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THE ORIGIN OF RELIGION

IT is no novel discovery to recognize the usefulness of reversing Descartes' *Cogito, ergo sum*—"I think, therefore I am"—so that it reads, "I am, therefore I think." The being and presence of a thinker are prerequisite to the act of thinking, and while thinking may bring the fact of the thinker into evidence, it is the thinker who declares to himself both the fact and the act. Here, surely, is the beginning of all religion. Religion is always some combination of affirmation with reasoned conclusion. The affirmation creates a field for the activity of reason, while reasoning expands and deepens the affirmation.

Reasoning is a process of explanation. The raw materials of explanation are always the realities we know and affirm, which come before any steps of reasoning. Reason does not supply these realities, but uses them. Reason puts them together in various ways in order to extend the scope of explanation or understanding. It may be taken as a "given" or an unavoidable affirmation that seeking understanding is the primary motive of thinking in human life, and that having understanding is the ultimate human fulfillment, even though every fulfillment seems to become the ground for further inquiry.

What then can we say about reasoning which seems more or less self-evidently true? What, in other words, is it both justifiable and necessary to affirm about reasoning?

We can say this: There is no reasoning until certain undeniable realities become present to our minds. These primary realities are required as starting-points. The reality we have been working with here is the reality of the self as a thinking being.

Another consideration implicit in what has been said is that the process of reasoning may be and often is twofold: We use thought to go from an affirmation to some fresh conclusion about the nature of things; and then we are able to direct our thought to an examination of the process by which we reached the conclusion. By this means we decide whether the mode of arriving at the conclusion has been suitable, necessary, and just.

This, we could say, is a second class of "reality." First came the declaration of starting-points. The affirmations, "I am" and "I think," constitute starting-points. The second class of reality is affirmed as the presence of "order" in both thought and in the world. Order is affirmed first about thought because the order which gives thinking its meaning exists before we look for a corresponding order in the world. We would not look for order in the world and in our experience of the world if the quest for understanding, for meaning, did not identify itself to us as orderly increase in what we know. But, without the world of experience, there would be no occasion for thought.

The reality of the self or thinker is, then, the first reality. The second reality is that thought, to be thought, is the perception of order and must itself be orderly. An account of order is given by saying that causes result in effects and that effects have proceeded from causes. An uncaused "reality" is either acceptable as a starting-point, as in the case of our own self-existence, or it interrupts and defeats reason, bringing the collapse of thought.

A third class of Reality is comprehended by the word Meaning. Growth in the understanding of meaning seems to be the purpose of thought, of human life. Very nearly every human activity is in some way related to or centrally expressive of the pursuit of meaning, of understanding. Historically, religion has been the means of

illuminating that pursuit with various forms of affirmation of reality, with various explanations of the processes of life, of the world, and of human thought and human action, and with definitions, intimations, and symbolic representations of fulfillment or the achievement of understanding. There seems a sense in which this final achievement always constitutes a return to the reality which was affirmed as pre-existing, before the activity of thought, before recognition of order, and before the expansion of understanding began. Here thought again collapses, but at this point with sufficient "reason." This cessation of thought is a form of fulfillment rather than frustration, and is acceptable to the reflective thinking which understands its own limits and intuits, although it cannot define, what lies beyond.

How does all this work out in practice?

An example might be taken from the thinking of a scientist, Erwin Schrödinger. In his book, *What Is Life?* (Cambridge University Press, 1945), Schrödinger shows that, for him, study of the processes of life and nature compels his thought to move into the area of meaning, of purpose. He begins, in his last chapter, by noting the orderly biological processes of life. "My body," he says, "functions as a pure mechanism according to the laws of Nature." But there is a prior reality which takes the form of an affirmation: "Yet I know, by incontrovertible direct experience, that I am directing its motions, of which I foresee the effects, that may be fateful and all-important, in which case I feel and take full responsibility for them." Given the initial reality of the Self and the awareness of orderly process, Schrödinger reasons to a conclusion that could well be termed the exhaustion of the utility or function of reason:

> The only possible inference from these two facts is, I think, that I—I in the widest meaning of the word, that is to say, every conscious mind that has ever said or felt "I"—am the person, if any, who controls the "motion of the atoms" according to the Laws of Nature.
>
> Within a cultural milieu where certain conceptions (which once had or still have a wider meaning amongst other peoples) have been limited and specialized, it is daring to give to this conclusion the simple wording it requires. In Christian terminology to say: "Hence I am God Almighty" sounds both blasphemous and lunatic. But please disregard these connotations for the moment and consider whether the above inference is not the closest a biologist can get to proving God and immortality at one stroke.
>
> In itself, the insight is not new. The earliest records to my knowledge date back some 2500 years or more. From the early great Upanishads the recognition ATMAN=BRAHMAN (the personal self equals the omnipresent, all-comprehending eternal self) was in Indian thought considered, far from blasphemous, to represent the quintessence of deepest insight into the happenings of the world. The striving of all the scholars of Vedanta was, after having learnt to pronounce with their lips, really to assimilate in their minds this grandest of all thoughts.

