

THE ROLE OF SCIENCE

WHAT is the role of science in human life? In considering such questions, it is customary to contrast science with religion. Often it is said that religion provides an account of the meaning of subjective experience, while science compiles, relates, and to some extent interprets the facts of the world of external experience. You could add that religion is concerned with the question of ends, science with means. On the whole, this seems accurate enough, but if you find yourself turning to science for conceptions of what is "real," then science appears to make a contribution to the thinking about ends, since ends and reality can hardly be separated.

Definitions of the role of science and religion are inevitably mixed up with history. That is, in an age which is struggling to release itself from bondage to religious dogma and the psychological oppressions it inflicts, the promise of science has an almost charismatic glow of ultimate truth. In periods of turbulence and transition, the definitions vary from individual to individual, depending upon the orientation of each one. Isaac Newton, for example, reserved to religion explanation of final causes which, he said, "are certainly not mechanical." But Newton was a religious thinker in the tradition of Jacob Boehme. Religion, for him, was an inward, mystical thing. De Lamettrie, on the other hand, saw religion as a social scourge. He regarded the wars of Europe as caused by the theologians and insisted that there could be no happiness in the world unless men turned atheist. Newton's inward feeling of devotion became in Lamettrie an intellectualized wonder at the marvels and potencies of Nature. Only ignorance of natural forces, he said, could make men fear to be atheist. He compiled evidence from the science of his time to prove what he believed—that Nature Herself could perform any necessary "miracles"—the miracles of

living things and functions—without any help from a supposed God.

Only a little reading along these lines makes it quite plain that most of the arguments about science and religion are really arguments about the *meaning* or scope of science and religion. It seems obvious that these two founders of modern materialism, Newton an unwilling founder, Lamettrie eager and determined, embodied what may fairly be called religious emotion, each in his own way. The definitions men make do not dispart the wholeness of human beings and we cannot afford to leave to either the theologians or the doctrinaire atheists the final word on what science and religion really mean.

While at this point we shall not attempt any final definitions, it is a notable fact that for at least a century or two science has been regarded by many men as providing a kind of Olympian region, high above controversy and emotional partisanship, where the true facts about the world and man are slowly being assembled. Progress is slow, we say, but the facts are there and we are adding to them daily. The time will come, it is argued, when all these facts will give unmistakable implication concerning problems and issues on which no certainty was ever possible before. What are some of these facts? Well, for example, the movement of the planets and other heavenly bodies, the circulation of the blood, and the dynamic or electronic constitution of matter. When a fact is finally acknowledged as a scientific fact, it ceases to be a bone of contention. Men still may argue, but about other things. Galileo, we all of us know, was right, and Cosmas Indicopleustes and Aristotle and Ptolemy and the doctors of the Church were wrong. Harvey was right and his professional colleagues in the practice of medicine, who mocked his theory, were wrong. Becquerel and his successors in the

formulation of the electronic theory of matter were right, and the men who had insisted that matter is made of dead, inert stuff were wrong.

Is this a correct evaluation of the role of science? It certainly seems reasonable enough. Further, it gives inspiration to the efforts of a large number of men who are obviously devoted to the welfare of their fellows.

A second general conclusion to be noted is the fact that men of scientific interest commonly direct their attention to the areas of greatest human need, or to what they feel to be the areas of greatest human need. For example, it seems fair to say that the major creative effort in science today is in the region of psychology and ethics. The ethical goal is of course somewhat hidden, or soft-pedalled, for the reason that "scientific facts" are by tradition, if not by definition, supposed to be morally neutral. A scientific fact does not become so by wishful, moralistic thinking. It is established by tough-minded men who wrest it from the rock of natural reality. It is supposed to be true no matter what anybody says or thinks or feels *ought* to be the case. The authority of a scientific fact is believed to lie in its absolute independence. It is sometimes called a *brute* fact for this reason.

But now there is the question: Is it possible that the brute facts of nature are somehow on the side of goodness, truth, and beauty? The world feels deep longings for these qualities. So, can there be a *scientific* ethics? Can the compulsion of the facts make us *good*? Pitirim Sorokin is working on this question with his Research Society for Creative Altruism. Jerome D. Frank is working on it in his psychiatric approach to the problem of war. Erich Fromm is exploring the possibility of a *sane* society and A. H. Maslow is pursuing his studies of self-actualizing persons in the hope of finding out some of the rules of psychological and moral health for all mankind. A well established example of scientists working with this motivation is the Parapsychological Laboratory at Duke University, now in existence

for about thirty years. The bearing of Duke's researches in extra sensory perception on the great issues of the age are suggestively indicated in a letter to MANAS by Dr. J. B. Rhine:

Mr. T. Lindley Chatburn, in his thoughtful essay which you printed in your Oct. 25 issue, raises an interesting question of method in his defense of Lord Russell's attempt to arouse greater opposition to nuclear warfare. Mr. Chatburn's point is so important that I hope he will consider with me a still more thorough application.

