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Free Logic
Selected Essays

Free logic is an important field of philosophical logic that first appeared in the 1950s. Karel Lambert was one of its founders and coined the term itself.

The essays in this collection (written over a period of forty years) explore the philosophical foundations of free logic and its application to areas as diverse as the philosophy of religion and computer science. Among the applications are those to the analysis of existence statements, to definite descriptions, and to partial functions. The volume contains a proof that free logics of any kind are nonextensional and then uses that proof to show that Quine's theory of predication and referential transparency must fail.

The purpose of this collection is to bring an important body of work to the attention of a new generation of professional philosophers, computer scientists, and mathematicians.

Karel Lambert is Research Professor of Logic and Philosophy of Science at the University of California, Irvine.

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*To my dear Carol, whose beauty, sweetness of nature, capacity to laugh,
and unfailing dignity have sustained me for more than half a century.*

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Introduction

In one way or another the nine chapters of this book all have to do with free logic. Most are updated revisions in and adaptations of previously published papers. The exceptions are Chapters 4 and 5, though Chapter 4 contains a revised segment from a recently published paper.

Chapter 1 began as an invited address to the Western Division of the American Philosophical Association Meetings in 1991, and at the request of the organizers of those meetings was subsequently published in slightly revised form in *Philosophical Studies*, 65 (1992), pp. 153–167. It is a critical analysis of Russell's famous theory of definite descriptions of which there are two quite distinct versions. The defining feature of either version is that definite descriptions are not singular terms. That the essence of Russell's theory has to do with logical grammar was stressed in my 'Explaining away singular existence statements', *Dialogue*, 1 (1963), pp. 381–389, and later, independently, by David Kaplan in 'What is Russell's theory of descriptions?' *Physics, History and Logic* (eds. W. Yourgrau and A. Breck), Plenum Press, New York (1970), pp. 277–288.

Chapter 2 is an adaptation of several papers. The main essays are 'Existential import revisited', *Notre Dame Journal of Formal Logic*, 4 (1963), pp. 288–292, 'Notes on E! III: A theory of descriptions', *Philosophical Studies*, 13 (1963), pp. 5–59, 'Notes on E! IV: A reduction in free quantification theory with identity and definite descriptions', *Philosophical Studies*, 15 (1964), pp. 85–88, and 'Free logic and the concept of existence', *Notre Dame Journal of Formal Logic*, 8 (1967), pp. 133–144.

This chapter lays out a motivation for, and the first axiomatic formulation of, a (positive) free logic. It presents the original semantical foundations, and applies that logic to the analysis of singular existence and definite descriptions. Indeed, it contains the first consistent and complete free theory of definite descriptions.

Chapter 3 is essentially an adaptation of two essays. The first is ‘On the reduction of two paradoxes and the significance thereof’, and appeared in a volume in honor of Gerhard Scheibe entitled *Physik, Philosophie, und die Einheit der Wissenschaften* (Hrsg. Lorenz Krüger and Brigitte Falkenburg), Spectrum: Heidelberg (1995), pp. 21–33. The second is ‘A theory about logical theories of “expressions of the form ‘the so and so’ where ‘the’ is in the singular”’, and appeared in a memorial issue of *Erkenntnis* (35 [1991], pp. 337–346) in honor of Rudolf Carnap and Hans Reichenbach. This chapter shows how two paradoxes discovered by Russell, one in Meinong’s theory of objects and the other in a Frege-inspired formulation of set theory, stem from the same source, the naïve theory of definite descriptions. It uses this information to provide an explanation of the origins of the various traditions in the treatment of definite descriptions exactly parallel to the explanation of various approaches to set theory in the wake of Russell’s paradox. Finally, it details some benefits of the free definite description theory approach especially as they concern the logics of definite descriptions in Russell and Frege.

Chapter 4 is new in this book. It is a formal and philosophical examination of the original (informal) theory of definite descriptions of David Hilbert and Paul Bernays, and also of certain neo-Hilbert-Bernays approaches, especially one due to Sören Stenlund. I am very much indebted to Paul Schweizer for his help in the formalization of the *original* Hilbert and Bernays theory. The critique of Stenlund’s approach is my own, and Schweizer is blameless. The upshot is that Stenlund’s theory, despite his claim to the contrary, is not a free definite description theory, but an interesting development hovering somewhere between the original Hilbert-Bernays treatment (as formalized by Schweizer and me) and free definite description theory.