Inevitably, after voicing this "grandest of all thoughts," Schrödinger comes to the question, What is this "individual" self which realizes its identity with the "All"? As he says:

> . . . each of us has the undisputable impression that the sum total of his own experience and memory forms a unit quite distinct from that of any other person. He refers to it as "I." *What is this "I"?*
>
> If you analyze it closely you will, I think, find that it is just a little bit more than a collection of single data (experiences and memories), namely the canvas *upon which* they are collected. And you will, on dose introspection, find that what you really mean by "I," is that ground-stuff upon which they are collected.

Schrödinger says little more, except to suggest that this "ground-stuff" is what is really important to us, and that while experiences and memories come and go, and separate personal identities are formed and dissolved, the core identity goes on and on. "In no case," says Schrödinger, "is there loss of personal experience to deplore."

This seems a veritable distillation of the central question of religious philosophy. No verbal answer that can be "given" has finality, yet

an answer is continuously sought. And to catalog all the different answers that have been given, or all the different ways in which direct answers have been *avoided*, would involve compilation of the history of all the religions of the world.

What is the Self? Is it the Ground? Is it the focus of awareness of the Ground? Or is it our collection of experiences and memories of which we become aware?

People seem to answer this question in terms of all three possibilities. Attachment to experiences and memories because of how they *feel* is obviously a large part of some religions. Then there are those who identify as ultimate the particular *focus* through which experience is suffered and enjoyed, naming it "soul." They develop a system of expectations under which the soul may hope to obtain endless bliss and countless delights. Finally, there are those who declare that all foci are ephemeral, that only the common ground is eternal, but they usually leave unanswered the questions of persons who feel unable to cast aside as unworthy the wonderful growth in the individual sense or feeling of meaning—which reaches toward the universal ground, yet always maintains some distinctive focus of self-awareness that becomes richer and richer, even while its "separative" implication is progressively dissolved. Here the matter is lost in paradox.

It seems clear that insofar as people *choose* their religious beliefs or convictions, they do so out of regard for their feelings and ideas concerning the possible resolution of this paradox or mystery. How are we joined and how are we separate from other forms of life, othet people, other worlds? What interests are common and what require graded identification? The forms of experience are diverse. Humans have differing networks of relationships—there is the family, the community, the nation, the world, and other possible divisions. Knowledge of each of these fields has things in common with the knowledge of the other fields, but also a light that applies mainly or only to one of them. In the family, the varying ages of children, the varying capacities of adults, and the varying needs and desires of all the members make decisions about family life unique. Subtle changes in the ratios of responsibility go on all the time.

Another set of considerations applies in the community, another in the nation, and still another to the world. All these relationships, however, are deeply affected, even determined, by the working answer given to the primary question: What is the Self? "No man is an island," a poet tells us, and this declaration of unity or inner connection resonates in our minds. But what then *is* an island, or any seemingly isolated or alien territory, which from time to time individuals who claim to be authorities on the national interest tell us needs to be either defended, neutralized, or eliminated?

Do the enmities in the world teach us anything about the self? Antagonisms have led to some very strange religious doctrines—as for example the claim that the world will not be a good place for growth until all heretics are stamped out, or atheists controlled, reformed, or expelled from the righteous society. This seems a way of asserting that differences have no value—a tough-minded insistence on unity, here and now, even before we have learned what ultimate unity means.

This returns us to Schrödinger's question, *"What is this 'I'*?", since it seems evident that all these hostile decisions, all these troubles, rest upon inadequate answers concerning the Self. Is it conceivable that no answer *ought* to be given?

There are manifest objections to suggesting that the question should have no answer. It seems fair to say that people who understand themselves are without enmity toward others; that they find ways to help other people; and that, indeed, the content of all high cultural tradition testifies to spontaneous reverence for such individuals and to enduring interest in their recorded works.

