epistemology" is to be rejected, and replaced by a new approach, "taking science for granted." As an account of Quine's distaste for the *idea* idea, this leaves a good deal to be desired; and as an account of what is involved in naturalised epistemology—of proceeding within science, but at the same time *acknowledging its revisability*—it is badly misleading. (And the references Grayling supplies at this point are hardly helpful: ***The roots of reference*** (Open Court, 1973) *in its entirety*, and Chapter III of ***Word and object***, in which ideas are not discussed at all!)

In general, I fear, Grayling's presentation tends to the sort of mushiness that will convey to students a very undesirable impression of what the appropriate standards of philosophical argument are. Furthermore, Grayling's choice of material seems to me parochial. For example, he conveys the impression that Quine is important primarily as paving the way for Davidson; he introduces the notion of presupposition as due to Strawson, not Frege; he characterises intuitionism with reference to Dummett, but with no mention at all of Brouwer or Heyting; and, though Grayling eventually comes to the conclusion (p. 288 ff.) that one should jettison the notion of truth in favour of the notion of warrant, Dewey is given scarcely a look-in.

This historical and geographical myopia is, no doubt, in part responsible for the superficiality of Grayling's treatment of some issues, for example, his use of a rather uncritical acceptance of Dummett's characterisation of realism versus antirealism—a characterisation that, I believe, runs together a number of logically distinct questions that might profitably have been distinguished.

Technical terminology is too often used without explanation; for example, "deep structure" on page 174, "Syncategorematic" on page 177, "*verstehen* theory" on page 192. And where explanations *are* given, they are sometimes confusing; for example, "'natural kind' terms... are terms which designate naturally occurring stuffs like gold and water, as opposed to artificial categories of things like spinsters, professors, and bicycles" (p. 183). There are rather a lot of misprints, including notably, "(x) (x is necessarily greater than 7)" for "$(\exists x)$ (x is necessarily greater than 7)" on page 67, and "Ramsay" for [F. P.] "Ramsey" throughout. Quotation marks are sometimes misused; for example, "$F(x_1, x_2, \ldots x_n)$ is to be satisfied by the sequence '$\langle O_1, O_2 \cdots O_{n+1}, \cdots \rangle$' (where 'O' is any object)" (p. 161). (In fact, as Grayling acknowledges in the notes, pages 160–162 follow my ***Philosophy of logics*** (XLV 372)—in places almost verbatim— but I must decline responsibility for Grayling's punctuation!) SUSAN HAACK

GEORGE BEALER. ***Quality and concept.*** Clarendon library of logic and philosophy. Clarendon Press, Oxford University Press, Oxford and New York 1982, xii + 311 pp.

The doctrine of a metaphysical realism of properties, relations, and propositions (PRPs) is one of the two basic tenets of this book. The other is that unlike set theory the theory of PRPs is a genuine part of logic and simultaneously a foundation for philosophy, psychology, theory of language, and mathematics. Two views of PRPs as intensional entities are distinguished: one according to which PRPs are identical if and only if they are necessarily equivalent; the other maintaining that intensional entities are either complex or simple and that each complex PRP has a unique, non-circular ultimate analysis in terms of simple PRPs and certain fundamental logical operations. The first conception is appropriate in the treatment of modality and the second is appropriate in the analysis of intentionality and the theory of meaning.

The book is divided into three parts. In Part I the two conceptions of PRPs are developed as separate first-order logics for which completeness theorems are proved relative to a certain novel, but also rather complex, algebraic semantics constructed by the author. Later, in Part III, the two conceptions are unified within a single theory in which the simple PRPs of the one conception are identified with the simple PRPs of the other and where the different types of complex PRPs are otherwise distinguished by a duplication of the logical operations involved in their construction. Thus the logical operations from the second conception are called thought-building operations, while those from the first are called condition-building operations. Both types of operation begin, as indicated, with the same simple PRPs (which may equally be called concepts and thoughts on the one hand or qualities, connections, and conditions on the other), but whereas the one type builds up complex concepts and thoughts the other type builds up conditions or states of affairs to which the thoughts correspond. The author is able in this way to give a purely logical analysis of the relation of correspondence between thought and reality. This analysis, needless to say, would not satisfy those who do not believe that concepts and thoughts are independently real PRPs or that simple concepts and thoughts in particular are identical with the properties and states of affairs to which they correspond. Nor would it satisfy those (such as Russell in his philosophy of logical atomism) who do not believe that logical operations are constituents of the conditions or states of affairs that obtain in the world.

