the appropriate basis for Meinongian theories. Zalta's choice of underlying logic has unsatisfactory consequences for his account of mathematical discourse. (See pp. 147–149.) If, as is standardly assumed, all true mathematical propositions are necessary, and if, as Zalta assumes, Peano number theory is closed under strict implication, then, on Zalta's view, for every sentence A of arithmetic, either A holds, according to Peano number theory, or else $\sim A$ does. This is an unsatisfactory result for variants of Peano number theory based on axiomatizable underlying logics. My criticism here clearly applies to Zalta's axiomatized type theory, and also, I think, to the model theory which he gives for his type theory.

(e) *General remarks.* Given the prior availability of excellent work in this tradition by Parsons, Routley, William Rapaport, and Hector Castañeda, this book would have benefited greatly from an attempt to explore carefully its interrelationships with, and divergences from, the previous literature. It would also have benefited from a sensitive examination of its own presuppositions, such as those mentioned under headings (c) and (d). Taken by itself, the book does go some way, as the author hoped, toward showing that non-naïve variants of the theory of objects constitute a fruitful area for study. But taken as an addition to the literature alluded to above, it does not, in my judgment, significantly extend our understanding of the resources or applications of Meinongian theories. MICHAEL BYRD

KAREL LAMBERT. ***Meinong and the principle of independence. Its place in Meinong's theory of objects and its significance in contemporary philosophical logic.*** Modern European philosophy. Cambridge University Press, Cambridge etc. 1983, xvi + 175 pp.

Karel Lambert is well known in the field of philosophical logic, especially in connection with free logics. It is therefore welcome to see his name added to those who find value in Alexius Meinong's much-maligned Theory of Objects. In this interesting and valuable contribution to the literature, Lambert points out the implications of one major thesis of Meinong's theory—the principle of independence (PI)—for theories of predication and free logics. He discusses the importance of Meinong's theory for understanding recent analytic philosophy, formulates a version of PI, discusses several theories of predication, analyzes three types of free logic and their relationships to PI, and provides a defense of his formulation of PI.

Recent Meinong-inspired theories have tended to fall into two broad categories: (I) those that distinguish between two kinds of properties, usually called "nuclear" and "extranuclear" (e.g. Terence Parsons, ***Nonexistent objects***, XLIX 652; Richard Routley, ***Exploring Meinong's jungle and beyond***, Australian National University, Canberra, 1980), and (II) those that distinguish between two modes of predication, often called "internal" and "external" (e.g. Hector-Neri Castañeda, *Thinking and the structure of the world*, ***Philosophia***, vol. 4 (1974), pp. 3–40; William J. Rapaport, *Meinongian theories and a Russellian paradox*, ***Noûs***, vol. 12 (1978), pp. 153–80). Although Lambert does not develop a full Meinongian theory, his analysis falls into category (I). The thrust of this review will be to examine Lambert's analysis in the light of the two-modes-of-predication approach.

In Chapter 1, Lambert presents five reasons why Meinong's views are relevant to contemporary philosophy: (1) There is our general need to talk and think about non-existents, and Meinong's theory offers a way to deal with this fact. (2) Meinong is a "natural philosophical adversary" to Quine, because "Quine's conception of existence is essentially Meinong's conception of being" (p. 5), yet whereas Quine would affirm that $\{x{:}x \text{ is an object}\} = \{x{:}x \text{ is an existent}\}$, Meinong would deny it; and where Quine's slogan is "to be is to be the value of a variable," Meinong's is "there are objects of which it is true that there are not such objects." (3) Meinong's notion of an objective (the object of psychological acts such as belief or judgment) is the G. E. Moore–Bertrand Russell notion of a singular proposition, a notion needed for the semantics of quantified modal logic. (4) Meinong's beingless objects can help us understand (and in some cases are required merely to express) such diverse philosophical theories as those of virtual classes or of F. H. Bradley's absolute idealism. (5) Meinong's PI can help us understand free logic.