But the wisest men of the past have been very reluctant to "define" the Self. They seem to have thought that if self-knowledge exists, definitions will not increase it in those with no aptitude for it. Yet there is evidence which suggests that self-knowledge *can* be increased.

What if it has a better chance of being increased through the example of action based on self-knowledge, instead of by verbal explanations? Well, teachers teach as well as act. The Buddha preached. Despite his silences, Pythagoras instructed his followers. Plato said he would never set down any ultimate secrets, but he nonetheless wrote voluminously, and a great many people delight in and learn from what he wrote. Words, apparently, have a part to play, even though there are times when silence serves better than words.

An example of the uses of silence is provided by a well-known story told of the Buddha. It relates that a monk named Vacchagotta came to him and asked whether or not there is an Ego—an actual "I am"—in man. The Exalted one, it is said, "maintained silence." When his disciple, Ananda, asked for an explanation, the Buddha replied that to say yes would have confirmed the believers in permanence, while the opposite answer would have confirmed the doctrine of annihilation. Apparently, the simplifications of the day were such that *any* answer would have been more misleading than *no* answer.

Suppose we say that there is the *ground* of self spoken of by Schrödinger, and that there is the cognized result of a focus in the ground, producing our self-awareness. One who has not traced his identity back to the ground, but is satisfied that his collection of experiences and memories completes his identity, needs to make some independent discoveries. He needs to go deeper into his being, not be given labels for what he neither feels nor knows.

In the *Diamond Sutra,* the Buddha declared that the truth about human enlightenment cannot be expressed in any formula, yet Buddhism is not without metaphysical teachings, and there are terms, such as *Bodhisattva,* to identify those who attain to self-knowledge. The Buddha, in a single passage, may deny that Bodhisattvas have any "reality," but then go on to describe what a *Bodhisattva* is like. A musing on this obviously intentional paradox may drive the reader to analogies concerned with less sublime objectives. For example, one who aspires to attain to some high excellence eventually discovers, when he reaches some portion of its realization, that being there is not at all like the goal he thought he was pursuing. It is not a "thing," a "height," or an "eminence," and he finds it virtually impossible to explain this to admirers who ask advice on how to make similar achievements.

So the Buddha says that *Bodhisattva* is just a name that is used; its "reality" exists in the minds of aspirants. One must conclude that the entire vocabulary of longing suffers from this paradox.

The wise do not speak of wisdom. For them, wisdom is a commonplace reality not needing attention. The healthy man does not have to concern himself with the circulation of his blood. But of course the wise *do* speak of wisdom; they discourse to the unwise on righteousness, and they declare that evil ways are to be avoided. And sometimes they make prescriptions for human behavior, to be taken in regular dosages, and suggest courses of discipline and exercise in the pursuit of virtue and truth. In short, the wise who have a concern for the rest of mankind seem to deliberately make themselves into a focus at some specific level of self-knowledge the level best suited to the people of their time. Teaching at that level provides a field for the organization of life and the interpretation of experience, producing, to use Schrödinger's phrase, a "cultural milieu." After a time, the learning potentialities of the milieu seem to be exhausted, and then there is decline, and sometimes reform and regeneration. Ideas at another level of self-knowledge may slowly replace the currency of the old ideas. Quite evidently something of this sort is going on

today, all over the world, in various ways and at various rates of acceleration. A deeper, more comprehensive conception of the self leads to countless changes in all human relationships. While habits are resistant, the new thinking wears away at them and eventually wiser ways of doing things come into being.

Interestingly, scientific progress—which is to say, in knowledge of how the world works—exhibits parallels with the increase of knowledge of the self, or religious insight. And it seems entirely reasonable that the development of knowledge of the world should have a contrapuntal relation to the line of religious or philosophic growth. Actually, there probably isn't much self-knowledge without a corresponding knowledge of the world. The self is able to know itself only by being *in* the world; there have been those who maintained that this is the *reason* for the world, but science—except for certain philosophical scientists—being concerned only with process, has been silent on this possibility.

Yet science, today, in the persons of its leaders, is becoming insistently subjective. That is, the part played by the self in the working of the world—is assigned greater and greater importance. And when a revolutionary change occurs in science, it results more from an extraordinary insight by some human being than from an objective discovery of some sort.