His approach would line up as follows: (1) The Pope suggests praying for deliverance. (2) Billy Graham advises having a Bible in the bomb shelter. (3) Lord Russell speaks, as Mr. Chatburn says, from his "philosophical convictions." But are philosophical convictions enough in the way of method to solve real issues in life and nature? No, the world has moved far ahead of these methods of the Pope, Billy Graham, and Lord Russell in its methods of fact-finding and problem solving.

Today the world is divided over ideologies that stem from differences concerning the nature of man. The communist bloc proudly bases its claim to soundness on what it calls scientific materialism. But the nature of man is something that can be tested by carefully controlled experiments. Such experiments have been carried out in many different countries and the findings are now firmly established. All that is needed to refute this presumed "scientific materialism" is to demonstrate that there are capacities in human personality that cannot be accounted for by physical principles.

Dictatorships have used erroneous formulations of ideas throughout the ages as armour for the maintenance of power. There was a time when Popes and Bibles were effective against some of these formulations, but that time is past. Destructive military armament itself has probably never done much to correct wrong ideas or defend against them. And who would suppose "philosophical convictions" to be very adequate either? Rather, the most effective answer to a wrong idea is the correction of it by the methods of truth-seeking known as the scientific method.

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It is impossible to deny the force of Dr. Rhine's last sentence, especially when the meaning

of "scientific method" is given the rich implication it has had in his hands. What we should like to suggest, however, is that the feeling-tone of the expression, "truth-seeking," contains trans-scientific emotion, and it is on the basis of this emotion that a man, as scientist, seeks the truth at all. Truth-seeking, in short, is the result of philosophic conviction.

Perhaps we can say that, divorced from the motive of truth-seeking, science is no more than technique. If it be argued that science does in fact include the motive of truth-seeking, then one may answer that science must be defined as the technique of fact-finding which is animated by a love of truth. Obviously, there is no real issue, here, but only a matter of terms, yet discussion of this sort ought not to get too far away from awareness of definitions, since it might easily degenerate into an exchange of private slogans.

What we seek, at the moment, is more credit for "philosophical convictions." Prime Minister Nehru was lately a visitor to this country. In an address delivered in Los Angeles recently, he informed his listeners that while India would soon have the capacity to manufacture nuclear weapons, his country would make no bomb. It seems to us quite plain that this declaration came from a philosophical conviction which has its roots in Indian philosophy and culture, going back over thousands of years. India is the country of Gautama Buddha and M. K. Gandhi, and the idea of nonviolence, or *Ahimsa* (harmlessness), pervades the serious thought of India. In this case, through the truth-seeking interest of her distinguished representative, Jawaharlal Nehru, India gives decisive direction to the fruit of science and the practice of technology.

Of course, it might be seriously claimed by some that antique Indian philosophy had its scientific aspect. The Yoga Aphorisms of Patanjali are an expression of Indian psychology, with the distinction that while Western psychology, on the whole, deals with the mental states, ancient Indian psychology comprehends

both the mental and the moral states, as conceived in Upanishadic philosophy and metaphysics. But will this claim of a scientific background for Indian philosophical conviction be respected in the West?

This is a question of considerable importance. The question of what is acceptable science and what is not is determined by the general climate of opinion in a given epoch or civilization. Dr. Rhine, for one, has some knowledge of this situation, since the scientific facts of extra sensory perception have made their way in the West against the grain of the metaphysical assumptions of materialism, and are not yet universally recognized, even today. What must be admitted is that the swaying of public opinion through the progressive revelation of scientific facts has by no means a rectilinear course. There must be, first, a kind of cultural hungering after the new ideas or facts which are to be disclosed. Then there must be, as the result of much cultivation and labor with the soil of human minds, a spreading familiarity with the terms and concepts of the research which brings out the new facts. Finally, there is the naked compulsion of the facts themselves. Only this latter influence can be identified as the authentic leverage of science in shaping opinion.