The special and common feature for the first-order intensional logics developed in this book is an intensional abstraction operator $[A]_{v_1 \cdots v_m}$ that generates a complex singular term from each formula A. Syntactically related to this singular term are all of the singular terms generated from the subformulas of A together with certain others generated from the latter by means of basic syntactic operations (such as conversion, inversion, reflexivization, etc.), most of which are related to the operators in Quine's predicate-functor logic. The denotation of $[A]_{v_1 \cdots v_m}$ is then determined algebraically in the author's model structures in terms of the denotations of the syntactically related simpler singular terms. Besides the algebraic operations corresponding to the syntactic operations on intensional abstracts, the author's algebraic model structures also contain (1) a partition of the domain of discourse into subdomains of particulars, propositions, properties, and n-ary relations, (2) a set of functions that assign different possible extensions to the PRPs in the subdomains, and (3) a distinguished function that assigns PRPs the extensions they have in the actual world. The functions assigning different possible extensions to the PRPs in a model structure serve in effect as different possible worlds (whether or not they are literally taken as such) and explain why $\Box A$ can be defined as $[A] = [[A] = [A]]$. No rationale is given, however, why a model structure need contain only an arbitrary set of such functions, that is, why some of the functions that assign extensions to the PRPs of the model structure need not themselves be in the structure. This is important since if the model structures were required to contain all of the functions assigning the different possible extensions that can be drawn from the domain of discourse (and in effect thereby involve all of the standard models having that domain in common), then the resulting semantics would yield an incompleteness theorem instead of the author's completeness theorem. (For example, by interpreting $\Box A$ as $(\forall F_1) \cdots (\forall F_n)A$, where $F_1, \ldots, F_n$ are all of the predicate letters occurring in A, the revised semantics would represent enough of the semantics of second-order logic to duplicate the latter's incompleteness.) The author is able to prove completeness, in other words, only by allowing a restricted form of the semantical quantification over the different possible extensions that can be assigned to the PRPs of a given model structure. This conflicts with his own interpretation of the origin of incompleteness in logic (p. 92ff.) and also with his argument that first-order intensional logic is superior to higher-order intensional logic insofar as the latter can be proved complete only by a restricted or secondary interpretation of predicate quantifiers.

The real locus of incompleteness in intensional logic, according to the author, lies in the predication relation. This relation is described in Part II as an analogue of the membership relation and is represented by a 2-place predicate constant Δ. Property theory, in other words, is really a form of set theory with n-ary abstracts but without the axiom of extensionality. Thus, since n-tuples can be defined in the usual set-theoretic way, but with Δ in place of $\in$, relational predication is analyzed—as it is in set theory—as a form of monadic predication: $\langle a_1, \ldots, a_n \rangle \; \Delta \; [A]_{v_1 \ldots v_n}$. Also, since the conversion principle, or what the author calls the naive principle of predication (i.e., $\langle v_1, \ldots, v_n \rangle \, \Delta \, [A]_{v_1 \cdots v_n} \equiv A$) leads to paradox, the author's proposal is that this principle is to be replaced by a Zermelo-style or a von Neumann-style principle of predication (i.e., Zermelo's or von Neumann's comprehension principles for sets with Δ in place of $\in$). His general point is that "whenever motivation is offered for the axioms in a given set theory, it is never stronger than an analogous motivation for the axioms in an associated property theory" (p. 115). Thus "on analogy with the iterative conception of set, there are also iterative conceptions of PRPs" (ibid.). The analogy may be challenged, however, insofar as the iterative concept of a set is none other than the concept of a class as composed of its members, that is, the concept of a class having its being in the objects that belong to it; and of course in the author's metaphysical realism PRPs are in no sense to be thought of as having their being in the objects that are their instances. Thus, since the ZF or GB axioms are motivated even independently of the axiom of extensionality in terms of the iterative concept of set, and since the latter (i.e., the concept of a set as "formed" in stages by iterated applications of the operation $X \mapsto X \cup \mathscr{P}(X)$) is none other than (or is the analysis of) the concept of a set as a class that has its being in its members, then it is doubtful—if not outright implausible—that an analogous motivation can be given for these axioms in property theory, or at least given in a property theory based on the author's metaphysical realism, and certainly any such motivation would not be as strong as the one for set theory. (The author's notion of an L-determinate type 1 property, that is, the notion of a property that has the same extension in every possible world and that he describes as an iterative concept, was originally given by Montague in *Pragmatics and intensional logic*, XLVII 210, and has nothing there to do with any so-called iterative concept of a property being "formed" in stages.)