We have these systems—largely mathematical—to explain how the world works and to make use of its mechanisms and energies. But now and then a system breaks down. According to Gödel's theorem, every closed system has somewhere an Achilles heel. When the system begins to weaken, we have a sense of some inadequacy or flaw. Little by little we locate the flaw. What then do we do? We do what is also done in religion. We go back into ourselves for better answers, for new organizing principles. We make, as Jacob Bronowski has put it, an "act of self-reference." In a remarkable paper, "The Logic of the Mind," which appeared in the Spring 1966 *American Scholar*, Bronowski said that the human mind, while it seems to be a logical machine in some respects, is not really like the machines we construct for the reason that "no logical machine can reach out of the difficulties and paradoxes created by self-reference." When the system breaks down, and new axioms are needed to make it work, Bronowski says—

> The decision to take new matter into our systems, in science or in literature, has no analogue in any logical machine. It is an imaginative step of a kind that we do not understand, but that we can watch in the work of a great scientist or great writer; and it is alike in science or literature.

Something Bronowski wrote elsewhere (in *The Identity of Man*) seems to draw both science and religion back into a single process of self-discovery:

> I hold that each man has a self, and enlarges his self by his experiences. That is, he learns from experience; from the experience of others as well as his own, and from their inner experience as well as their outer. . . . We must enter into others in order to share their conflicts, and they must be shown to have grave conflicts, in order that we shall feel in their lives what we know in our own: the human dilemma. The knowledge of Self cannot be formalized because it cannot be closed, even provisionally; it is perpetually open, because the dilemma is perpetually unresolved.

The first real step in self-knowledge might well be the acceptance of this dilemma, as the totally uncompelled but totally necessary condition of gaining enlightenment.

REVIEW
STONE-AGE ILLUMINATION

THERE is a great temptation to ignore the characters and even the "true story" of Laurens van der Post's new book, *A Mantis Carol* (Morrow, 1976, $6.95), and to devote the space available to extracts from his wonderful prose. The background of facts doesn't matter much. Or it matters only because it seems so curious a foundation for what the writer wants to say. Why make the hero of a philosophical book an African Bushman? Why develop musing, pantheistic themes around the occupation of "hunting"? But it becomes evident that van der Post has his reasons for doing these things, and they are likely to satisfy most readers.

The book begins with some loosely connected events that drew the author to America, there to meet a Jungian therapist, a woman who had been having recurring dreams about a praying mantis. Van der Post, she learned from *The Lost World of the Kalahari*, knew something about praying mantises, and she hoped that he would be able to help her understand her dreams. She wrote to him in England. He had been invited to lecture in America, and since her question somehow haunted him, even to the point, apparently, of drying up the inspiration for the book, *The Heart of the Hunter*, he was working on, he decided on the lecture tour.

As he traveled about, speaking in Canada and cities in the United States, he began to get ideas about the praying mantis, the god of the Bushmen of the Kalahari. The mythic side of the Bushman belief seemed to reveal its symbolism to him, so that when he met the therapist in New York, he was well prepared for their series of talks together. He met with her friends, too (one of whom was Daisetzu Suzuki), and since she was a Quaker and helped with programs at the Quaker study center at Pendle Hill, he spoke there about the Bushmen and their beliefs. Of this meeting he says:

> I was struck how without exception people who not only had never been to Africa but had never heard of the Bushman before, related to him instantly and followed this evolution of his imagination as if they themselves were utterly at home within it, all sitting like children in a Stone-Age nursery listening to their very first story told for the first time. At the end the nature of the theme and our joint effort at interpreting it, produced so great a sense of human totality and belonging to life on the earth when it itself was young, that someone could only contain the emotion of the moment by reaching out at the truth in jest and declaring that we must be the first conference of Bushmen ever held in the United States of America.

The book has many passages of this sort. The text seems made of loosely connected pæans, each celebrating a dramatic unity which shows what an apparently ordinary experience could mean to van der Post. For example, traveling through New York and New England moved him to say:

> We have nothing so awesome as the fire of autumn sweeping through the great maple forests of America, stripping their leaves from them in tongues of flame until they stand naked and penitent before the reckoning we call winter. It is a moment always full of a profound and natural sanctity for me, when the earth round about me becomes like an antique temple wherein this conflagration, aflame and aflicker among the trees, accomplishes the final metamorphosis that fire did for the dead in those archaic places of the forgotten mysteries, removing what was provisional, false and perishable from the spent life, so that only what was permanent, true and imperishable could accompany the spirit that once invested it on the journey to whatever lies beyond the here and now.