It is just possible, for example, that Patanjali's Yoga Aphorisms are indeed the mature expression of a precise scientific discipline. But Westerners in general have practically no familiarity with the vocabulary of this discipline, and neither familiarity with nor confidence in the metaphysical assumptions of ancient Indian cosmology and anthropology, which form the far-reaching background of Patanjali's system. As a result, this system of psychology is not taken seriously in the West. Fifty or a hundred years from now, perhaps, it may be taken seriously, as a result of complex and subtle causes, including scientific experiment and research, but right now it is the *temper* of Western thought, and not the abstract question of what is scientific and what is not, which determines attitudes in this matter.

On the question of the temper of civilization, consider the progress in the West of psychic research. Possibly the first Western man to attempt a scientific approach to this field was John Glanvil, a friend and contemporary of the Cambridge Platonists of the seventeenth century. Glanvil wrote some excellent books, but little if any attention was paid to him because the general movement of scientific inquiry was in another direction. As a result of the extraordinary emphasis on physics and chemistry, a body of implicit assumptions was built up which, in time, made *any* effort at psychic research seem frivolous. These assumptions were not "scientific," of course, but metaphysical—that is, they made sweeping judgments as to the essential nature of things—yet they completely dominated the thinking of nearly all the scientific leaders of that and later centuries. When, in the 1870's, William Crookes published a series of reports on psychic investigations he had personally conducted, practically no one would listen to him except a few Spiritualists who had their own axes to grind. The great Thomas Huxley found nothing of interest in psychical happenings, even "supposing the phenomena to be genuine," and the physicist, John Tyndall, disposed of the notorious report of the London Dialectical Society's Committee on psychic research (1870) by saying, "The world will have a religion of some kind, even though it should fly for it to the intellectual whoredom of Spiritualism."

In that period of history, science was concentrating on physics and biology (or evolution) and efforts in other directions were quickly ploughed under. It was not until after the agony of the first world war that our disenchanting world began to look around for some other view of reality than the simply physical, and some better rule of life to take the place of the survival of the fittest and the struggle for existence. The evolution controversy had its last big flare-up in the Scopes Trial in 1925, and the impetus of the scientific imagination was ready to seek a new focus. The *philosophical* springs of a fresh

direction of interest are apparent in Alexis Carrel's book, *Man the Unknown*, published in 1935. The earlier founding of the Parapsychological Laboratory at Duke University gave permanent form to an attempt to uncover hidden aspects of the nature of human beings. Unquestionably, this effort had a philosophical and even an altruistic inspiration.

Today, the temper of the Western world has passed from the uneasiness and wondering of the post-World-War-I years to the deep anxieties and even desperation of the post-atom-bomb, antenuclear war period. We are in a slough of circumstances created by science *without* truth-seeking inspiration—the technology of destruction. Looking at the situation historically, we are in a position to say that while science, or rather the direction and cultural momentum of the past two hundred years of scientific investigation, made Materialism a respectable philosophy, we now want it made unrespectable and are at last willing to change the direction and the emphasis of scientific research.

We want this change because we are frightened, disillusioned, and sick of the bitter fruits of materialism—our own practical materialism as well as the doctrinaire materialism of the Communists. But we also want it for better reasons. There has always been in the hearts of men a philosophical longing for a high philosophy of life. Covered up and suppressed by the noisy bluster of material progress, this longing is now coming to the surface to fill the void left by the collapsing nineteenth-century utopian dream. So, the temper of our civilization is now beginning to be receptive to a science that will give us a new view of the nature of man.

What may the new science of the non-physical capacities of human beings reveal to us? Well, it may suggest that a being with non-physical capacities is a being with nonphysical interests. It may, in short, give us a functional instead of a theological account of the human soul. It may give us an idea of the self which

transcends time and space. It may imply the possibility, if not the fact, of human survival of bodily death.

But we are obliged to ask at the same time if there remains the possibility of a "non-physical" materialism. While the phrase is itself a contradiction in terms, the question is not without pertinence. It is quite possible to conceive of a non-physical intelligence which would attempt to control or do harm to others for its own selfish interests. Hypnotism as a power is far from rationalized in terms of materialistic psychology, yet is capable of being used for destructive ends. "Souls" are not necessarily all good. The non-physical is not necessarily the spiritual. You could argue that the essential materialism lies in self-interest, and with this definition you could identify all systems of theology which promise private salvation and eternal bliss to an exclusive company of true believers as systems of materialism.

It is true, of course, that the *tendency* of the evidence of parapsychology is to encourage idealistic thinking and a cleaving to the high values which are commonly associated with the idea of an enduring reality which persists beyond the limitations of time and space. But this tendency is characteristic in *our* culture, which has only the grossest ideas of good and evil and which has never developed with any refinement a moral philosophy of motive. In Buddhist thought, for example, the *Pratyeka* Buddha who enters Nirvana, leaving all his fellows behind, is the epitome of selfishness, but he is nonetheless a non-physical being with almost immeasurable non-physical capacities.

