of propertyless entities. There are two ways this can occur. (i) I_S involves an unmediated attachment with I_E (if the exemplification tie has properties and is a primary substance, as I discussed in the paragraph before this one). Or (ii) I_S involves an unmediated attachment with a propertyless exemplification tie (if the exemplification tie is propertyless). For the remainder of this subsection, I will be interested in *how*, exactly, propertyless entities can be involved in an unmediated attachment.

Propertyless entities are typically considered to be unstructured. I take it that, although it is hard to discuss propertyless entities at all, it is coherent to maintain, at the very least, that propertyless items can be described as be totally unstructured. If propertyless items are unstructured, they are point-sized (the size of a point, spatially unextended), and simple,[74] lest their having any spatial extension or physical parts give them some sort of *structure*.

I will next discuss the unmediated attachment of propertyless items. Propertyless, point-sized entities (such as I_S and I_E) that are involved in an unmediated attachment, in doing so, must *collocate* (spatially overlap), in order to involve an unmediated attachment. If any point-sized entities (such as I_S and I_E) do not spatially collocate, then there would be a spatial distance between them, and any distance between them would forbid them from being involved in an unmediated attachment. (To reiterate, propertyless entities can only be involved in a *non-relational unmediated attachment*. The unmediated attachment between propertyless entities cannot be a *relation*, since if propertyless items were interrelated, they would not be propertyless, but would share a relation, which is a polyadic *property*.) Since propertyless entities can only be partless,[75] an unmediated attachment of propertyless entities involves the unmediated attaching of their «totalities» (their «entireties»). The issue I am concerned about

---

[73]. Typically, an *entity* is considered to be that which possesses properties, and something that does not possess properties is considered to not exist, and not to be something that can be coherently referred to in any way. I will however refer to *propertyless entities* as «entities» due to the fact that I see no reason why I cannot broaden the category of entity to include new class: those items which are propertyless. The bare particulars, and perhaps predicating ties (if predicating ties are propertyless) discussed by many philosophers would be members falling into that class of entity.

[74]. Armstrong apparently agrees with this: «They [bare particulars] may be conceived of, or at least imagined, as points, whether spatial points or as spacetime points.» (Armstrong, 1997, .86) this was also mentioned by Moreland in the passage above.

[75]. They are partless since they are devoid of any part-whole relations, such as the relation, parthood, which is a polyadic *property*.

is this: The unmediated attachment of the entirety of two *propertyless, partless, unstructured, collocated, point-size*, also gives rise to a *point-sized, unstructured, partless, point-sized, propertyless entity*. In other words, the two propertyless entities involved in an unmediated attachment, upon their unmediated attaching, where their «entireties» are involved in an unmediated attachment, result in an entity (in the broadest sense of «entity») *that is also* a propertyless, partless, point-sized, unstructured, point-size entity. The two items cannot attach to form a mereological entity — a whole with two parts — since propertyless items must be devoid of a part-whole relation since a relation is a polyadic *property*. The two propertyless entities *appear to amalgamate and unify to the point of becoming identical*. There is no difference between *one of* the propertyless entities before the unmediated attachment, and the unmediated attachment of *both of* the entities. For these reasons, if the exemplification tie and the bare particular are involved in an unmediated attachment, which requires that I_S and I_E be involved in an unmediated attachment (or which requires that I_S and a propertyless exemplification tie be involved in an unmediated attachment, if the exemplification tie is propertyless), upon their being in an unmediated attachment, I_S and I_E cannot be distinct: they are a single entity that is partless, point-sized, propertyless, and unstructured. I_S and I_E become identical, which means that the exemplification tie and the bare particular become identical. Without a difference between the exemplification tie and a bare particular of the substance, there are no distinctions between properties and the particular that has the properties, and the statement, «the exemplification of a property», has no meaning.

4. Substances that are Bundles of Properties

Bundle theories offer an alternative description of ordinary objects, and, as discussed in the introduction, bundle theory is apparently the only other theory about the property possession of ordinary objects that we are currently offered by metaphysicians. In this section I will be concerned with the unmediated attachment of the compresence tie and the properties that the tie bundles. In addressing this issue, I will first need to discuss the compresence tie that bundles those properties and that the compresence tie is propertyless (subsection 4.1). After that I will discuss a few issues to do with the properties of a bundle (subsection 4.2), whereby I will be able to discuss that the bundle theory involves an unmediated attachment of propertyless entities (subsection 4.2).

4.1 The Compresence Tie is Propertyless

Properties also have properties:[76] first-order properties instantiate second-order properties. When considering that properties *have* properties, on the bundle account, since

[76]. One may object that there are no properties above the first order. This is a position called *elementarism*: the position that there are only first-order properties (See Hochberg, 1978, p. 324; Bergman, 1958). On this account, first-order properties are propertyless entities, for the following reasons. First-order properties are properties of things (*moving at velocity v*, *locatedness*, *concreteness*, etc.), and if Elementarism is true, there are no second-order properties, properties that are properties of *properties*, such as *relationhood* (i.e., *being a relation*), *locatedness*, *abstractness* (or perhaps *concreteness*), and so on. According to this account, a lion, L, which has the property *goldenness* (first-order), which, on the metaphysical realist scenario, is a property that is itself not a property, since «not a property» denotes second-order property. The correct statement, according to the elementarist, would apparently be, «the property *goldeness* is propertyless», where «propertyless» (somehow) does not denote the property, *propertylessness*. It is *not* true that the property *goldenness is a property* (first-order property italicized, second-order property italicized and underlined) of L property, since it is not true that *goldenness* has the property *propertyhood*. Accordingly, Elementarism leads to the conclusion that it is not true that the L has properties. Elementarism leads to the conclusion that there are no *things* (bundles). This appears to show Elementraism is contradictory, since it is a theory that hold is that first order properties are not properties and things that have first-order properties do not have properties.

properties are property-bearers (i.e., they are items that are composed of sets of compresent properties), properties can be considered *secondary* bundles. On this account, properties (secondary bundles) can be considered as bundles that are compresence with other secondary bundles (properties); whereas things (primary bundles) can be considered bundles that are not compresent with other bundles.