It is in no way remarkable that the writer of these lines finds reason to speak often of "synchronicities." How could such a man avoid them? To the eye of one so well tuned to correspondences, synchronicities must seem to be going on all the time!

Well, a woman who attended his talk at Pendle Hill approached him after the meeting. She said she had something to show him, that it was important, immeasurably important. So he went back to New York with her to see the

photograph of a head she had done—cast in bronze. It was of a Bushman given the name of Hans Taaibosch, who, until he died, had been a performer in an American circus. Was he truly a Bushman?—a *pure* Bushman?—she wanted to know. Van der Post was able to reassure her: "He is the purest of Bushmen you could possibly ever meet."

> "Yes, its a Bushman head, a beautiful Bushman head. Look at the wide, high cheek-bones, the Mongolian slant of eye, the pointed Pan-like ears, the oval face, the fine-drawn chin, the unique peppercorn head of the purest classical features conceivable. . . . "

Who was Hans Taaibosch? No one really knew, except that he was indeed a Bushman, as van der Post had confirmed. During the first world war a lawyer who had clients in the circus business in America went to a variety show in Kingston, Jamaica, "and there suddenly was Hans in the limelight, naked except for a sort of skin bikini, dancing and prancing and displaying his remarkable little figure for the delight of a bored, well-nourished and well-wined audience." The performer was popular enough, but the lawyer didn't like the tone of the laughter. He wanted to help this little Bushman to get away from such people, including his manager, who practically "owned" him. It took years, but in 1917 Hans was in America, working for a circus for which the lawyer acted. By comparison, this was a decent sort of job.

There is something about Bushmen that wins peoples' hearts. The Bushmen living in the Kalahari excited feeling close to awe in van der Post, although one must read his books to understand why. But this feeling at least explains why the sculptress was so attracted to the little man, and why the lawyer on vacation in Jamaica was determined to help him. The circus people became devoted to him:

> Without exception he affected everybody as he had affected the lawyer. Everyone took him to their hearts and he was, and remained until he was too old to do his piece any longer, without an enemy in its ranks. All were his friends from the owners to the men who pitched the great top and the people who performed within the magic ring. The lion tamers, who came and went, not unnaturally were immediate objects of his admiration but on the whole the clowns mattered most to his own warm and spontaneous heart as if in their tumbling, constant humiliation and incorrigible capacity for laughing at their misfortunes, he saw his own unrecorded fate portrayed, and thus felt accompanied, needed, wanted and so became content.

Now the book becomes an account of the life of Hans Taaibosch, describing the times he spent with his American friends. The author's knowledge of the Bushmen is of course responsible for the excellence of this part, yet its quality reaches far beyond any sort of "knowledge," becoming an invitation to put aside the confusions and distractions of our chaotic surroundings and to submit in heart and mind to the archaic simplicities of Bushman life.

How did Hans Taaibosch reward his friends? He danced for them. The dance of the Bushman always has meaning. Van der Post says:

> "He would dance, for instance, the story of man's search for fire and his sense of liberation, gratitude and reverence when with the help of the mantis he found his fire at last. He would dance his joy at the birth of a child and his anguish at the death of a friend. He would dance out his gratitude to the animal his hunter had brought home for having been so good to allow itself to be killed so that he could continue to live. There was nothing he did not have a dance for. It was amazing that as he danced, usually only in he darkest hour of the night, the fact that he was dancing conveyed itself to all nature around him, not only compelling it to recognize the rhythm but also to become a party to it.

The sculptress described one of the dances Hans had done for her—a dance that seemed full of longing, with imploring gestures—and said that as he grew older, his dances were almost always of this character. Then, "he only danced the one with his hands stretched to their utmost length up to the sky." And this, she said, "had nothing to do with his ailing physical power and decline of vigour, because this last variation was every bit if not more exacting than the first." Van der Post

recognized what had happened. He explained that the Bushmen had two dances concerned with hunger, the first called the little hunger, the other called the great hunger.

> They are the great terminal dances of Bushman life. The first one is of the physical hunger the child experiences the moment he is born and satisfies first at his mother's breast, and which from then on stays with him for the rest of his life on earth. But the second dance is the dance of a hunger that neither the food of the earth nor the way of life possible on it can satisfy. It is a dance of the Bushman's instinctive intimation that man cannot live by bread alone, although without it he cannot live at all; hence the two.