What then is the role of science? The role of science is to verify and to put to work, in a manner consistent with the nature of things, the deepest longings of our hearts. It is not the role of science to explain to us what are or ought to be those deepest longings. Science is not a secret weapon in the fight for truth. It is not a man-made fiat of infallibility that we may, in the high

noon of our progress, substitute for the infallible will of God. It is not an escape from the agony of inward decision. It will never tell us what, finally, to believe, nor whom, ultimately, to love. It is critic and tool, telescope of sight and mirror of form, but it is not the truth-knowing and truth-seeking being himself, who is prior to any limited form of knowing and seeing. Science, in its role of deliberate impartiality, is a method of correcting for the limitations of the instruments of knowing and seeing. In our age, which is an age of heavy-handed technology, science needs an elaborate apparatus in order to do work that is in accord with the temper of the times. For Jesus, the Sermon on the Mount was probably an expression of perfect scientific knowledge, but that was because his temper allowed the validity of the kind of sight he possessed. Some day, perhaps, the world will have this temper, making possible the general practice of a science which seeks and declares the same conclusions.

REVIEW

"THE NEW WORLD OF PHILOSOPHY"

WITH this title Prof. Abraham Kaplan introduces nine lectures on both contemporary and ancient philosophers—demonstrating that deftness of touch which he has manifested in other writings and in philosophers' conferences over many years.

We know a little of Dr. Kaplan's history—as, for instance, that he stopped being a "formula" man, a "school of thought" man, a long time ago. In 1950 he decided that there were values in areas of thought other than Logical Positivism and, after attending the 1950 Conference of Philosophers at the University of Hawaii, he attempted a rethinking of the problems of Eastern philosophy and metaphysics. This new—and, to his colleagues, surprising—turn of interest has resulted in such lectures as those appearing in *The New World of Philosophy* under the headings of "Indian Philosophy," "Buddhism," "Chinese Philosophy," and "Zen." In these papers Dr. Kaplan is interested in passing on what the philosophers of both past and present have to say to us that relates to contemporary problems. Though Kaplan appears to be very much an eclectic, he is certainly aware that some sort of "higher synthesis" will probably be needed for the discovery of the true "philosopher's stone." In his Introduction Dr. Kaplan writes:

For us the difficulty is not in finding similarities but in doing justice to differences. It is relativism and subjectivism that remain the bugbears of our thinking. We say that every man is entitled to his opinion; but how can we acknowledge that title without conceding that our own opinion is no better than any other? Or putting it the other way around, how can we act with vigor and confidence in our perspectives and yet recognize the possibility, and even the reasonableness, of other points of view? We are caught, most of us, in the dilemma of absolutism or subjectivism. On the one hand, there are the "God's truth" philosophies, for which all others are heresies and the work of the devil; I have known men espousing even such a sweetly reasonable view as that of Analytic Philosophy who nevertheless act as though they alone were in possession of God's truth.

If only there were not conflicting claims to truth, or if, indeed, God Himself, in unmistakable accents, proclaimed which was His truth! But on the other hand, the subjectivist, for whom you pay your money and take your choice, makes whatever is chosen worthless, save as an expression of a momentary whim or fancy.

This is the problem of crucial importance which Joseph Wood Krutch discussed in his *Saturday Evening Post* article for the "Adventures of the Mind" series. Mr. Krutch believes that a complete relativism leaves the human soul not only unsatisfied, but unable to express its full capacity. Krutch's and Kaplan's ideas seem to mesh at another point as well, for in answer to the problem of the consequences of "subjectivism" Dr. Kaplan writes.

I do not think we escape the dilemma with eclecticism which pretends to be better than all by making a concoction of the best from each. In my judgment, it is often the worst that is chosen or at any rate it loses its worth when we set out to make a hash of it. It seems to me that the rich diversity of the world's cultures is rapidly giving way to an empty sameness, in the pursuit of what I have elsewhere described as a realm of value rich and creamy with homogenized goodness. We are cultivating a cultural uniformity amidst unyielding political differences; the hope of the world, as I see it, lies in exactly the reverse: a political unity within which cultural and individual differences can flourish. I do not look forward to a state of society in which all men espouse one world philosophy, but rather to a state in which each man espouses his own philosophy, but one in which he can live at peace with all the world.