Secondary bundles (properties) require a compresence tie to bundle the properties that make up the secondary bundle. I will call this compresence tie that bundles the properties of the secondary bundle, T_P. T_P would have to be propertyless lest a vicious regress ensue: If T_P has properties, since T_P is not bundled, T_P would also be a bundle, and would itself involve a compresence tie, T_{P2} that bundles T_P's properties. T_P's compresence bundle, T_{P2}, also requires a compresence bundle, T_{P3}, where T_{P3} requires T_{P4}, and so forth, and a regress that is vicious may ensue, for the following reasons. If any bundle (such as T_P) is bundled by another bundle (such as T_{P2}), and so on, at every stage of the regress, the bundle at one stage is held together by another compresence bundle at the next stage. Each bundle stage depends on the *next* bundle stage of the regress. At any stage of the regress, the bundle is reducible to (i) the compresence bundle (T_{PN}) and (ii) the properties that the compresence bundle bundles. Any bundle is only a bundle because of the existence of a second bundle, where the second bundle is only bundled due to the existence of a third bundle, *ad infinitum*. If properties of any stage of the bundles regress are bundled by the next bundle in the regress, never in the regress is there a point where the properties that are bundled are *not* dependent on other bundles. At any stage, a compresence bundle involves infinite compresence bundles, where none of the bundles can be described as being a *last bundling* in the regress. It appears there may not be a point in the regress at all where bundling occurs since this regress appears to be an infinite regress that attempts to complete a task by an infinite sequence of steps, where the «completion» «at infinity» in fact never occurs. If the bundles regress is not completeable, there may be reason to wonder how a regress of compresence bundles is coherent. Each stage of the regress depends on the coherence of a compresence bundle at the next stage, *ad infinitum*. But if there is no last stage, there is no point in the regress that one can point to where that bundle at that stage is clearly bundled in some way. For this reason, T_P must be propertyless.

4.2 The Unmediated Attachment of the Properties of a Bundle and Propertyless the Compresence Tie

The primary bundle, like the T_P of the secondary bundle, also involves a compresence tie: the tie that ties the primary bundle's properties (i.e., the first-order properties of the primary bundle or what I am calling the secondary bundles). All bundle theories involve this tie. Loux writes:

> The account bundle theorists provide invariably involves… appeal to a special relation tying all the attributes in a bundle together… … *But however it is labeled, the relation is treated in the same way. It is taken to be an unanalyzable or ontologically primitive relation,* but it is explained informally as the relation of occurring together, of being present together, or being located together…[77]
> (Emphasis added.)

The point I will be concerned about in this section is that if properties are bundled by a compresence tie, I will discuss that the properties and the compresence tie involve an unmediated attachment, and like the problems of non-bundle substances discussed in the last

[77]. Loux, 1998, p. 99.

section, this unmediated attachment also must be an unmediated attachment of propertyless items, thus rendering bundles impossible since properties and the compresence tie would be indistinguishable.

Loux discusses compresence as a *tying relation*, but compresence must be a *non-relational* bundler (a non-relational tie), and not a property (relational, or polyadic, property), that is involved in an unmediated attachment to the properties it connects. If compresence *were* a polyadic property, the following vicious infinite regress would ensue: bundle B *is* F, where if the italicized «is» denotes a *relational* compresence, then F *is compresent with* B's compresence relation, ad infinitum.[78]

Compresence is *propertyless*, or it has *properties*. If compresence is propertyless, the unmediated attachment the compresence tie to T_P would be an unmediated attachment of propertyless entities, which is the same problem that was discussed in section 3. So that option apparently won't do, and we must consider that compresence itself has properties. If the compresence tie of the primary bundle has properties (such as the property of being a tie, the property of being located where bundle B is, or the property of bundling properties F, G, and H), compresence would itself be a bundle — a special bundle that is responsible for bundling other properties[79] — since compresence itself is not bundled (it is not an ordinary member of a bundle).[80] The compresence bundle would itself have a compresence tie, which I will call T_C, that bundles the properties together. In order to avoid a vicious regress. As with T_P, T_C must be propertyless, in order to avoid a vicious regress: T_C requires compresence tie, T_{C2}, and so on, where no stage of the regress involves any bundling. For these reasons, like T_P, T_C must be a propertyless item.

For compresence to be involved in an unmediated attachment with the properties (secondary bundles) it bundles, T_P and T_C would have to be involved in an unmediated attachment, which is an unmediated attachment of propertyless items. However, such an unmediated attachment would render the compresence tie and a property it bundles identical,

---

78. Ehring has lucidly discussed the issue that compresence is not an ordinary member of a bundle (i.e., not a property):

> …[T]he properties included in the bundle are co-instantiated or compresent. The co-instantiation relation, *C*, is not a member of the bundle [i.e., the co-instantiation relation is not compresent with the properties of the bundle it bundles]… If we include *C* without modifying the formulation, then *C* itself is co-instantiated with the remaining tropes [properties]: co-instantiation is co-instantiated with the [bundle] FGH. But that either makes no sense or lead to infinite regress. An alteration of the original formulation is necessary… (Ehring, 2001, 165.)