To these may be added a sixth: The recent trend in certain branches of artificial intelligence towards theories of intensional entities can best be understood in terms of Meinongian theories (cf. William A. Woods, *What's in a link: foundations for semantic networks*, in ***Representation and understanding***, Academic Press, 1975, pp. 35–82; Ronald J. Brachman, *What's in a concept: structural foundations for semantic networks*, ***International journal of man-machine studies***, vol. 9 (1977), pp. 127–152; Anthony S. Maida and Stuart C. Shapiro, *Intensional concepts in propositional semantic networks*, ***Cognitive science***, vol. 6 (1982), pp. 291–330).

In Chapter 2, Lambert presents his outline of Meinong's theory and his formulation of PI. The first Meinongian thesis is that "there are objects having no being," where 'there are' must be given "some appropriate sense" (p. 14). That sense is provided by the next thesis: "The domain of nonbeings Meinong called '*Aussersein*', literally the domain of objects outside of being" (p. 14); i.e., the quantifier in the first thesis ranges over *Aussersein*. PI is closely related to Meinong's reason for believing in *Aussersein*, namely, "*what* an object is is a function solely of its *nature*.... That an object is what it is need not depend on, or even concern, its being" (p. 17). It should be noted that these two statements by Lambert are not equivalent without an assumption to the effect that an object *is* what it is (i.e., an assumption about the relationship of "structural" to "assertional" information; cf. Woods, op. cit.). Routley, op. cit., p. 253ff., makes this explicit, as does Lambert, several pages later (p. 28). PI, in (my translation of) Meinong's words, is "the *Sosein* of an object is not, so to say, concerned with [*mitbetroffen*] its *Nichtsein*"; Lambert formulates this more precisely, as we shall see.

A third Meinongian thesis is the principle of indifference, which "declares that the being or nonbeing of an object is not part of the nature of that object" (p. 19). An alternative interpretation of this, however, is that being is not predicable of (thing-like) object*a*, but only of (proposition-like) object*ives* (cf. Rapaport, op. cit.). Lambert observes that PI and the principle of indifference are distinct: the former says, roughly, that *what* an object is is independent of its being; the latter says, roughly, that *whether* an object is is not part of *what* it is. Note that it follows that if "existence" *is* part of *what* an object is (e.g. as in the case of the existing golden mountain), then that "existence" is *not* that object's being. An object's *Sosein* is its "nature"; for Lambert, it is the object's *nuclear* properties. Its *extranuclear* properties are those, such as existence, that are "indifferent" to its *Sosein*: Lambert, unlike Parsons (op. cit.), *derives* the notion of extranuclear properties from the principle of indifference. He gives an example: Being simple (S), which holds of all and only those objects with just one property, is extranuclear. For suppose o is S because o is (only) F; then if S were part of o's nature, o would have *two* properties. It does not necessarily follow, however, that S and F are distinct *kinds* of properties, since some object o' might be S because it is (only) S (just as o was only F). What might be the case, instead, is that o has properties in two ways: o is-internally (only) F and (hence) is-externally S. Note that if o is-internally S also, then it is not the case that o is-externally S. Object o' is-internally (only) S and (hence) is-externally S.

A further Meinongian thesis discussed by Lambert is this: "if an object has being, it is completely determined" (p. 26). But, if 'o exists' is taken to mean that there is a real object correlated with the Meinongian object o (cf. Rapaport, op. cit.), then completeness is neither a necessary condition for existence, nor is incompleteness a sufficient condition for non-existence: The round square and the golden mountain do not exist, *not* because they are incomplete, but because the former is impossible and the latter just does not happen to. But the tallest mountain, which is just as incomplete, surely does exist.