Dr. Kaplan also illuminates areas for synthesis between Eastern and Western thought. Writing on Indian philosophy, he says:

The gods are but symbols of the one underlying reality; the powerful impulses of love and hate are but human expressions of the forces by which this reality manifests itself in experience. In their personal lives, Indians are more puritanical, I would judge, than most Westerners; but there is no place in their perspectives for the idea that there is something obscene about either sex or death.

With regard to morality in the sense of concern for the welfare of others, Indian philosophy needs no apologies. The goal of moksha, of emancipation,

though individual in form (like the Western quest for personal salvation), is thoroughly social in content. In a way, it goes beyond even the prevailing Western conception of moving from egoism to altruism. For the goal is not unselfishness but selflessness, a movement, not from self to other, but from self to Self, in which there is no other.

Indian philosophy is as great an expression of the human spirit as is to be found in any culture. It makes of philosophy not a merely academic pursuit, but a kind of vision of eternal truth—the sort of vision that we find in the West in Plato, Plotinus, Spinoza, and Kant. In the sweep of thought and elevation of expression there is a grandeur in the Upanishads which led someone to describe them as "the Himalayas of the soul," and something of this quality runs unmistakably throughout Indian philosophy. I think no one can fail to respond to it.

The differences between Kaplan's point of view and that of Krutch, however, become readily apparent in other passages. Krutch, for example, obviously believes that a kind of "vision of eternal truth" is possible, but that it never can be glimpsed through institutional means. Krutch is a gnostic without allegiance to the formal structure of a gnosis and therefore has little use for organized religion. Prof. Kaplan, on the other hand, seems to take a sort of Jungian position—which is that religion, while being both important and fascinating, deals simply with the wondrous capacities of the human psyche to make constructions, rather than with the area of fundamental truth. (Mr. Krutch is not especially attracted by formal philosophy nor by religion *per se*, but is deeply concerned with territory through which countless religions have marched to so little avail.) In any case, a good example of Prof. Kaplan's view occurs in the introduction to his book, and should be taken into account along with his appreciation of Eastern philosophy and religion:

Philosophy, as I see it, has in a certain respect more kinship with art than with science. We do not expect every culture much less every individual, to create and appreciate one and the same style of art, while we do expect them ultimately to arrive at and accept the same scientific truths. And a living philosophy is even more like the creation of art than

like its appreciation: when it comes to philosophy, there are no spectators, only participants. The pictures that we paint of ourselves and the world, the ideas with which we furnish our minds—these are as intimately our own as anything could be. An acquaintance with the work of others serves us best when we make it a guide and stimulus to the release of our own creativity.

COMMENTARY

CULTURAL REGENERATION

SOMEHOW, the treatment of the issues of modern education in this week's *Frontiers* seems to give short shrift to the problems raised by our correspondent. In his comment, the *Frontiers* writer disposed of the question of "authority" in the classroom by ignoring it. This does not seem quite fair.

And yet, the problem of authority is not a problem that you solve with method or a "system." You solve the problem of authority in education by developing real teachers—men who are able to distinguish between questions of fact and questions of value. No one is an authority on questions of value. And no one is an authority on issues of fact except those who have taken the trouble to find out what the facts are. Education, then, is the process of exhibiting the techniques of fact-finding and then it is the giving of an example of how to evaluate the meaning of the facts. A good teacher never indoctrinates values. He may display—indeed, he ought to display—his own enthusiasm for the values *he* has embraced, but the students will have to generate their own sense of values and their own enthusiasm for the ones they select.

These, you could say, are the abstract issues. But in a going society the abstract issues are always embodied in situations of particular direction. There is some kind of cultural movement and judgment, a more or less established *direction* in the selection of the facts held important, and the values held up for comparative examination.

What is that "direction," today? In this question, we think, lies the key to the confusion in modern education. It suffers from a stultified sense of direction. Individuals, of course, often have an intensely perceived and declared sense of direction, but they are the exceptions. There is little cultural sense of direction, these days—the kind of spirit which animated, say, the Progressive

Education movement in its great days, the days of publication of the *Social Frontier* at Teachers' College. And when this spirit is lacking, even good men find themselves falling back upon tradition in self-defense. This makes for routine performance, the reliance on rank and status. It makes teachers pretend that things have been found out which haven't been found out. It makes them shaky in the presence of rebellious originality, since they lack an intelligible frame of reference for opening up avenues of development for the fresh thinking they encounter.

The problem, as we see it, is a problem of the total culture, not one that belongs to teachers and colleges alone. It is too much for the teachers and colleges to deal with, and to ask them to deal with. We live in a time of the break-up of old institutional patterns and habits. Why, then, look for help from big institutions?

The people who will shape the new educational institutions of the future may not even be a product of existing institutions. They may be able to do better for the future partly because they are innocent of the influence of the old institutions.