79. I discuss this issue much more in another article (Grupp, 2004b).

80. Ehring has lucidly discussed the issue that compresence is not an ordinary member of a bundle (i.e., not a property):

> …[T]he properties included in the bundle are co-instantiated or compresent. The co-instantiation relation, *C*, is not a member of the bundle [i.e., the co-instantiation relation is not compresent with the properties of the bundle it bundles]… If we include *C* without modifying the formulation, then *C* itself is co-instantiated with the remaining tropes [properties]: co-instantiation is co-instantiated with the [bundle] FGH. But that either makes no sense or lead to infinite regress. An alteration of the original formulation is necessary… (Ehring, 2001, 165.)

and thus there would no difference between properties and tie in bundle theory, and the statement «property F is a member of bundle B», would have no meaning.

5. Conclusion

If my preceding arguments are sound, then it follows that there are no n-adic properties. There are no relations (polyadic properties), such as part-whole relations, topological spatial relations, or temporal relations; and there are no monadic properties, such as the properties of color, spatial extendedness, mental properties, modal properties, and so on. Although the current age of analytic metaphysics surely endorses the stance that a propertyless reality preposterous, this has certainly not always been the case. For example, perhaps my arguments in this paper will bring back interest in theorization about a Parmenidean reality, or about an atomistic reality, such as of the sort of atomistic reality described by the ancient Buddhist or Greek atomists. If my argumentation is correct, it could provide evidence that reality involves only bare particulars and no properties. It appears that the theorization of this article leaves room for such a position since it is only properties and property possession that have been attacked in this paper, and not bare particulars. If there are only bare particulars, reality might be a propertyless reality of only bare particulars, which is to theorize that reality is *atomistic* (composed of philosophic atoms[81]), where the atoms are propertyless and unstructured, and where their activities are apprehended by minds that, in interpreting these apprehensions, create colors and shapes and surfaces out of these activities apprehended. Armstrong apparently considers bare particulars to be atomic and spatially unextended:

> They may be conceived of, or at least imagined, as points, whether spatial points or as spacetime points… By hypothesis, the points are not different from each other in intrinsic nature.[82]

If blob theory gives evidence of a propertyless atomic reality, then from what I can tell, this is a position is very much aligned with the ancient Buddhist or Greek atomists. A passage from the philosopher Barry Stroud helps to explain:

> Democritus [460-370 BCE, one of the first known materialist atomists] had envisaged atomistic explanations of everything that happens. If all that exists are impenetrable atoms… variously moving, then everything that happens must be nothing more than a matter of certain kinds of atoms coming together or separating. The world seems to us to be full of coloured, or sweet or bitter, or warm or cold things. But that is only so for humans beings, constituted as we are. We, too, are nothing but combinations of variously moving atoms, and the atomic thesis is meant eventually to explain why the world appears to us in those ways, even though no such qualities belong to anything that exists [outside of our mind]. The «appearances» are just a result of the atoms that we are made of being affected in certain ways by other atoms…
>
> We have words for what we think of as the colours, odours, and tastes of… objects… but those words stand for nothing that exists in realty [outside of experience]. In that sense, they are nothing

---

81. Since Peter van Inwagen's book Material Beings, philosophic atoms (basic building blocks), such as those discussed by the Presocratic Greeks (Democritus, etc.) are now usually called «physical simples». «mereological simples», or «material simples». There is much current dialogue in the literature on this issue from such philosophers as Merricks (2001), Markosian (1998), Hudson (2001), McDaniel (2002, 2003), Zimmerman (1996a, 1996b), and several others.

82. Armstrong 1997, 86.

> but empty words. «If the animal were removed,» Galileo said, «every such quality would be abolished and annihilated»[83] [84]

The ancient Greek Democritus apparently held a position something like the one being described here, where philosophic atoms are propertyless. But it is hard to understand how his atoms are propertyless and structureless since he maintained that they have a spatial size. It seems that any item with a spatial size has at least some structure, and therefore it has properties. It would be better to theorize that reality consists of spatially unextended, and therefore absolutely structureless, philosophic atoms. Currently, the position that philosophic atoms are point-sized is widely held.[85],[86] Such a reality would consist of numerically distinct, but metaphysically identical philosophic atoms, where at the fundamental level of the philosophic atoms, reality does not involve structure, and since atoms, being propertyless, are indistinct, one might as well say there is only one, even though a mind could count them up, if they could be perceived. If reality is composed of philosophic atoms, the apprehension of, and representation of, the activities of the atoms by the mind, and the consequent *mental*

---

[83]. Stroud, Barry, 2000, *The Quest for Reality*, Oxford University Press: New York, pp. 8-9.

[84]. Some might wonder how an atom can be in motion without having a property, such as the property *being in motion*. I too feel this may be a problem. It could be solved if one merely endorsed an ancient Buddhist atomism rather than an ancient Greek atomism; there may be many reasons for doing this, not just in order to bring ones theory of atomism into accord with blob theory.

On the Buddhist account, the problem of change and of identity over time (often discussed in the endurance and perdurance debate) are taken so seriously that real mind-independent change and identity over time are rejected, and instead, change and identity over time are considered an imaginary fiction created by the mind. Buddhists hold that if change could occur, it could only do so if an object m vanished out of existence and a copy of it m* came into existence. This sounds preposterous to many non-Buddhist metaphysicians, but it is widely known that it might be the case that philosophers cannot explain change and identity over time. If that is the case, the Buddhist position could be more coherent than the accounts of endurance and perdurance, if the Buddhist account involves fewer problems. But on the Buddhist account, there is no real motion or change, there is only one instant that is replaced, but all that ever exists is one moment that is instantaneous and changeless. So motion never occurs, and unstructured philosophic atoms need not have the property of motion, even though a mind may believe it experiences matter in motion. (See Grupp 2005a.)