Let us now turn to Lambert's formulation of PI. It is ingenious and provides him with a fine analytical tool. It is also arguably as good as many other formulations. But it has some problems. To see why, note that it is surprisingly difficult to formulate Meinong's loose statement of PI in a precise fashion without falling into mere tautology. For example, Chisholm tells us that it asserts that "every object ... has the characteristics it does have whether or not it has any kind of being" (*Beyond being and nonbeing*, ***Philosophical studies***, vol. 24 (1973), p. 246. With quantifiers ranging over the domain of *Aussersein*, this becomes (PI.1) $\forall x[x$ has *Sosein* $\rightarrow.(x$ has *Sein* $\rightarrow x$ has *Sosein*$)\ \&\ (x$ lacks *Sein* $\rightarrow x$ has *Sosein*$)]$, which is mere tautology. The somewhat weaker (PI.2) $\forall x[x$ has *Sein* $\rightarrow x$ has *Sosein*$)\ \&\ (x$ lacks *Sein* $\rightarrow x$ has *Sosein*$)]$ is equivalent to $\forall x[x$ has *Sosein*$]$, which, while true, does not carry the message of PI. Consider next, one version offered by Routley (op. cit., p. 24): (PI.3) $\forall x \neg [x$ has *Sosein* $\rightarrow x$ has *Sein*$]$. Now, if the '$\rightarrow$' of (PI.3) is material implication, then this is equivalent to (PI.4) $\forall x[x$ has *Sosein* $\&\ x$ lacks *Sein*$]$, which is clearly false. Worse, if we now consider (PI.5) $\forall x \neg \Box[x$ has *Sosein* $\rightarrow x$ has *Sein*$]$ (or even a version using relevant implication), then (PI.5) is equivalent to (PI.6) $\neg \exists x \Box[x$ has *Sosein* $\rightarrow x$ has *Sein*$]$, i.e., no (Meinongian) object necessarily exists. Now, Meinong *did* assert this in at least one place (***Über emotionale Präsentation***, 1917, see page 95 in the Kalsi translation, ***On emotional presentation***, Northwestern University Press, 1972), but it is questionable whether he actually meant it. In any event, it would be somewhat dogmatic to employ a formulation of PI that automatically ruled out ontological arguments. Note, also, that another equivalent of (PI.5), namely, (PI.7) $\forall x \Diamond [x$ has *Sosein* $\&\ x$ lacks *Sein*$]$ materially implies (in as weak a modal system as Kr) $\forall x \Diamond [x$ lacks *Sein*$]$, which is as questionable as (PI.6). We might, then, try (PI.8) $\exists x \Diamond [x$ has *Sosein* $\&\ x$ lacks *Sein*$]$. But then we ought to come right out and assert (PI.9) $\exists x[x$ has *Sosein* $\&\ x$ lacks *Sein*$]$. Before being so bold, however, we should also consider (PI.10) $\Diamond \exists x[x$

has *Sosein* & x lacks *Sein*], which also seems acceptable. And J. Michael Dunn (personal communication) suggests (PI.11) $\neg \Box \forall x$ [x has *Sosein* $\rightarrow x$ has *Sein*] with '$\rightarrow$' as relevant entailment, noting that if '$\rightarrow$' were strict implication, this would collapse to (PI.10).

It seems best, however, to avoid unnecessary complications. A reasonable solution, then, is this version, also due to Chisholm (op. cit., p. 246), "though every object may correctly be said to be something or other, it is not the case that every object by correctly be said to be": (PI.$*$) $\forall x$[x has *Sosein*] & $\neg \forall x$[x has *Sein*]. Note that (PI.$*$) implies (PI.9), which in turn implies (PI.10). Moreover, each conjunct of (PI.$*$) is an independently acceptable Meinongian thesis.

Lambert's formulation is this (p. 28): (PI.L) The argument "There are nuclear properties $P_1, P_2, \ldots$ such that the set of $P_1, P_2, \ldots$ attaches to s; so, s has being" is invalid. We can now see, however, that this formulation inherits the problems of (PI.5)–(PI.7), and does not seem to have any significant advantages, *qua* Meinongian exegesis, over (PI.$*$). Why, then, does Lambert formulate it thus? Ultimately it is because of his formulation of the converse of PI in terms of the *logical truth* of a certain (material) implication (pp. 24–25). One justification he offers for using the notion of logical truth in that context is his earlier discussion of the distinction between PI and the principle of indifference; yet this earlier discussion does not warrant the use of logical truth and, hence, does not warrant a stronger formulation than (PI.$*$). Another justification is that certain terms ('presupposes,' 'excludes,' 'properly convertible') used by Meinong and his student Mally in their discussions of PI "suggest" such a "logical relationship" (p. 24). I suspect, however, that the nature of *Aussersein* as the realm of everything there is and is not collapses any distinctions between logical and material relationships. Textual interpretations aside, however, Lambert's larger point remains intact: (PI.L) is clearly Meinongian in spirit, if not in letter, and serves him well in the sequel, as we shall see.