The education of a child, said Francisco Ferrer, must begin with his grandfather. This is a way of saying that the generation which starts things new must educate itself. You say different things to different generations on the subject of education. What you would say about education in the time of Horace Mann, who struggled to get the public school system going in the United States, is different from what you would say today. In those days the great thing was a *community* venture with obvious benefits to be obtained for all. Today, the cultural circumstances are quite different. The education of a youth of today ought to involve the raising of issues that it would not occur to anyone to raise in the nineteenth century—not, at least, in the same terms. Pragmatically, the basic questions of today have anti-state and anti-institution overtones. They shake the foundations of the Establishment.

You can't expect the Establishment to help to ask these questions. It doesn't know how. It has no mechanisms for self-distrust. *It is not Socrates.*

It seems fairly obvious that the good educational institutions of the future will be identified by their careful avoidance of medieval trappings and by the deliberate informality of their undertakings. How to get plant and staff without these familiar supports is of course the central problem.

MANAS interests itself in reporting on colleges which strike out in this direction. The fact that they are often unstable and sometimes disappear is not important. What is important is the acute awareness of human need that they represent.

Meanwhile, honesty compels the admission that we do not see how such colleges can survive, except in the direction of literature and the arts. In these fields, the individual is still supreme. The practitioner needs no big laboratory, no cyclotron. But unless you are willing to teach science the way it is taught at St. John's, you will need a lot of money to equip science departments, and for this you need conventional support, which means . . .

Good educational situations are the fruit of cultural health. We do not have cultural health. For the time being, therefore, we must fall back on the virtually unique instances of individual educational genius or inspiration—which are possible in any age and adverse environment. For good educational situations, generally, we must grow more cultural health than we have now. This takes time and effort and sacrifice on the part, at first, of the very few.

Cultural regeneration is always a possibility, but it is the work of individuals. To expect institutions and organizations to accomplish the ends of cultural regeneration is the twentieth-century version of bowing down to wood and stone. Cultural regeneration comes from the private thoughts of private minds and the moral energy which springs only from individuals. The

capital of culture is deposited entirely in individuals. Institutions and organizations can write withdrawal slips, but they can make no deposits. A culture may be said to be bankrupt in resources and values whenever it submits to the collectivist fallacy—the assumption that political or organized action can generate the qualities of culture. A culture is rich when its forms and avenues of human expression are recognized to be the result, and not the cause, of the free activities of human beings. How do you get a culture of this sort? It is made by people who are free of the idolatry of institutions and who persist in their individual resolves and behavior in the face of institutional lethargy and opposition.

CHILDREN

. . . and Ourselves

ON THE PROCESS OF EDUCATION

AN unusual and valuable volume of this title (Harvard University Press, 1961) reports the results of a meeting called by the National Academy of Sciences through its Education Committee. The Committee had for a number of years examined the long-range problem "of improving the dissemination of scientific knowledge in America," and in September of 1959 some thirty-five scholars and educators met for a protracted conference at Woods Hole on Cape Cod. *The Process of Education* is a succinct summary (92 pp.) of the Conference's many discussions. It is written by Harvard psychologist Jerome S. Bruner, who was the Conference director.

Of particular interest to readers of MANAS will be the lucid treatment of the elusive subject of "intuition" in relation to the teaching-learning equation. Dr. Bruner, incidentally, reveals that leading representatives of each field of modern science are acutely aware of the role played by the intuitive factor in scientific discovery. He summarizes:

The complementary nature of intuitive and analytic thinking should, we think, be recognized. Through intuitive thinking the individual may often arrive at solutions to problems which he would not achieve at all, or at best more slowly, through analytic thinking. Once achieved by intuitive methods, they should if possible be checked by analytic methods, while at the same time being respected as worthy hypotheses for such checking. Indeed, the intuitive thinker may even invent or discover problems that the analyst would not. But it may be the analyst who gives these problems the proper formalism. Unfortunately, the formalism of school learning has somehow devalued intuition. It is the very strong conviction of men who have been designing curricula, in mathematics and the sciences particularly, over the last several years that much more work is needed to discover how we may develop the intuitive gifts of our students from the earliest grades onwards. For, as we have seen, it may be of the first importance to

establish an intuitive understanding of materials before we expose our students to more traditional and formal methods of deduction and proof.