[85]. This position is held by Cohn and Varzi (2003), Hudson (2001), Kris McDaniel (2003), Roeper (1997), Quentin Smith (1993, 1995), and many others, and this is the standard view in relativity and quantum field theory.

[86]. To my knowledge, this is also a position held by many physicists (Herbert 1987, 61).

representations of those activities in the mind,[87] might account for our experience of time, and of structure, in reality, even though there is no time or structure.[88]

Works Cited

Armstrong, D. M. 2001. «Universals as Attributes,» in Loux, Michael. 2001.

Metaphysics: Contemporary Readings. Routledge: New York, pp. 65-91.

Armstrong, D.M., 1997, *A World of States of Affairs*, Cambridge University Press: Cambridge.

Armstrong, D.M., 1989, *Universals: An Opinionated Introduction*, Westview Press: Boulder.

Bealer, George, 1982. *Quality and Concept*, Clarendon: Oxford.

Bergmann, G. 1957. «Elementarism». *Philosophy and Phenomenological Research* 18, pp. 107-114.

Butchvarov, Panyot, 1979, *Being Qua Being*, Indiana University Press: Bloomington.

Campbell, Keith, 1990. *Abstract Particulars*, Blackwell: Cambridge.

Campbell, Keith, 1981. «The Metaphysic of Abstract Particulars,» *Midwest Studies in Philosophy* 6: 477-488.

Casullo, Albert, 2001, «A Fourth Version of the Bundle Theory,» in Loux, Michael, 2001, *Metaphysics: Contemporary Readings*, Routledge: New York, pp. 134-148.

Castañeda, Hector-Neri, 1972, «Thinking and the Structure of the World», *Crítica* 43-86.

Cohn, Anthony, and Varzi, Achille, 2003, «Mereotopological Connection», *Journal of Philosophical Logic*, 32: 357-390.

Davis, Richard Brian, 2003, «'Partially Clad' Bare Particulars Exposed», *Australasian Journal of Philosophy*, Vol. 81, No. 4, pp. 534-548.

Denkel, Arda, 1997, «On the Compresence of Tropes», *Philosophy and Phenomenological Research*, LVII, No. 3, 599-606.

Ehring, Douglas, 2001, «Temporal Parts and Bundle Theory», *Philosophical Studies*, 104: 163-168.

Heil, John, 1998, *Philosophy of Mind*, Routledge: New York.

Hochberg, Herbert, 1978, *Thought, Fact, and Reference*, University of Minnesota Press: Minneapolis.

Gilmore, Cody, 2003, «In Defence of Spatially Related Universals», *Australasian*

---

87. In this note, I will very briefly explain why I am using the concept of *interaction* of atoms here. Typically philosophers hold that ordinary composite objects are collections of atoms that are *arranged* a certain way (for a good example, see T. Merricks 2003), where atoms exist in a network of relations. The word «arrangement» denotes the network of relations that the atoms are in. But if the arguments of this paper are applied to matter and space, rather than to time (see Grupp, 2005b), it leads to the conclusion that there are no relations between non-identical atoms, or between non-identical chunks of space. If this is the case, then we can only account for structures in nature not by holding that structures are networks of interrelated atoms, but rather there is something else going on that is responsible for the existence of structures out of atoms. The only other way I can imagine that philosophic atoms give rise to structures in nature is by way of some sort of interaction among philosophic atoms, if the atoms are not interrelated.

88. I am grateful to Quentin Smith for a few helpful comments he gave when he read over parts of this paper.

Journal of Philosophy, Vol. 81, No. 3, pp. 428-428.

Glouberman, M., 1975, «The Substance Theory of Bundles», *The Personalist*, 56, pp. 38-46.

Greene, Brian, 1999, *The Elegant Universe*, W.W. Norton and Co.: New York.

Grupp, Jeffrey. Forthcoming. «Western Analytic Metaphysics Reduces to a Philosophy of Brahman, Part 2», *Journal of Indian Council of Philosophical Research (JICPR)*).

Grupp, Jeffrey. Forthcoming. «Western Analytic Metaphysics Reduces to a Philosophy of Brahman, Part 1», *Journal of Indian Council of Philosophical Research (JICPR)*).

Grupp, Jeffrey, 2005a. « The R-theory of time, or Replacement Presentism: The Buddhist Theory of Time», *Indian International Journal of Buddhist Studies, Forthcoming* (*in press*). (This paper can be read at www.abstractatom.com.)

Grupp, Jeffrey, 2005b. «The Impossibility of Relations Between Non-Collocated Spatial Objects and Non-Identical Topological Spaces», *Axiomathes, Forthcoming* (*in press*). (This paper can be read at www.abstractatom.com.)

Grupp, Jeffrey, 2004a, «Problems with the Platonist Exemplification Tie Between Located Entities and an Unlocated Entity». *Dialogue: Canadian Philosophical Review*. Vol. XLIII. 491-498. (This paper can be read at www.abstractatom.com.)

Grupp, Jeffrey. 2004b. «Compresence is a Bundle: A Problem for the Bundle Theory of Objects», *Metaphysica: The International Journal for Ontology and Metaphysics*, Vol. 5, No. 2, 63-72.