The author provides many applications of his intensional logic, including a purely logical analysis of intentionality, mind, and consciousness. These all deserve an extended discussion and examination of their own, but space prohibits going into such matters here. This is a highly original book, and whether or not we agree with its basic tenets, it will no doubt stimulate a much overdue reassessment of the metaphysical philosophy of logical realism. NINO B. COCCHIARELLA

RAYMOND TURNER. *Counterfactuals without possible worlds.* ***Journal of philosophical logic***, vol. 10 (1981), pp. 453–493.

What does it mean for a sentence of the form "if it had been the case that ϕ, then it would have been the case that ψ" (henceforth $\phi > \psi$) to be true, and how is the truth of such a sentence to be assessed in practice? Turner's article contains an interesting attempt to reduce David Lewis's answer to the first half of this question (XLIV 278) and Nelson Goodman's answer to the second half (XII 139) to the same denominator.

Lewis analyzes the truth conditions for counterfactuals in terms of a comparative similarity relation among possible worlds: $\phi > \psi$ is true in world w iff ψ is true in those worlds in which ϕ is true and which in other respects are as similar to w as is possible given the truth of ϕ. This analysis has been much under attack; even among those who accept the framework of possible-world semantics many regard with suspicion the notion of "comparative similarity" as used by Lewis. According to Turner, the only way to arrive at a clear understanding of this relation is by careful reflection on the concept of "possible world." Within his framework *partial descriptions* (of possible worlds) figure as basic entities. Being closed under truth-functions, the set of partial descriptions constitutes a Boolean algebra, the ultrafilters of which are to be understood as complete descriptions of possible worlds. Assuming that the algebra is at most denumerably infinite, one can assign to each of its elements a natural number, to be understood as the *degree of detail* of the partial description concerned, in such a way that the logically strongest descriptions of degrée n decide the descriptions of degree less than n. Now, instead of a comparative similarity relation among (complete descriptions of) possible worlds, a *comparative plausibility* relation among partial descriptions (of possible worlds) is introduced. This is motivated by the idea that the question whether a given world u is more similar to world w than world v is, if it is to be of any practical interest, must be decidable on the basis of finite information about these worlds: u is more similar to w than v is iff for any pair of sufficiently detailed descriptions u' of u and v' of v one can on the basis of a partial description w' of w recognize that u' is more plausible than v' (and definitely so, i.e., whatever additional information about w may be supplied).

In discussing the notion of "comparative plausibility" Turner restricts himself to an exposition of the constraints that *must* be imposed upon this relation in order that the comparative similarity relation induced by it gets exactly the structural properties of a Lewis-like overall comparative similarity relation. As a consequence, Turner's theory is on many points open to the same objections as is Lewis's. In particular need of further justification is the assumption that any two partial descriptions u' and v' are always *comparable* as to their respective plausibility, so that one may call u' and v' equally plausible given w' (and expect this to be an equivalence relation) if it is definitely so that neither of them is more plausible than the other. See David Lewis, *Ordering semantics and premise semantics for counterfactuals*, ***Journal of philosophical logic***, vol. 10 (1981), pp. 217–234, for a discussion of this issue as far as similarity is concerned.

Goodman's theory enters the scene when the question is discussed as to when a counterfactual $\phi > \psi$ is warrantably assertible given a partial description w' of the actual world w. Turner's answer to this question consists in a formal account of the following evaluation procedure for $\phi > \psi$. Think of a number of alternative circumstances in which ϕ could be true. Select the alternatives that are most plausible given w'. Check to see if these most plausible alternatives together with ϕ imply ψ. If so, one may consider $\phi > \psi$ as true. If one of these most plausible alternatives together with ϕ imply $\neg \psi$, one may regard $\phi > \psi$ as false. If neither of these cases apply, partition the alternative circumstances more finely and repeat the process. On Goodman's account $\phi > \psi$ is assertible if (i) there is an argument leading from ϕ together with a set S of sentences that are all *cotenable* with ϕ to the conclusion ψ; and (ii) there is no such argument leading to the conclusion $\neg \psi$. Turner suggests that "χ is cotenable with θ" can be understood as meaning "$\theta \wedge \chi$ is at least as plausible as $\theta \wedge \neg \chi$"—and, indeed, given this interpretation both accounts turn out equivalent.

The paper concludes with a comparison of two alternative truth conditions. On the one hand there is the "orthodox" truth condition proposed by Lewis (see above); but one may prefer to define truth in terms of assertibility: $\phi > \psi$ is true in a possible world w iff ϕ is warrantably assertible on the basis of a partial