In Chapter 3, Lambert discusses the "traditional" theory of predication, which he identifies by two key features: a *core thesis* (CT) and a *constraint*. (CT) "A statement has the logical form of predication just in case it consists of an n-place general term joined to n singular terms and is true (or false) according as that general term is true (or false) of the n-tuple of objects specified by the n singular terms, or of the object specified by the singular term if $n = 1$" (pp. 43–44). The constraint is that the argument, "Gs; so, s has being" is valid (p. 50). This theory is distinguished from the Meinongian theory of predication, "best reconstructed as simply CT minus the traditional constraint" (pp. 48–49). Note that those Meinongians who favor two modes of predication can acccept CT by treating 'true (or false) of' as ambiguous between the two modes. Lambert himself seems to distinguish (p. 49) between two senses of Meinongian predication: predication as possession and as true-of; note that the former is "structural," while the latter is "assertional."

Of chief importance is that (PI.L) is equivalent to the denial of the constraint. For comparison, note that (PI.$*$) implies, but is not implied by, the denial of the constraint (here understood as $\forall x$[x has *Sosein* $\rightarrow x$ has *Sein*]). But Lambert's proof of equivalence assumes the *failure* of an abstraction principle (A) $(\dot{x})(Fx)s$ iff Fs (read: s is a thing that is F iff s is F). Now, on the two-modes-of-predication view, there are two versions of (A), since 'Fs' is ambiguous; in both versions, to be a thing that is F is to be-internally F: (A1) s is-internally F iff s is-internally F. (A2) s is-internally F iff s is-externally F. Clearly, (A1) is true, but uninteresting, while (A2) is false. (Both of Lambert's counterexamples to (A) turn out, on re-interpretation, to be examples of (A2).) But it is the (A2)-interpretation that is crucial in Lambert's proof. For, when that proof is re-interpreted in two-modes fashion, the move from (A) and (22′) 'The spheroid which is-internally such that it is not a spheroid is-internally spherical and is-internally such that it is not a spheroid' to (24′) 'The spheroid which is-internally such that it is not a spheroid is-internally spherical and it is not the case that it is-externally spherical' fails. Moreover, Lambert's (24) construed as (24′) is no longer a contradiction, so (22′), (24′), and (A) do not imply (25′) 'The spheroid which is-internally such that it is not a spheroid has being,' thus blocking Lambert's proof that the constraint implies (PI.L) (just as it does not imply (PI.$*$), either).

Next, Lambert identifies three "basic beliefs" (p. 59) that, together, apparently lead to violation of the law of non-contradiction: (1) CT; (2) that 'so and so' is true of the designatum of 'the so and so'; and (3) that every singular term refers. Which should be given up? Given the six motivations for Meinongian theories from our discussion of Chapter 1, (1) seems the most obvious, and is, in fact, Lambert's choice, since he opts for a modified version, $C\bar{T}$, in Chapter 4.

This modified core thesis is a counterfactual version of Quine's theory of predication as stated on p. **168** of ***Word and object***: ($C\bar{T}$) "Predication joins an n-place general term to n singular terms to form a statement which would be true or false according as the n-place general term is true (or false) of the n-tuple of objects referred to by the n singular terms were they to refer" (pp. 82–83). The point is that $C\bar{T}$ provides a syntactic definition of predication that holds even when a singular term fails in fact to refer.

Lambert argues that "$C\bar{T}$ is nonextensional [in the sense that] there are coextensive general terms ... such that substitution of one for the other in some statements ... changes the truth-value of those statements" (p. 84). His argument reveals, however, the need for several crucial assumptions, at least one of which is not explicit; and even then it is open to objection. Suppose T is a theory for which $C\bar{T}$ holds; suppose T contains the irreferential singular term 'the spheroid which is such that it is not a spheroid'—I take it that this may be understood as 'the x such that x is spherical and x is non-spherical'—and consider the general term 'object,' which is true of exactly the universe of objects. For convenience, I shall abbreviate the irreferential term by 's'. Now, since s is irreferential, it does not "specify" an object. Consider the statement 's is an object.' This is not true, but—by $C\bar{T}$—it is a predication. Next, the general terms 'spherical object' and 'spherical if an object' are coextensive, since they are true (or false) of all spherical (or non-spherical) objects. Lambert then claims that no matter what the truth value, if any, of (*) 's is spherical,' substitution of co-extensive predicates for 'spherical' fails to preserve truth value:

Case i: Suppose (*) is true. Substitution yields 's is a spherical object,' which is false, since s is not an object. *But* 'spherical' is co-extensive with 'spherical object' only if there are no non-existent objects, which was not one of Lambert's original assumptions. (Note, also, that if the substitution is made for *all* occurrences of 'spherical,' then 'the x such that x is a spherical object and x is non-spherical is a spherical object' is still true.)

Case ii: Suppose (*) is false. Substitution yields 's is spherical if an object,' which is materially true, since s is not an object. *But* it was not assumed that 'spherical' is co-extensive with 'spherical if an object.' (And note, again, that complete substitution (as in the first case) yields 'the x such that x is spherical if an object and x is non-spherical is spherical if an object,' which has the same truth value as (*).)

Case iii: Suppose (*) is truth-valueless. Then substitution as in the first case yields the same results, and falls prey to the same objections.

Thus, Lambert's claim that "*any* theory of predication having $C\bar{T}$ as its core is ... nonextensional" (p. 93, my italics) is perhaps too strong, since a two-modes theory with non-existent objects could be extensional.

Chapter 5 presents an excellent overview of free logics and discusses Meinong's role: Meinong has in common with *some* free logicians a belief in PI, but, unlike *all* free logicians, Meinong quantifies over non-existents. (But why *shouldn't* free logicians who recognize an outer domain of virtual objects "quantify" over them with the Meinongian *Aussersein* quantifier? Promoting virtuality to some sort of reality seems a virtue in analyses of thought and talk of non-existents.) Lambert classifies free logicians as "negative" (those who count *all* simple statements with irreferential singular terms as false), "positive" (those who count *some* such statements as true), and "neuter" (those who count *all* such statements as truth-valueless). Meinongians are clearly akin to the positive free logicians and not to the negative ones. Indeed, Lambert shows that PI is inconsistent with negative free logic but entailed by positive free logic. Furthermore, since the differences between free logics depend on the underlying theories of predication, and these in turn differ on the acceptability of the traditional constraint, and the constraint is entailed by PI, it follows that support for (positive) free logic comes from support for PI.

Note, however, that it is crucial to Lambert's thesis that PI *not* imply "a world of nonbeings" (p. 121), because "no free logician shares Meinong's world picture" (p. 122). Since (PI.*) *does* imply that there are *Seinlos* objects, I find it preferable to say that either positive free logic is the most plausible free logic or (better) a Meinongian theory is even more plausible.

Lambert's defense of PI, in Chapter 6, takes the form of exhibiting true sentences about non-beings and defending their truth. Here, I shall only describe three of these. First, "the winged horse of Bellerophon is the winged horse of Bellerophon" is clearly about a non-being, and is true because (a) everything the winged horse of Bellerophon possesses is possessed by the winged horse of Bellerophon (and vice versa) and also (b) 'the winged horse of Bellerophon' refers to whatever 'the winged horse of Bellerophon' refers to. Second, the *predication* "Vulcan is the planet causing the perturbations in Mercury's orbit" is about a non-being and is true by the definition of 'Vulcan' as 'the planet causing the perturbations in Mercury's orbit.' Finally, "the winged horse of Bellerophon is mythological" is about a non-being, is clearly true, and is indeed a predication (since there is no good non-predicational paraphrase of it, e.g. in terms of an "In the myth ..." operator).

It is to be noted that Lambert's three examples concern a self-identity statement, a definition, and an extranuclear (alternatively, an external) predication. It is unfortunate, though consistent with his overall approach, that he finds the more interesting *nuclear* (alternatively, *internal*) predications to be *weak* support for PI, on the ground of requiring further assumptions (specifically, CT and the law of non-contradiction). On the two-modes approach, however, such a defense is perfectly natural: 'The round square is round' is true *because* the property of being round is internally predicable of the round square, yet the round square lacks being because it is an impossible object. This sort of defense of PI does not require CT, and it is to be *expected* that it should require some "independent" principle from the realm of being (or an empirical fact, as would be needed in the case of 'the golden mountain is golden') in order to demonstrate *non*-being. WILLIAM J. RAPAPORT

DONALD NUTE. ***Essential formal semantics.*** Rowman and Littlefield, Totowa, N.J., 1981, xiii + 186 pp.