Grupp, Jeffrey, 2003, «The Impossibility of an Exemplification Tie Between Particulars and Universals», *Metaphysica: The International Journal for Ontology and Metaphysics*, Vol. 4. No. 1. 27-38. (This paper can be read at www.abstractatom.com.)

Herbert, Nick, 1985, *Quantum Reality*, New York: Anchor.

Lango, John W., 2002, «Overlapping Networks of Tropes», *The Modern Schoolman*, LXXIX, January/March.

Losonsky, Michael, 1987, «Individuation and the Bundle Theory», *Philosophical Studies*, 52, 191-198.

Loux, Michael, 1998, *Metaphysics: A Contemporary Introduction*, Routledge: New York.

Lowe, E.J. 2002, *A Survey of Metaphysics*, Oxford University Press: New York.

Lowe, E.J., 2001, «Recent Progress in Metaphysics», International Conference On formal Ontology in Information Systems., October 17-19, 2001, Ogunquit, Maine (also viewable at: http://www.fois.org/fois-2001/)

Loux, Michael (editor) 2001, *Metaphysics: Contemporary Readings*, Routledge: New York

Loux, Michael, 1998, *Metaphysics: A Contemporary Introduction*, Routledge: New York.

Lowe, E. J., 1998, *The Possibility of Metaphysics*, Oxford University Press: Oxford.

Markosian, Ned. 1998. «Simples». *Australasian Journal of Philosophy* 76:213-26.

McDaniel, Kris. 2003. «Against MaxCon Simples». *Australasian Journal of Philosophy* 81:265-275.

McDaniel, Kris. 2002. «Extended Simples, Shape, and Space». 2nd Annual Princeton-Rutgers Graduate Student Philosophy Conference.

McDaniel, Kris, 2001, «Tropes and Ordinary Physical Objects», *Philosophical Studies*, 104: 269-290.

Maddy, P., 1990, «Physicalistic Platonism», in Irvine, A. D. (ed.), *Physicalism in Mathematics*, Kluwer: New York, pp. 259-289.

Merricks, Trenton. 2001. *Objects and Persons*. New York: Oxford University Press.

Mertz, D. W., 2003, «Against Bare Particulars: A Response to Moreland Pickavance», *Australasian Journal of Philosophy*, 81: 14-20.

Moreland, J. P., 2003, «Bare Particulars and Individuation: A Reply to Mertz» *Australasian Journal of Philosophy*, 81:1: 1-13

Moreland, J. P., 2001, *Universals*, McGill-Queen's University Press: Montreal and Kingston.

Moreland, J. P., 1989, «Keith Campbell and the Trope View of Predication», *Australasian Journal of Philosophy*, Vol. 67, No. 4, pp. 379-393.

Oaklander, L. Nathan, 1978, «The Bundle Theory of Substance», *The New Scholasticism*, vol. 52, pp. 91-96.

O'Leary-Hawthorne, John, and Cover, Jan A.,1998, «A World of Universals,» *Philosophical Studies* 91: p. 205-219.

O'Leary-Hawthorne, John, and Cortens, Andrew, 1995, «Towards Ontological Nihilism», *Philosophical Studies*, 79: 143-165

Orilia, Francesco, 1998, «Guise Theory, Property Theory, and Castañeda's Philosophical Methodology», in Orilia, F., and Rapaport, W. J., 1998, *Thought, Language, and Ontology: Essays in Memory of Hector-Neri Castañeda*, Kluwer: Dordrecht, pp. 39-59.

Petitot, Jean, and Smith, Barry, 1997, «Physics and the Phenomenal World», in R. Poli and P. M. Simons, 1997, Formal Ontology, Dordrecht/Boston/London: Kluwer, 233-253.

Price, H. H., 2001, «Universals and Resemblances,» in Loux, Michael, 2001, *Metaphysics: Contemporary Readings*, Routledge: New York.

Roeper, Peter, 1997, «Region-Based Topology», *Journal of Philosophical Logic*, 26: 251-309.

Schaffer, Jonathan, 2003, «The Problem of Free Mass: Must Properties Cluster?», *Philosophy and Phenomenological Research*, LXVI, No. 1, 125-138.

Simons, Peter, 2000, «Identity Through Time and Trope Bundles», *Topoi*, 19: 147-155

Smith, Quentin, 2003, «Why Cognitive Scientists Cannot Ignore Quantum Mechanics», in Smith, Quentin (ed.), 2003, *Consciousness: New Philosphoyical Essays*, Oxford University Press, New York: .409-446

Smith, Quentin, 1997, «The Ontological Interpretation of the Wave Function of the Universe», *The Monist*, vol. 80, no.1, pp, 160-185.

Smith, Quentin, 1995, *Time, Change, and Freedom*, Routledge: New York.

Smith, Quentin, 1993, *Language and Time*, Oxford: New York.

Stroud, Barry, 2000, *The Quest For Reality: Subjectivism and the Metaphysics of Colo*r, Oxford University Press: New York.

Swoyer, Chris, 1999, «Properties,» Stanford Encyclopedia of Philosophy, <http://plato.stanford.edu/entries/properties/>.

Unger, Peter, 1980, «Skepticism and Nihilism», *Nous* 14, pp. 517-545.

Van Cleve, James, 2001, «Three Versions of the Bundle Theory,» in Loux, Michael, 2001, *Metaphysics: Contemporary Readings*, Routledge: New York, pp. 121-133.

Vallicella, William, 2002, *A Paradigm Theory of Existence*, Kluwer Academic Publishers: Hingham.

van Inwagen, Peter, 1990, *Material Beings*, Cornell University Press: Ithaca.