Van der Post asked the Bushmen about the dance of the great hunger. They told him that it was—

> "not only we dancing, feeling ourselves to be raising the dust which will one day come blown by the wind to erase our last spoor from the sand when we die, lest others coming and seeing our footsteps there might think us still alive, not only we feel this hunger, but the stars too, sitting up there with their hearts of plenty, they too feel it and feeling it, tremble as if afraid they would wane and their light die, on account of so great a hunger. Grand Mother Sirius, sitting there with the greatest heart of plenty, sitting higher than all the rest, feeling herself to be looking over the edge of night into the day beyond, knows this hunger too and seeing how far and long we must travelling go together before this hunger can be killed, weeps for us all who are dear to her heart, and lets her tears falling come to splash in the dust kicked up by our dancing feet and lie on the bushes and grass, so that we in the morning seeing how white and shining their leaves have become, know that they are wet and glistening thus with star-tears shed in the night because of this great hunger and us on account of it."

One sees why Laurens van der Post chooses to write about Bushmen.

COMMENTARY
THE PARADOX OF WORDS

WORDS are means by which we enter into the lives of one another, yet their limitation becomes especially obvious in the case of this week's lead article. Religion is a word which stands for the highest feelings of which human beings are capable. All of life enters into and is affected by religious feeling. How could words possibly convey this meaning?

They can't, of course, but confusion arises only when we assume or pretend that they can.

It is sometimes thought that the best words are those which have an exact meaning. But these are words which have little or no feeling behind them. And feeling is an energy which, somehow or other, makes words mean more than they say. Concerning matters we care about, it is impossible not to want words to mean more than they say. For this reason words with resonance in them, which have a tendency to overflow, are valuable to us, even though they can be terribly misused.

Thought is animated by feeling. A thought without a feeling goes nowhere, gets nothing done. Similarly, a feeling without its vehicle of thought has no access to the world, no avenue leading to action. The world is a place where precise relations, definable things, establish the conditions of action. Science is the discipline of finite relations. If you want to accomplish something in the world, you need science, or precise definition.

But getting things done in the world exacts a price. No accomplishment, however great, ever really represents or exhausts the feeling which led to the action. Feelings have a holistic quality. You feel with your whole being, all your heart. An act is an offprint of the feeling, shaped by thought, but it never contains all the feeling, which reaches out and on. When you aim a feeling with a thought—perform an act or put it into a word—limitation of necessity takes place. Inside, the act has all those wonderful implications, the endless correlations the feeling wants to proclaim, but outside it is a finite, limited, "little" thing.

So it is with everything that can be said about religion. Yet there are words which, used well, have in them a tendency to generate feelings of measureless unity—which, so to speak, defy the limiting function of definitions. But obviously, immeasurable responsibility attaches to any such use of words.

CHILDREN
. . . and Ourselves
ON COUNTING PRACTICE

GOING through our file of back issues of the *New Schools Exchange Newsletter*—always a good source of ideas—we came across a letter from John Holt (in the March 31, 1976 issue). Mr. Holt, who has taught a great many small children, found something about "counting" in the *Newsletter* that made him want to argue a bit. What he said seemed to make a great deal of sense. But being without much experience in this area, we turned to Whitehead's *Introduction to Mathematics* and were gratified to discover an excellent fit between our two "authorities." Whitehead says:

> Now, the first noticeable thing about arithmetic is that it applies to everything, to tastes and sounds, to apples and angels, to the ideas of the mind and to the bones of the body. The nature of the things is perfectly indifferent, of all things it is true that two and two make four. Thus we write down as the leading characteristic of mathematics that it deals with properties and ideas which are applicable to things just because they are things, and apart from any particular feelings, or emotions, or sensations, in any way connected with them. This is what is meant by calling mathematics an abstract science.

Whitehead goes on, describing the advantages of abstract science, what it can do for us, but here the point is that some kind of quantum jump is involved in going from real things—the things children are familiar with—to the adult activity of working with numbers without noticing or caring what they enumerate, if they enumerate anything at all. This thinking "abstractly" is a capacity that develops in children later on—probably Mr. Holt could say about when—but in this letter he is giving reasons why it is useless and confusing to try to make children learn the language of abstraction before they understand what it means and how it is used. They need to come to this language gradually, step by step, and with the sort of help that can be given by someone who knows what is happening. John Holt's letter is printed below.

