Book Reviews

Personal Knowledge. Towards a post-critical philosophy. Michael Polanyi. University of Chicago Press, Chicago, Ill., 1958. xiv + 428 pp. $6.75.

Michael Polanyi's concern in this book is to refute a theory of what science is which is not merely false but which is harmful to the practice of science; he calls it the "objectivist theory," and against it he urges an alternative according to which science is ineradicably "personal." Hence the title of his book, which might, otherwise, be misleading. The book is not so much about our knowledge of persons as about physics, probability theory, crystallography, biology, and so forth, which he argues are *inherently* and not accidentally personal in structure; they are, one and all, personal, yet not "subjective." His problem, therefore, is first to prove that the sciences all conceal at bottom a personal commitment and secondly, to show how that commitment can be personal or responsible, and not whimsical or subjective. I believe he has achieved a large measure of success in the first of these tasks but not in the second.

Increasingly, Polanyi holds, a notion is gaining currency that science is an impersonal activity. To be sure, *men* must raise certain questions, gather relevant data, formulate tentative hypotheses, and, by experimental procedures, confirm their guesses or prove them untenable; but the "objectivist" theory holds that the passions of the scientist, his beliefs, his commitments, his trust in his own unformulated and unformalizable frameworks, and his accreditation of reports, institutions, and his fellow scientists are all of an accidental character. In principle, the entire procedure might be accomplished by a mechanicological apparatus; the person of the scientist is logically irrelevant to problems posed, relevant evidence, symbolic formulations, and final probable truth. All of this is a caricature both of the actual work of science and of its logical structure, according to Polanyi. The person of the scientist functions at the beginning and in the middle, and is present in the final results.

How then does the personal factor manifest itself in the very structure of science? Polanyi discovers it wherever there is an act of appraisal, choice, or accreditation. Each science operates within a conceptual framework which it regards as the "most fruitful" for those facts which it "wishes" to study because they are "important," and thereby it chooses to ignore other facts which are "unimportant," "misleading," and "of no consequence." In short, the framework *selects* out of a chaos of phenomena those circumstances which are susceptible of "fruitful" investigation and formulation. But the framework itself is not selectable by any formalizable process; it represents a passionate commitment by the person of the scientist, a commitment which then proceeds to make itself good, but always to a degree only. The framework itself is never logically decidable by the simple, uninterpreted facts themselves. Further, the conceptual framework itself can never be exhaustively understood by the scientist using it; it has implications beyond what can at any time be foreseen, and the skillful use of it demands a faith in it which can never be adequately grounded by explicit thought. Finally, science in any significant sense is never the work of a single man. The thought of any one scientist would be impossibly trivial unless that man had faith in the skill, reliability, and veracity of a continuing community of investigators.

Scientific knowledge, then, from mathematics through astronomy, physics, chemistry, and biology, is an activity of men who seriously investigate nature from the standpoint of changing conceptual frameworks passionately believed in, within a trusted community of scientists, professionally accredited, using methods which are better described as "skills," "arts," or a kind of connoisseurship than as an impersonal calculus. This in general is Polanyi's argument, and it is demonstrated by a running analysis of a variety of problems within the sciences. Polanyi is a polymath of intimidating scope, and it is far beyond my powers to estimate the reliability as to detail of arguments which touch upon crystallography, relativity physics, genetics, economics, learning theory, probability theory, Gödel's theorem, law, evolution, and, indeed, the entire encyclopedia of modern scientific knowledge. But these have the role of illustrations, and long before the spirit is worn out by the bewildering variety of subjects, Polanyi's thesis has become clear and plausible in outline.