Williams, D. C., 1953. «The Elements of Being», in van Inwagen and Zimmerman, 1998, *Metaphysics: The Big Questions*, Blackwell: New York, 40-52.

Yandell, Keith. 1999. *Philosophy of Religion*. New York: Routledge.

Zimmerman, Dean W., 1997, «Distinct Indiscernibles and the Bundle Theory», *Mind*, Vol. 106, 422, April, 306-309.

Zimmerman, Dean. 1996a. «Indivisible Parts and Extended Objects: Some Philosophical Episodes from Topology's Prehistory». *The Monist*. 79:148-180.

Zimmerman, Dean. 1996b. «Could Extended Objects Be Made Out of Simple Parts? An Argument for 'Atomless Gunk'». *Philosophy and Phenomenological Research* Vol. LVI, No. 1:1-29.

Jeffrey Grupp
Philosophy Department
Purdue University
West Lafayette, IN
47907 U.S.A.
<jeffgrupp@aol.com>

THE SORITES CHARTER

· Version 2.2 ·

*Copyright © 1995-2006 by the **SORITES** team*

PREAMBLE

This Charter is an updated and amended version of the original «Copyright Notice and Legal Disclaimer» appeared in Issue # 01 of *SORITES* (April 1995). It is a covenant between the **SORITES** team, as a publisher, and its contributors and readers, prescribing their respective duties and rights, as well as the terms and conditions under which those rights have to be exercised.

Persons dealing with **SORITES** in either capacity, as contributors or as a readers (or users), bind themselves to abiding by these regulations, as does the **SORITES** team itself.

This Charter aims to safeguard all legitimate interests in a balanced way, so as to ensure maximum access to, and use of, the materials we produce, to serve the scholarly public at large, to enhance the prestige of our contributors and the influence of the journal and its publisher, while preventing dishonourable behaviour and academic fraud.

This Charter bears a family resemblance to various schemes: the GNU Free Documentation, Creative Commons, Creative Archive and Open Content licenses. Moreover, the current version borrows a few notions and phrases from them. Nevertheless this Charter stands on its own and must not be interpreted as adjusted to any of those models. Although all those approaches share a strong leaning towards open and free content-divulgation, a distinctive view prevails in each case.

Openness and freedom are broad and loose concepts admitting of sundry conceptions. 'Free content' has been commonly agreed upon to stand for content which readers can and may honestly use without hindrance or threat of reprisals — rather than as content they necessarily get for free — but there are several views as to the justification and implementation of those liberties. A thorough elucidation of those problems goes beyond the scope of this Preamble, though.

In order for the current scheme to stand out as a differentiated dispensation, it will be called '**the allodial approach to intellectual property**'. Four features make it unique:

— The first one is that, while it allots to everybody an unhampered access to intellectual goods **without discrimination**, it also recognizes the right to private intellectual ownership, construed — according to Civil-Law systems — as twofold: an entailed, perpetual, untransferable and non-renounceable entitlement to authorship-recognition and to the integrity of the work; and an alienable right to the exclusive use and profit from that work.

— The second one is that it regards a compilation (such as a journal Issue) as a collective work, and hence as an intellectual entity jointly authored and owned by the Editor and the contributors taken together as a group, while each article, by itself, is an intellectual entity belonging to its author alone.

— The third one is that it resorts to the legal notion of *servitude* or *easement*, which enables us to reconcile all those rights and liberties, in the same way as happens with land freeholds: certain positive or negative interests, franchises or privileges (*servitudes*) may be conferred on non-owners over an estate for certain legitimate reasons and purposes.

— The fourth one is that it rules out any registration requirement, as contrary to the rights to privacy, unobstructed access and uncontrolled dissemination.

* * *

The **SORITES** team will publish revised versions of the **SORITES** Charter, similar in spirit to the present version, but different in detail, to address new problems or concerns. Authors and readers having obtained certain rights in virtue of the current Charter will keep those rights and will never be subject to restrictions brought in by later versions.

Everybody is free to copy this Charter, and to modify or attune it to their own needs, provided appropriate authorship credit is given to the **SORITES** team.

DEFINITIONS

[D01] A **separate material** is an intellectual product which is released, broadcasted or published as an intangible entity standing on its own rather than as a section or a division of another intellectual product.

Parts of an aggregated work — such as essays gathered into a collection — are not separate materials, since they are not released as intellectual products on their own.

[D02] **An Issue of the *SORITES* journal as a whole** is either:
(i) a single document or file (be it its official version or any unofficial rendering also released by the **SORITES** team as an undivided file, such as the PDF file or a print-out thereof); or
(ii) a set of files produced by slicing one of the entire-file versions in order to facilitate handling, browsing or downloading (in which case the conveyor is bound to distribute the whole collection taken together at the same time).

[D03] A reader of **SORITES** is an individual who, abiding by all the terms laid down in this Charter, accesses the **SORITES** site, or a mirror thereof, or receives or uses any file or document directly or indirectly proceeding from that site.

[D04] As a rule, institutions and organizations are not readers. They are considered users only when this Charter explicitly confers a certain right on them.

[D05] Private use is personal use by an individual. Sharing downloaded or stored files within an organization is a divulgation, not private use.

[D06] An Issue of the journal *SORITES* is an aggregated work; the articles it contains are not separate materials.

[D07] A copy of a material is either a print-out on paper or a reproduced file or set of files.

[D08] A reproduced file, or a set of files, is either (i) a duplication of the original file, or set of files, as released by the **SORITES** team; or (ii) any result of converting the downloaded file or files to a different format by applying conversion tools, provided the content is not garbled or curtailed.