* * *

I've been thinking about this ever since some eighteen years ago I heard a conversation between my niece, then perhaps four or five, and some older brothers and sisters. They were "teaching her to count," Sesame Street style, by having her recite the names of the numbers in order. I heard her say, "one, two, three, four, seven, six, eight . . , " at which point I heard the indignant voices of a couple of the other kids saying to her, "No! No! Seven comes *after six!"*

It occurred to me then, and it has to me many times since, that from such talk many children could get a very strange notion about numbers—that they were a sort of procession of little creatures, perhaps dwarfs, the first one named One, the second named Two, the third Three, and so on. Later on these dwarfs seem to do numbers of mysterious and meaningless dances, about which people would say things like "Two and two make four," etc. It seemed very likely that any child with such a notion of numbers would get into many kinds of serious trouble before long, and this did indeed happen to my niece. Some years later I asked a number of adults who themselves had always been hopeless at arithmetic what they thought of this notion of mine, and a number of them laughed and said that this was indeed the feeling they had always had about numbers, and was part of the reason why they had always had such trouble with them.

I would say then that it is *extremely* important that a child *not* be "taught" to count number names in the absence of real objects. In this respect, I think Sesame Street has been making a most serious mistake. No doubt first grade teachers like to have their children able to say, "One, two, three . . . " but this ability has nothing necessarily to do with an understanding of numbers.

To put it differently, when little children first meet numbers they should *always* meet them as adjectives, not nouns. It should not at first be "three" or "seven," all by itself, but always "two coins" or "three matches," or "four spoons," or whatever it might be. Time enough later, probably much later, for children to intuit the notion that the noun "five" is that quality which all groups of five objects have in common.

I would say, too, that it is not at all necessary, and indeed not a good idea, to have children meet numbers always in the counting order. Thus we might at one moment show a child two of some kind of object, but the next thing we show, according to the circumstance, might be five of some other object, or eight, or whatever. Numbers, then, exist in nature in quite random ways, and a child should be ready to accept numbers, so to speak, where he finds them.

It would also be helpful, at least some of the time, to have children see, and in time learn to recognize, some of the smaller numbers, probably everything smaller than ten, by the sorts of patterns they make. Thus, a child being shown three small objects, might on one occasion see them in a row, on another, see them arranged in a triangle. Four objects could be shown, either arranged in a square, or in a row of three with another one on top. The pattern for five could be a regular pentagon, or a square with another one on top, as in the manner of a child's drawing of a house, or perhaps a square with another object in the center. Six we could show in two rows of three, or a triangle with a row of three on the bottom, then two, then one, or perhaps in other ways. Such patterns might be put on cards, perhaps with the number symbol or digit of the card on the other side. I'm not at all suggesting that the children should be forced, or even encouraged to memorize these cards. But if such cards were available for children to see and play with in various ways, perhaps play matching games with, they might intuit and in a short time come to learn these relationships. But it does seem to me important that a child has ways *other* than counting to identify small numbers.

In this connection, a set of dominoes might be a useful toy, and indeed I would guess that quite young children would enjoy playing dominoes even if they could do no more than match patterns with other patterns. Questions of scoring could come in later.

It also seems to me important, if children are shown counting, that if and when adults are counting objects for a child, that they *not* do what in this case many do now, which is to move from one object to the next, saying as they go, "one, two, three, . . . " The child sees the adult touching these items, which in other respects all look exactly alike, and saying a different word for each one, and may very well conclude that in some strange way "one, two, three," . . . are the names of these objects, dwarf style. This confusion can be very easily avoided. The trick is as we count each item to move it over to the side, saying at the first, "now we have one," then, as we move the second object to it, "now we have two," and then in turn, "now there are three," "now there are four," "now five," and so on. Thus at every point the number name refers not to a particular object but to the size of the group of objects which we have set to one side.

Somewhere along the line we could introduce the idea of ordinal numbers, that is, the numbers which indicate *place* of an item in an array, and not the size of a group of items. Thus, given a row of small objects, we might touch them in turn, saying as we go something like, "This is the first one, this is the second one, and the third one, and the fourth one, and the fifth, and the sixth . . . etc." No need at first to talk about such notions as "cardinal" and "ordinal." If we simply use words in a way that reflects the nature of these ideas, the child will in a fairly short time grasp that difference.

Another point. When counting a number of small objects, there is no necessity that we should always count by ones. We might just as well move two objects over to the side at a time, and saying as we do, "now we have two, now four," or whatever—something to indicate to the child that there are numbers of ways of doing this and we can pick the one that seems most handy.