Part 1 considers scientific knowledge as a skill involving connoisseurship, habits, and traditions. "The aim of a skilful performance is achieved by the observance of a set of rules which are not known as such to the person following them" (page 49). An analogy is drawn between scientific knowing and swimming; maxims and rules are useful as guides, but only insofar as they can be integrated into a practical knowledge of the art. Further, in science the inquiry is guided by reference to and belief in a reality which lies far beyond our explicit comprehension. We have clues, but the clues are clues to an ultimate reality not identical with the clues themselves. We use the clues to explore a vision of reality animated by an enthusiastic hope; we hope the patterns of order we have selected will, by leading us on to new discoveries, progressively enable us to explore a physical reality which extends far beyond our theoretical comprehension. Our affirmation of the truth of a theory is an act of *believing* in its significant contact with that reality. Skillful performance rests upon an acceptance of an indefinite number of unformalizable particulars of which we have at best a subsidiary awareness.

Part 2, the largest section, explicitly applies Gestalt theory to scientific knowing. We direct our attention *focally* to a theme, a problem, or a question, but supporting and conditioning that focal or thematic awareness is a background of subsidiary awareness of all that is presupposed in order to make sense out of the focal theme. This vast and unformalizable background Polanyi calls the "tacit component" in knowing, and this is all that must be *believed* if the particular matter under scrutiny is to be doubted or investigated. To say anything whatsoever is to affirm an indefinite number of unsaid things. Language itself supplies such a background of commitment; to speak in a language is to accept the language itself as an adequate framework for true and meaningful speech. Further, we must credit the assertions of others and hope that they share enough of our own framework to make significant agreement or disagreement possible. The whole of scientific discourse occurs within a social medium which must be affirmed in outline: technical journals, a continuing tradition of responsible authorities, institutions, and libraries. Any particular matter within this whole can be doubted and questioned, but we cannot doubt the whole without destroying the conditions for

doubt. Again, Polanyi presents us with the image of scientists necessarily living within a framework of tacit beliefs and commitments, where personal faith is the presupposition of even the most radical revolution. However, as I mentioned above, this faith, while personal, is not "subjective"—that is, not arbitrary or capricious. It is, Polanyi holds, "responsible."

Part 3 attempts a justification of personal commitment, in order to distinguish it from the capricious and the arbitrary. This is, in my opinion, the weakest section of the work. "Within the framework of a commitment, to say that a sentence is true is to authorize its assertion . . . the verification of a statement is transposed into giving reasons for deciding to accept it, though these reasons will never be wholly specifiable" (page 320). Polanyi's problem now is to make sense out of his distinction between the personal and the subjective; for if knowledge contains an irreducible factor of belief—a belief moreover which can never be adequately grounded—how is it to be distinguished from superstition and error? And Polanyi most certainly wants to distinguish science from superstition, wishful thinking, and fantasy. The latter are "subjective"; the former is personal—that is, "responsible." But both rest upon beliefs which can never be formalized or demonstrated adequately. How, then, are the two to be distinguished? And here I must admit to a profound disappointment. "It is enough" Polanyi says, "to establish here once more the principle which distinguishes them: namely, that commitment is personal choice seeking and eventually accepting something believed (both by the person incurring the commitment and the writer describing it) to be impersonally given, while the subjective is altogether in the nature of a condition to which the person in question is subject" (page 302). And a few sentences further on he states, "The scientist pursuing an enquiry *ascribes* [italics mine] impersonal status to his standards and claims, because he regards them as impersonally established by science. But his submission to scientific standards for the appraisal and guidance of his efforts is the *only sense* in which these standards can be said to pre-exist or even to exist at all for him. . . . I can speak of facts, knowledge, proof, reality, etc., within my commitment situation for it is constituted by my search for facts, knowledge, proof, reality, etc., as binding on me. These are proper designations for commitment targets which apply so long as I am committed to them; but they can not be referred to non-committally. . . Commitment is in this sense the only path for approaching the universally valid" (pages 302–303). "*Our claim to speak of reality serves thus as the external anchoring of our commitment in making a factual statement*" (page 311).