[D09] A different format is any modification which leaves the content intact and unaltered.

[D10] The phrase 'copy or partial copy' covers any print-out, extended quotation, electronic posting or display as well as any other reproduction.

ARTICLES

Art.01.— **SORITES** is both a resource site, <http://sorites.org> (or set of sites, such as <sorites.info>, <sorites.net>, etc), and a digital journal, *SORITES*, consisting in a series of issues. Both of them belong to the publisher, the **SORITES** team.

Art.02.— Each Issue of the *SORITES* journal as a whole is a collection, an aggregated work, jointly owned by the contributors and the publisher.

Art.03.— Individual papers remain the private property of their respective authors (the contributors) encumbered with the following servitudes:
(i) No part of any such paper may be printed or displayed elsewhere, or incorporated into a publication of any sort, unless *SORITES* is therein clearly and explicitly acknowledged and cited as the original source of publication.
(ii) In particular, when a contributor posts a version of his or her paper on a home page, institutional web-site or subject repository, a link must be made to the version displayed at the **SORITES** web-site.
(iii) When contributors merge a recast version of a substantial portion of an article published in *SORITES* into another paper, they must also give due credit to the *SORITES* source and clearly inform their audience how to access the **SORITES** site (including a reference to the official web-site, **http://sorites.org**).
(iv) Contributors adhere to the other terms and provisions contained in this Charter, grant **SORITES** readers and users the rights provided by Art.06 and consent to abide by the publisher's claims and commitments (arts. 04, 13 and 14).
(v) When contributors republish their papers, they are free to apply any other License, provided clauses (i), (ii) and (iii) of this article are honoured.
(vi) Any individual who signs a co-authored article is a contributor who accedes to the above burdens being laid on the paper. Arrangements between co-authors cannot stand in the way of that undertaking.

Art.04.— By submitting a manuscript to *SORITES*, contributors declare: that it is an output of their personal research; that it has not been published yet (in the sense of appearing under an ISSN or an ISBN); that it is not currently submitted for publication elsewhere; and that it complies with established Copyright laws. Acceptance of a manuscript by the **SORITES** team is done in good faith under the assumption the declaration is truthful.

Art.05.— The authors of the included papers and the publisher — whether jointly or separately, as the case may be — hereby reserve all rights not conferred to other parties in this Charter.

Art.06.— Subject to honouring the conditions set forth in this Charter, readers are hereby accorded the following rights:

[i] The right to freely access, view, read, search, store, and link to, any material offered at the **SORITES** site, especially any Issue of the *SORITES* journal, any paper therein included, and any other file or document displayed or supplied at the **SORITES** site.

[ii] The right to duplicate single detached articles for a personal, private and fair use done in good faith. Fair use encompasses teaching, study, criticism and review.

[iii] The right to reproduce and distribute on any medium *verbatim* copies of any **separate material** released at the **SORITES** site, provided the material is reproduced **in its entirety** and preserved as an Invariant Document, unaltered in its text, titles and headings.

Art.07.— When a copy of a separate material published by **SORITES** is incorporated into a volume or a package containing other materials, the content obtained from the **SORITES** site must be printed on separate sheets, clearly demarcated, by page breaks, from those accompaniments. No text or logo from other sources must be mingled with, or interpolated into, the **SORITES** material.

Art.08.— The freedom awarded to readers in Art.06 means that:

(1) No fee will be charged or requested by the **SORITES** team.

(2) No registration will be demanded.

(3) No one will be locked out of accessing the **SORITES** site.

(4) As regards issues of the *SORITES* journal and papers therein published, exercising those rights is not conditional upon reciprocation or remuneration of any sort, whether moral or material, or upon any consideration other than respect for intellectual property claims raised in this Charter.

(5) As regards other materials offered at the **SORITES** site, moral consideration may be demanded, such as not using those materials for any unethical purpose or activity.

Art.09.—

[1] Private business companies are not entitled to incorporate a copy of an Issue of the *SORITES* journal into any commercial material they sell for profit without the previous conformity of the **SORITES** team.

However they are hereby allowed to combine a whole Issue of the *SORITES* journal — or any other material offered as a separate unit at the **SORITES** site — into publications they circulate at no charge, provided they observe the other provisions of this Charter, especially Art.07.

[2] Learned societies and academic establishments are hereby authorized to sell integral copies of issues of the *SORITES* journal or any other material offered as a separate unit at the **SORITES** site.

[3] Search engines and indexing data-bases are entitled to store, reproduce and display integral or partial copies of any material published by the **SORITES** team, including issues of the *SORITES* journal, even of detached papers, provided due credit and links to the original **SORITES** site (or a mirror thereof) are ostensibly shown.

Art.10.—

[i] Except as provided by Art.09[3] or by fair use legal provisions, no copy or partial copy of a detached paper may be distributed without its author's acquiescence.

[ii] The **SORITES** team hereby authorizes any such transmission subject to the author's approval, provided the copyright box on top of the paper is literally incorporated into the copy or partial copy.

Art.11.—

[i] No part of any Issue of the *SORITES* journal may be delivered to a plurality of individuals — whether in writing or by any other means — unless the source is clearly and explicitly recognized. Furthermore, such a recognition must comply with the following stipulations.

[ii] No part of any Issue of the *SORITES* journal or of any paper therein included may be conveyed to others by means of reproduction, quotation, copy or paraphrase, without a clear and explicit acknowledgement of the Issue of the *SORITES* journal, the author's name and the paper's full title.

