do. Surely the privileged people outside of Watts need "retraining" as much as the people inside, because they have a distorted view of social reality.

It is not altogether ridiculous to say that social experimentation requires that there be no experts—or, if you wish, that everyone is an expert on some relevant aspect of planning. Indeed, one measure of performance of social planning might very well be the extent of contribution of all members of society. One of the most frustrating aspects of society today is the very little that most of us can contribute to the planning of social change; at best we have an occasional vote (often on undesirable alternatives) or an occasional letter to a representative. It would be a tragedy if all the good work of the earlier pragmatists produced a society ruled by "scientific" experts, no matter how elegant their experiments might be.

I'd feel a lot happier about the coming age of man-machine digital systems if I could more clearly understand a theory of implementation of the results of social experiment.

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Philosophical Inquiries

Delaware Seminar in the Foundations of Physics. Mario Bunge, Ed. Springer-Verlag, New York, 1967. xii + 193 pp. $9.50. Studies in the Foundations, Methodology and Philosophy of Science, vol. 1.

The most outstanding feature of this collection of essays is the diversity of their subject matter and approach. Three of the contributions (Bergmann, Bernays, Bunge) treat general questions about the nature of physical theories; two (Noll, Truesdell) present closely connected, and rather technical, discussions of the foundations of continuum mechanics; two (Grad, Jaynes) offer divergent accounts of the nature of statistical physics; two (Schiller, Margenau and Park) treat quantum mechanics, from quite different points of view; one (Post) offers a critical discussion of the physical content of the covariance principle; and another (Havas) presents a general discussion of problems arising in formulating general relativity theory.

Of the general discussions, the most substantial is Bunge's. He presents the outlines of a general account of the nature of "contemporary theoretical physics" by referring to a specific example of a physical theory—the two-component theory of the neutrino. He analyzes this theory into four components; its background (the other theories it presupposes); its form (the mathematical formalism of the theory); its content (the physical interpretations of this formalism); and finally, its evidential support. The general picture that emerges is one of a theory whose "essence" is a certain mathematical formalism which may be given various interpretations, or applied to various physical situations. The enterprise of giving such interpretations is discussed and an attempt made to distinguish this from the enterprise of producing empirical tests for the theory. A suggestion is made that the understanding of this enterprise—the semantical side of physical theorizing—may be advanced by employing the concepts and results of model theory. This appears to be a fruitful suggestion. It is regrettable that Bunge does not pursue it further in his article.

Two of the more specialized contributions are unified by a feature worth noting. Both the contribution of Jaynes and that of Margenau and Park deal extensively with the concept of subjective probability and its role in physics. It is astonishing that neither refers to *any* of the vast body of literature on subjective probability published in the last 30 years. The work of Ramsey, de Finetti, Savage, and Jeffrey has produced a theory of subjective probability quite distinct from, and superior to, the rudimentary efforts of Laplace, Keynes, and Jeffreys. In particular, the work of de Finetti has provided an account of how there can be wide intersubjective agreement about the values of certain subjective probabilities—one of the commonly mentioned difficulties in viewing physical probabilities as subjective.

This lacuna is particularly surprising and regrettable in the work of Jaynes—surprising because Jaynes is an advocate of a subjective interpretation of probabilities in physics, regrettable because it masks a very interesting problem in Jaynes's maximum-entropy principle. This is essentially a principle for choosing a prior probability distribution on the basis of data about average values of certain quantities. It is introduced by Jaynes as a postulate. From the point of view of modern subjective probability theories, an interesting question is this: Can this distribution be shown by the one on which *all* prior distributions converge in the limit of large numbers of certain kinds of experiments—the experiments which give us the data on "average values"?

The lacuna is not so surprising, but equally regrettable, in the contribution of Margenau and Park. The most glaring manifestation of it is the absence in their discussion of a distinction between the a priori or logical interpretation of probability (whose most outstanding recent proponent is Carnap) and the subjective interpretation in general. What the relation between these interpretations is may not be a closed question, but it is generally recognized not to be identity. The question of whether or not a subjective interpretation of probability in quantum mechanics is possible or fruitful is hardly illuminated by mounting objections to a quite different interpretation of probability. It is also regrettable that an alternative to the authors' account of the "seemingly miraculous" numerical agreement between subjective and objective probabilities—that of de Finetti—is not even mentioned.

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The Theory of Automata

Computation: Finite and Infinite Machines. Marvin L. Minsky. Prentice-Hall, Englewood Cliffs, N.J., 1967. xviii + 317 pp., illus. $12. Prentice-Hall Series in Automatic Computation.

A mathematical theory of computing machines (sometimes called automaton theory) was first presented by Alan Turing in 1936 (hence such machines are also often called Turing machines). Since that time there has been an extensive development of the field, although the models proposed are still very far from the current digital computers we find in so many places these days.

Minsky's *Computation: Finite and Infinite Machines* has finally brought order and sense to the mass of material that has appeared in the literature since Turing's first publication. The book has the character of simplicity that so often marks a great step forward; it uses only elementary mathematics (although in somewhat sophisti-