Some children, of course, grasp these notions of cardinal and ordinal in spite of our rather confusing way of presenting them, but many do not, and I strongly suspect a great many children might find it easier to move confidently if when we first introduce them we use some such method as this. I do urge readers to try it.

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FRONTIERS

Adequate, Clean, Available

IT is becoming apparent that the collection and application of solar energy for human needs is an idea whose time has come. The groundswell of interest in this immediate solution for space and water heating, and over a longer term for power to run machines and transport, can do nothing but grow. There are no other equally reasonable solutions, and this too is becoming plain. Those who would like to assure themselves on this question are likely to find Barry Commoner's current book, *The Poverty of Power* (Knopf, $10.00), the best reading on the present energy and economic crisis, and very nearly all they need for making up their minds.

He starts with the question of world petroleum supply. Is it running out? Using U.S. government figures, he shows that no one really knows how much oil remains stored beneath the surface of the earth. It is of course a finite and diminishing quantity—that is certain. But the claim that the supply is now close to exhaustion is based on the fact that the oil companies—American oil companies—are not bringing in as many wells as in the past. Because they are locating fewer sources of oil, they say that it is becoming scarce. Prof. Commoner shows that they are finding less oil because they are not looking for it with as much interest and effort as they used to. Why this lack of interest in looking for oil? Because the oil companies found it cheaper—and therefore more profitable—to import it. No businessman, the oil companies explain, can be expected to extract a product from the earth when it costs less to buy it from another supplier. So the U.S. has become dependent on foreign oil. Profit, not social need, determines the policies of the oil companies.

Next he talks about coal, of which there is still a good supply, explaining its good and poor uses. Converting coal into a fuel that can be used for motor transport is so expensive that more inflation will result. Coal is good for generating electricity, useful in running locomotives, but today the coal-powered locomotives are all in museums. They now run on oil.

The chapter on nuclear power gives a better explanation of this source of energy, how it works, what it involves, and why it should not be relied upon, than anything else we've seen. The analysis is factual, sober, and dependable. The conclusion, arrived at in simple language, is made obvious. It is folly to continue to spend vast sums of money on the development of nuclear power. It hasn't worked well, a great many people know this, and it won't work in the future, and if it did it would be too dangerous.

Here, in this brief review, these statements appear as claims. They are not "claims" in Prof. Commoner's book.

The section on the sun gives the physical, biological, and economic foundation for relying on solar power, increasingly, for the energy needs of the world. It describes in some detail the intermediate steps for a changeover from the use of fossil fuels to solar energy. The section on agriculture tells how farmers were gradually persuaded or obliged to substitute fossil fuels for solar power, how this change in methods of cultivation enriched the petrochemical companies but not the farmers, and ends by showing why farmers must now gradually go back to depending on the sun. Only in this way can they become independent of outside industry, no longer a colony of the oil companies. Already some organic farmers in the corn belt have shown that commercial farming without use of artificial fertilizers or pesticides can be as profitable as chemical farming (see MANAS, May 19), while consummg far less energy. Reporting on this research, Prof. Commoner says:

> The organic farms used only 6800 BTU of energy to produce a dollar of output, while the conventional farms used 18,400 BTU. Thus, organic farms appear to yield about the same economic returns as the conventional ones, but do so by using

> about one-third as much energy. . . . These observations, being based on only one year's results, must be regarded as tentative. As the study continues and we learn more about how the conventional and organic farms compare in their production, costs, and income, it will be possible to evaluate measures that might restore farming to a more thrifty use of energy, without undue loss in production. We hope to learn how to help farmers find their way back to the sun.

The advantages of using sunlight as a source of energy are described at length. The neglect of solar energy by the government has this explanation:

> Solar energy has been largely ignored in the current debate over national energy policy—usually dismissed as only a faint, distant hope, irrelevant to current concerns over the price and availability of fuel. When the facts are known however, it turns out that solar energy can not only replace a good deal, and eventually all, of the present consumption of conventional fuels—and eliminate that much environmental pollution—but can also reverse the trend toward escalating energy costs that is so seriously affecting the economic system.

The Poverty of Power may eventually be regarded as a "watershed" book. Its appearance may well mark the time when Americans began to recognize that nothing can stop the deliberate and increasing development of the appropriate technology for the collection and use of solar energy, and that the thing to do now is take some active part in supporting or carrying out this far-reaching change. In a *Washington Post* review, a well-known economist, Robert Lekachman, said that *The Poverty of Power* is "scrupulously argued, convincingly documented, and infused by human values." We agree.