[iii] Whenever the quotation occurs within a publication, it is also mandatory to mention the date of publication and the official pages (as shown within the Copyright box on top of the

paper), as well as the ISSN (1135-1349) and the official web-site: **http://www.sorites.org**, or a mirror thereof such as **http://www.sorites.info**.

[iv] When the quotation takes place in an electronic medium, a link to the **SORITES** site (or a mirror thereof) is also imperative.

Art.12.—

(1) Any use of copies or partial copies of an Issue of the *SORITES* journal, or of papers therein included, not permitted in this Charter will be a violation of the contributors' and the publisher's intellectual property.

(2) Distribution of copies of detached papers without the author's consent is hereby prohibited unless pursuant to Art.09[3].

(3) Derivative works are unlawful, except in so much as they are provided by Art.09[3].

(4) Shortening, abridgment or truncation is only licit as provided either by Art.09[3] or else by fair use terms in accordance with intellectual property legislation.

(5) In any case, the two following activities are absolutely forbidden: 1. change of words or any other semantic or syntactic alteration; 2. false, faulty, obscured or disingenuous attribution.

(6) The **SORITES** team reserves the right to sue malicious or reckless transgressors of this Charter as culprits of plagiarism, forgery or other misdemeanours, requesting both compensatory and punitive remedies. It also reserves the right to publicly denounce serious copyright violations.

Art.13.—

[i] Any Material displayed at the **SORITES** site, including issues of the *SORITES* journal, is provided *as is*, without any guarantee of any kind.

[ii] While the **SORITES** team tries to ensure the correctness of all the content it publishes, it makes no representation or warranty as to the accuracy, completeness or fitness for any purpose of such a content and — to the maximum extent allowed by law — disclaims any pledges or assurances, whether express or implied, to the effect that any published material is free of defects or non-infringing.

[iii] By furnishing those documents, the **SORITES** team does not underwrite any commitment except in so much as explicitly espoused in the present Charter.

[iv] Any views expressed in papers published in **SORITES** are the opinions of the contributors and not those of the **SORITES** team. The publisher disowns being answerable for the contributors' ideas or arguments.

Art.14.— Under no circumstances and under no legal theory shall the **SORITES** team, or any contributor or supplier of **SORITES**, be liable to any person for any indirect, special, incidental or consequential damages for loss of good will, mistaken belief, confusion, delusion or any and all other damages or losses suffered as a result of downloading, reading, or using any materials retrieved from the **SORITES** site or included in any Issue of the *SORITES* journal. The user assumes, at their sole risk, full responsibility for relying upon any opinion or information contained in any material published or displayed by **SORITES**.

Art.15.—

[i] By opening, accessing, downloading, storing, reading or in any other way using any material offered at the **SORITES** site or any part thereof, readers enter into a synallagmatic contract with the **SORITES** team binding themselves to full acceptance of the above stipulations. Breach of any of those provisions entails automatic forfeiture of all rights derived from this Charter and termination of the contract.

[ii] If, upon downloading or storing a file containing an Issue of the *SORITES* journal or a part thereof, or receiving an electronic or printed copy thereof, or any other material obtained from the **SORITES** site, a reader fails to assent to the conditions stipulated in this Charter, he or she is obliged to immediately discontinue reading, storing, sharing or using the material in any way.

[iii] In the event of such a termination, though, third-party rights derived from usage prior to the termination will survive.

[iv] Readers to whom previous versions of this Charter bestowed rights in excess of those granted here, or subject to less stringent conditions, may continue enjoying those rights.

[v] The **SORITES** team will revise this Charter at its sole discretion. Acquired rights will endure, though.

[vi] In the event that there exists any inconsistency between this Charter and legal commandments, the latter will take precedence.

[vii] If a reader cannot satisfy simultaneously the duties under this Charter and commitments stemming from custom, contract of other sources, they must either extricate themselves from those commitments or else refrain from accessing **SORITES** and from using any material released by the **SORITES** site.

[viii] This Charter is the complete and exclusive agreement between the **SORITES** team, its contributors, and its readers which supersedes any proposal or prior deal, oral or written, and any other communication relating to the subject matter of this Charter.

Art.16.— Rights granted in this Charter are contingent upon third-party intellectual-property claims.

Art.17.— In compliance with Spanish Law, all issues of the *SORITES* journal are legally registered, electronic copies being deposited with the competent authorities, namely the Legal-Deposit office of the Autonomous Community of Madrid (Registration: M 14867-1995.)

Art.18.— Although a mirror of **SORITES** is displayed at the internet host <www.ifs.csic.es/sorites/> belonging to the Spanish Academy of Sciences, or C.S.I.C., thanks to a permission graciously given by the system's administrators, the journal is not sponsored or endorsed by that institution, the only owner and publisher being the **SORITES** team.

———————————

Madrid. 2006-10-05 [V.2.2]
(Previous versions: 1995-04-10; 1996-12-31; 1998-04-27; 2002-10-03; 2004-12-31; 2005-01-18 [V.2.1])
Lorenzo Peña (The **SORITES** Team)
<http://sorites.org/copyrigh.htm>

RELEASE NOTICE

This issue of ***SORITES*** is made available in several formats, but its only official version is the WordPerfect 5.1 document released with filename:

sorite17.wp

Although each version, whether official or not — as initially released on October 30 by the **SORITES** team — is an entire seamless file, it may be splitted down into chunks in order to facilitate downloading, browsing, transferring or e-mailing. In such cases, the unity of this issue of **SORITES** as a whole must be preserved by keeping the ensuing collection intact.