An obvious limitation of formal instruction, Dr. Bruner explains, is that the teacher with a whole classroom of pupils has little opportunity even if he has the ability—to evaluate and encourage the development of intuitive cognition:

The emphasis in much of school learning and student examining is upon explicit formulations, upon the ability of the student to reproduce verbal or numerical formulae. It is not clear, in the absence of research, whether this emphasis is inimical to the later development of good intuitive understanding—indeed, it is even unclear what constitutes intuitive understanding. Yet we can distinguish between inarticulate genius and articulate idiocy—the first represented by the student who by his operations and conclusions, reveals a deep grasp of a subject but not much ability to "say how it goes," in contrast to the student who is full of seemingly appropriate words but has no matching ability to use the ideas for which the words presumably stand.

The intuitive student will inevitably essay "leaps" ahead of text and lecture, sometimes landing in the wrong place. It is at this point, in Dr. Bruner's view, that the teacher meets the greatest challenge:

It requires a sensitive teacher to distinguish an intuitive mistake—an interestingly wrong leap—from a stupid or ignorant mistake, and it requires a teacher who can give approval and correction simultaneously to the intuitive student. To know a subject so thoroughly that he can go easily beyond the textbook is a great deal to ask of a high school teacher. Indeed, it must happen occasionally that a student is not only more intelligent than his teacher but better informed, and develops intuitive ways of approaching problems that he cannot explain and that the teacher is simply unable to follow or recreate for himself. It is impossible for the teacher properly to reward or correct such students, and it may very well be that it is precisely our more gifted students who suffer such unrewarded effort.

Educational experiments such as Goddard College, reported on last week, are obviously conducted by men aware of these considerations. The opportunities for development and/or

appreciation of intuitive perceptions are enhanced by a classroom situation in which the teachers work with rather than upon the students, each faculty member dealing with no more than eight or ten questing students at a time. In large universities, the ideal situation seldom exists for students during the first two years, but "readings for honors" courses, seminars and tutorial programs do serve a number of gifted students in this way. It is the goal of the exceptional student to reach the level of discussion which these programs provide. Tutorial and "honors" teachers often perceive the limitations of the usual "grading" system and avoid using it whenever possible, save for an approximate evaluation of the student's work at the end of the semester.

We are somewhat surprised to find ourselves quoting an ambitiously titled *The Art of Thinking* just released by the Philosophical library. But the author, Dagobert Runes, manages some good paragraphs on the limitations of the grading system. He says:

Minds differ qualitatively. Some run in short waves of detail, others in long waves of comprehension. Here, the more imaginative will lose out in school to the short-range mind.

Some minds are given to verbalizing, others prefer silence. Here expression will play its advantage. Some minds are geared to long attention spans, others are not. Some minds are strongly dependent upon environment and emotional recognition, others are indifferent. There are myriad dispositions of the human mind to be considered if a school is to educate or lead.

The grading of students is a primitivism by which pupils are sized up for use and purpose in the households of the master. Grading of students' talents is an offense to the dignity of men since the young are entitled to live among their peers unblemished by degradation and unflattered by vulgar praise.

As Dr. Runes later remarks, students should not be "relentlessly pushed to outdo their peers and reach for the top":

And, pray tell me, what is on the top? A brilliant physicist working in a Russian laboratory on nuclear weapons? An astrophysicist in Hitler's rocket

center calculating how to bombard London? A Chinese bacteriologist figuring out how to spread a plague over America through a series of little bombs? A sociologist in a New Orleans university preparing a learned resolution as to why Negroes are not entitled to sit on a bench next to a member of that sallow race that chooses to call itself white? That legal pundit in Little Rock who contrives ways and means of using the law to block justice?

FRONTIERS

Letter from a Generation

WE have a communication from a university student—actually, a paper turned in for one of his classes—which might be labelled, "Letter from One Generation to Another," and sub-titled, "A Reproach." This student is articulately critical of the classroom situation as he finds it. First of all, it represents, he says, a divorce between thought and action. Second, it is autocratic. The student has no real voice, no status as a human being with a mind. There are more objections, but these seem to be the basic ones.

Thinking about this paper, we tried to figure out to whom it was addressed. Who is the responsible party? We found no answer except that it was a communication from one generation to another. Shall we stipulate that the student has a right to make such complaints? Shall we agree that the sharper and more searching his comments, the greater should be our appreciation of his role as critic? It would be pointless, at any rate, to reproach *him* for his impatience on the ground that he has not given enough thoughtful consideration to the Problems of Educators. It might even be said that education will not improve except by the intervention of such students who, when they take the place of the present generation of teachers, find ways of doing better.

But what would be better? Practically anything, according to this student, yet the question ought to be seriously faced. Rather than review his paper point by point, or extract by extract (which we may attempt some other time), we should now like to muse a while on educational ideas that for some reason or other refuse to be forgotten.