And so: if I regard the standards of my activity as universal, "impersonally given," then I am personal and responsible, and my activity is scientific, whereas, if in fact I am merely subject to some condition, then I am in fact "subjective." But, the "facts" in question are themselves facts only for *belief*. Hence, we end up with the spectacle of science calling astrology subjective superstition, since science doesn't "believe" in the "facts" of astrology, and of astrology repeating the compliment with respect to science, since its feeling is reciprocal. Each has its own facts, truths, beliefs; each calls itself personal and responsible and its opponent "subjective" and merely involved in certain mental "conditions"; and there is no way out of the impasse.

Now this last, it should be understood, is the conclusion *I* draw from Polanyi's argument, not his; in short, I do not see that Polanyi has provided us in the end with any means whatsoever for distinguishing truth from error, the personal from the subjective, science from superstition, although he is most anxious to do so. For in Polanyi's universe of discourse there are *no* facts, and there is *no* reality independent of a belief which can never be adequately grounded. But surely this is a serious logical muddle. A madman is not less mad by virtue of the passion of his commitment to his world but more so; and to distinguish him from the sane by saying he suffers from "a condition" becomes meaningless within any system such as Polanyi's where fact is dependent upon sheer belief. The logical muddle consists in mixing together two points of view. If, as Polanyi argues, we must always dwell *within* a framework of belief within which there are such things as "facts" and "truths" but outside of which there are none, then indeed we have no right to adjudge any other belief whatsoever "subjective," except insofar as we simply do not share that belief. Page 304 states this as clearly as one could wish: "The 'actual facts' are accredited facts, as seen within the commitment situation while subjective beliefs are the convictions accrediting these facts as seen non-committally by someone not sharing them." And so after a long argument we come at last to this —that questions of true and false, fact and fiction, science and superstition, are merely questions of two different frameworks, two different beliefs, two different commitments; the ontological war of worlds is now a war of beliefs. And where do we go from there? To put it briefly, I think Polanyi has overstated his case and ends up with such a radical subjectivism that he can no longer make sense of some rather crucial distinctions.

The last section of the book develops a theory of evolution which is something like Bergson's, except that Polanyi's is directed to an end. Life culminates in ourselves, and here Polanyi is thinking of the scientist—men who are responsible to a "firmament of obligations . . . truth . . . greatness, and universality." Life is an "ordering principle" which moves toward "liberating" itself, which it does through commitment and belief, and which progresses toward an "unthinkable consummation." God is the last word in the book. Here Polanyi exhibits an admirably synoptic view and achieves expressions of a high order of disciplined beauty.

This sketchy account, however, utterly fails to do justice to a most impressive book. I believe there is a major flaw in Polanyi's position; but even so, his argument against the "objectivist" school is, for me, decisive. I do believe that Polanyi is too much concerned with tracing every activity of man down to the chimpanzees, bees, and worms, and too little concerned with the ultimate logic of his position. But I should not wish to give the impression that this work is anything but a very major attempt to rethink the conditions of scientific knowledge.

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The Geology of South Australia. Prepared by members of the South Australian Division of the Geological Society of Australia. M. F. Glaessner and L. W. Parkin, Eds. Melbourne University Press on behalf of the Geological Society of Australia, 1958 (order from Cambridge University Press, New York 22, N.Y.). Illus. + plates. $8.50.

South Australia, far exceeded in area by three other Australian political subdivisions, is larger than Texas by more than 100,000 square miles. Wide plains and low hills characterize much of the land surface, but in the southeastern part of the state, ranges that trend generally northward are locally rugged, with maximum altitudes exceeding 3000 feet. The northwestern section of the state is arid and has extensive areas mantled with dune sand. The eastern part has moderate rainfall, and a large northeastern district is within the Great Artesian Basin.

Bedrock in South Australia includes great thicknesses of ancient sedimentary strata, which are best displayed in low ranges that extend northward from Gulf Saint Vincent. The oldest bedrock unit, mapped as Archean, consists of many deformed and metamorphosed sedimen-