This unusual textbook, suitable for a second course in logic, is distinguished by its narrowly focused concern with semantic completeness results for a broad range of logical systems, and by its unconventional—and unremitting—use of quantificational notation in the meta-language.

Chapter 1 (47 pages) introduces a Zermelo-style set theory (without axioms of choice or infinity) and mathematical induction. The succeeding four chapters treat, respectively, classical sentential logic (33 pages); first-order predicate logic without identity or function letters (40 pages); the modal logics Kr, T, S4 and S5 (23 pages); and three logics of subjunctive conditionals (21 pages). Semantics in which mappings into $\{0, 1\}$ play the central role are well if briefly motivated in each case, and developed as far as required for the presentation of soundness and Henkin-style completeness proofs. But there is virtually no additional material—no mention of alternate (e.g. algebraic) semantics, no discussion of decidability, not even a statement of the Löwenheim–Skolem theorem.

What material the author has selected, however, is tightly organized and uniformly presented throughout, so that the semantic refinements necessary for treating modal logic and conditionals are made to seem inevitable developments, as perhaps they were. There are some pleasant surprises among the largely standard proofs, for example, an uncomplicated and elegant demonstration of the deduction theorem wherein the hypothesis that $K \cup \{\phi\} \vdash \psi$ is used only after showing that $\{\psi : K \vdash \phi \supset \psi\}$ contains K, ϕ, and the axioms, and is closed under *modus ponens*.

Considerably less elegant is the author's handling of notational matters. At the start, the usual quantificational symbols ($\backsim, \rightarrow, \&, \vee, \leftrightarrow, (x), (\exists x), =$) are introduced as meta-linguistic abbreviations, and such English phrases as "only if," "for every," and "there exist" scarcely occur again in the book. Blessings are mixed; proofs are quite compact but perspicuity often ends up being sacrificed to excessively formal rigor. The reviewer would have preferred proofs presented in the style of the journals, this JOURNAL, and the author's own purported paradigm on page 11, the likes of which are not seen again after its presentation as a model for students to use as they "develop a mathematical prose style" of their own.

Object-language symbols and formulas are never displayed. Instead, meta-linguistic names for the latter are built—using prefix notation—from a nonstandard set of signs (how many of $\underline{\mathrm{n}}, \underline{\mathrm{i}}, \underline{\mathrm{u}}, \underline{\mathrm{l}}, \underline{\mathrm{c}}$ does the reader recall having seen before?). Abbreviations for these names, using infix notation and a more standard set of symbols ($\sim, \supset, \wedge, \Box, >$), are introduced immediately, and the author subsequently switches back and forth at will between these two ways of doing things. Complicating matters further, he insists that wffs are *sequences* in the set-theoretic sense—functions from initial strings of positive integers into sets of symbols, rather than, say, n-tuples. Consequently, the statements of definitions, theorems and proofs too often become intimidating. To cite but the briefest example, definition 102 forces the student to contend with "ϕ is a *modal generalization* of $\psi \leftrightarrow (\phi = \psi \vee (\exists\sigma)((\mathrm{n})(\mathrm{n} \leq \ell(\sigma) \rightarrow \sigma_{\mathrm{n}} = \underline{\mathrm{l}}) \,\&\, \phi = \sigma{*}\psi))$" when he or she might have been told instead—or at least in addition—that the modal generalizations of a wff are those obtained by prefixing zero or more necessity signs to it.

Sometimes all this gets to be too much even for the patience of the author who declines, on the grounds that "the proof is rather long and complicated," to prove a result critical for the many variants of Lindenbaum's lemma required later—that the set of finite sequences of members of a countable set is countable. Of course, it is but the work of a few minutes of class time to show how to associate a unique integer with each such sequence.

Despite these objections, the reviewer liked this book and especially recommends it for those students