The first idea comes from a novel, *The Great Meadow*, by Elizabeth Madox Roberts. A colonial farmer is ploughing a field on Long Island. While trudging along, he balances a copy of John Locke's *Treatises on Civil Government* on one handle of the plough, planning some after-supper lessons for his children. They will understand, he hopes, what it means to be citizens of the New World.

This idea is appealing for two reasons. First, it is education in a pioneer situation. This farmer, and others like him, are working on the plan of creating the sort of society they believe will be good. They are transmitting to their children principles which they believe apply to the needs of the time. Second, the farmer is practicing the sort of education one man can undertake, without relying on any public institutions. He is transmitting for inspection his own felt convictions. He can hardly be dogmatic or authoritarian about it, because of the nature of the material he offers to his children. They experience at the same time his own efforts at self-education. They share in his sense of discovery. There is a good chance, since they are human, that they will begin by participating in his dreams and end by making dreams of their own. All the essential elements of education are in this situation. Mark Hopkins plus log plus student is a similar situation.

The problem of the educational institution is the problem of adding facilities and scope to this situation without losing any of the essentials.

What is left out of the discussion, thus far, is notation of the fact that the farmer with Locke on his plough handle had some pretty clear ideas about the meaning and ends of human life. His spectrum of learning was unconfused by philosophical dilemmas. He offered an education that was clear and intense by reason of what it ignored as well as from what it gave.

Nobody, so far as we know, could write a curriculum with comparable intensity and clarity, today. The modern educator is obliged, or believes he is obliged, to transmit a vast amount of material, but then he ought to declare his uncertainty about a great deal of what he has "taught." We have in our editorial office a set of the bound volumes of the weekly, *Science*, going back to the 1920's. We used to think what a wealth of fact and theory was being preserved in all those books. There they are, gathering dust, and now, without much deliberation, we find ourselves wondering what they would bring in money from a dealer in scholarly periodicals. We have an inescapable impression that, somehow, this kind of "knowledge" is becoming irrelevant. But we don't *know*. So we keep the books, look something

up in them once in a while, and try to keep down the dust.

We used to think about the dream of starting some kind of school or college, in which that set of *Science* would make a small nucleus for part of the library. Now we don't know about the idea of a college and we don't know about *Science* magazine. And we are suspicious of people who seem sure about such matters.

Then there is the idea found in Albert Jay Nock's *Theory of Education in the United States*. One of his suggestions makes this picture: Serious, committed scholars working in their fields, with students permitted to approach them respectfully—on the periphery, as it were—and observe them as they work; and if the students exhibit capacities of promise, the scholars may give them a hand, now and then, if they have time. Great painters have been made in this way. The relation need not involve snobbery, and will not, if the scholars are really scholars and the students really want to learn.

As you think about it, you realize that there is not much point in talking about education unless it is commonly admitted that education has a content—a partially known content, at least—that ought to be transmitted from one generation to another. But doubts about this "common admission" keep fighting back at you while you are talking about education. This blurs almost anything you say. An honest education will have to demonstrate to students, by many illustrations, how to recognize this blurring effect and how to evaluate its significance.

These, in barest outline, are what seem to us some of the essential problems of education in the twentieth century.

When you add to them the overlay of institutional problems—that is, the reluctance of human beings to acknowledge their lack of basic orientation in this culture, the possible irrelevance of much of what is taught in the schools, the need of school administrators to raise money, the peonage of budgets to subsidy for military research, the obligation of professors to support their families, you get around to feeling amazed that there is any education going on at all.

Meanwhile, the students have *their* institutional needs. They will need jobs—jobs which, in some sense, will make them subject to pressures very like those which afflict the professors. Much of the time, there is practically no relation between getting ready for a job and getting ready for life. Often, the two are at odds. The schools are supposed to square this circle, and it is obviously too much for them.

So, with these rather dim prospects for institutions of education, we try not to waste time and emotion on proposals for institutional reform, directing our interest, instead, to the simpler equations, such as the man with the plough, Locke, and his children.

Because it is a simple equation, it can be set up anywhere, by anyone who cares. It can happen in a high school, a college, a university, a home, or on a job somewhere. It can also be arranged by people who dare to start experimental schools and are willing to go hungry while they do it.

Education in this society, except for the accidental or Æolian sort, can take place only if someone or some devoted group becomes a buffer against the pressures which are a constant presence. Education without pressures is something like publishing a magazine of serious thought. If you want to do it, you have to pick up the tab.

This is hardly a "reply" from one generation to another. There are no real replies, these days; only more questions.