Chapter 5 presents the foundations of much unpublished work in the 1980s and 1990s done by Peter Woodruff and me on what Bas van Fraassen originally called “the spectrum” of (positive) free definite description theories. It lays out the motivation for one approach to the

subject and provides a uniform procedure for proving the completeness of various theories in what I prefer to call – less misleadingly – the hierarchy of positive free definite description theories. It is of a piece with Kripke's semantical analysis of the Lewis hierarchy of modal logics.

Chapter 6 is the updated adaptation of two essays. The first is 'Predication and extensionality', *The Journal of Philosophical Logic*, 3 (1974), pp. 255–264, and the second is 'Fixing Quine's theory of predication', *Dialectica*, 52 (1998), pp. 153–161. This chapter contains the proof that Quine's theory of predication (and hence his theory of referential transparency) is non-extensional, a proof to which Quine himself devoted some attention in his posthumous essay, 'Confessions of a confirmed extensionalist'. It also seeks to restore the extensional features of the theory without recourse to the elimination of singular terms.

Chapter 7 is a considerably revised version of the essay entitled 'Nonextensionality'. It was published in a volume in honor of Franz von Kutschera entitled *Das weite Spektrum der analytischen Philosophie* (Hrg. Wolfgang Lenzen), de Gruyter, Berlin (1997). It shows how the logical dependence of two notions of extensionality – the truth-value dependence conception and the *salva veritate* substitution conception – can be restored despite a forceful argument that they are not in a language that contains singular terms without existential import.

Chapter 8 is a much revised version of my Collège de France lectures on the philosophical foundations of free logic, lectures I was invited to give in the spring of 1980. They were published in the journal *Inquiry*, 24 (1981), pp. 147–203 under essentially that title. These lectures, awarded the Medal of the Collège de France, comprehensively examined motivations, discussed confusions, considered applications and laid down now widely adopted conventions.

Chapter 9 is a considerable revision of 'Logical truth and microphysics'. It was published initially in a memorial volume in honor of Henry Leonard entitled *The Logical Way of Doing Things* (ed. Karel Lambert), Yale University Press, New Haven (1969). It was the first application of van Fraassen's technique of supervaluations to a topic in the philosophy of science. His method initially was invented to provide a completeness proof for (positive) free logic that did not depend on model structures utilizing inner and outer domains. Chapter 9

shows that van Fraassen's method can also be used to reconstruct the Reichenbachian interpretation of elementary microphysical statements without appeal to a third truth-value along with a defense of that reconstruction against complaints by Michael Scriven and Wesley Salmon, among others.

There are many to thank in the development and preparation of this book. In particular, I am indebted to Paul Schweizer in the formal development of the original Hilbert-Bernays theory of definite descriptions, and to Peter Woodruff in the essay on the hierarchy of positive free definite descriptions theories. I have enjoyed Woodruff's companionship for nearly forty years. Nothing can detract from his enormously powerful intellect and good nature. Whether the huge amount of work we have done together on definite descriptions ever gets into public print is in the lap of the gods. More generally, I am especially indebted to Bas van Fraassen, Robert K. Meyer, and Brian Skyrms for years of friendship and support, and with each of whom I have been privileged to work on various topics. I am also indebted to longtime personal associations with Edgar and Inge Morscher at the University of Salzburg, Wolfgang and Ulli Spohn at the University of Konstanz, and the late Jules Vuillemin of the Collège de France. I should also like to thank John and Julie Trafford, the former for having discovered the Trafford Eclipse, and the latter for restoring the Sun. Thanks are also due to my good friend Lee Sandler for his many kindnesses. To my children, Kal, Kathryn, and Christopher I am grateful for taking it upon themselves to keep my professional efforts in perspective via loving irreverence. For the preparation of the current book, I thank Terence Moore and his colleagues at Cambridge University Press. They are a firm, decisive, and very helpful group of people.

Free logic is a logic with no existential presuppositions. Alternatively, it is a logic whose theorems are valid in all domains, including the empty domain. Explanation. In classical logic there are theorems which clearly presuppose that there is something in the domain of discourse. Consider the following classically valid theorems. :1.