Toward a Theory of Instruction

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Chapter 4

Man: A Course of Study

THERE IS a dilemma in describing a course of study. One must begin by setting forth the intellectual substance of what is to be taught, else there can be no sense of what challenges and shapes the curiosity of the student. Yet the moment one succumbs to the temptation to "get across" the subject, at that moment the ingredient of pedagogy is in jeopardy. For it is only in a trivial sense that one gives a course to "get something across," merely to impart information. There are better means to that end than teaching. Unless the learner also masters himself, disciplines his taste, deepens his view of the world, the "something" that is got across is hardly worth the effort of transmission.

The more elementary a course and the younger its students, the more serious must be its pedagogical aim of forming the intellectual powers of those whom it serves. It is as important that a good mathematics course be justified by the intellectual discipline it provides or the honesty it promotes as by the mathematics it transmits. Indeed, neither can be accomplished without the other.

With these things in mind, let me describe the substance or structure of a course in social studies now in the process of construction, parts of which have been taught to children in grade five. What is presented here is a blueprint. It may turn out to be the case, as modifications are made during tryout

and testing, that the final course will have a quite different shape. It is plain, in the very form of its construction, that the course will have different form when taught by different teachers. Indeed, it is constructed in modules so that a teacher *can* (indeed, is encouraged to) place her own signature upon it. I do not hesitate to present what I know to be an unfinished course, for it is the process of curriculum making that is of concern here, and not the product. The present effort, carried out under the aegis of Educational Services Incorporated with grants from the Ford Foundation and the National Science Foundation, is very much in process—as we shall see in the final essay.

STRUCTURE OF THE COURSE

The content of the course is man: his nature as a species, the forces that shaped and continue to shape his humanity. Three questions recur throughout:

What is human about human beings?

How did they get that way?

How can they be made more so?

We seek exercises and materials through which our pupils can learn wherein man is distinctive in his adaptation to the world, and wherein there is discernible continuity between him and his animal forebears. For man represents that crucial point in evolution where adaptation is achieved by the vehicle of culture, and only in a minor way by further changes in his morphology. Yet there are chemical tides that run in his blood that are as ancient as the reptiles. We make every effort at the outset to *tell* the children where we hope to travel with them. Yet little of such recounting gets through. Much more useful, we have found, is to pose the three questions directly to the children so that their own views can be brought into the open and so that they can establish some points of view of their own.

In pursuit of our questions we proceed to explore five subjects, each closely associated with the evolution of man as a species, each defining at once the distinctiveness of man and his potentiality for further evolution. The five great humanizing forces are tool making, language, social organization, the management of man's prolonged childhood, and man's urge to explain his world. It has been our first lesson in teaching that no pupil, however eager, can appreciate the relevance of, say, tool making in human evolution without first grasping the fundamental concept of a tool—or what a language is, or a myth, or social organization. These are not obvious matters. So we are involved not only in teaching the role of tools or language in the emergence of man, but, as a necessary precondition for doing so, in setting forth the fundamentals of linguistics or the theory of tools. And it is as often as not the case that (as with the "theory of tools") we must solve a formidable intellectual problem ourselves in order to be able to help our pupils do the same.

While one readily singles out these five massive contributors to man's humanization, under no circumstances can they be put into airtight compartments. Human kinship is distinctively different from what we find in a primate troop, and is based on a system of classification that is inconceivable without language. Distinctions between those who are permitted or favored as mates and those who are ruled out as "incestuous" are governed by a system of naming that can only be mastered by one who can handle a human language—as in the famous case of mother's brother's daughter being the favored bride in many patrilineal societies. Or, to take another connection, tool use enhances the division of labor in a society, and division of labor in turn affects kinship. Indeed, language itself is only clearly appreciated by reference to its acquisition in the uniquely human interaction between child and parent. And obviously the nature of man's world view, whether formulated

in myth or in science, depends upon and is constrained by the nature of human language. So while each domain can be treated as a separate set of ideas, as we shall see, success in teaching depends upon making it possible for children to have a sense of their interaction.

The choice of topic is partly fortuitous—in the sense that it reflected the interests and knowledge of those of us who were involved. But beyond that, its emphasis on the "newer" behavioral sciences recognizes what in an earlier essay was described as the need for general principles in understanding man and society lest we be overwhelmed by the richness of historical record.

LANGUAGE

Teaching a decent beginning of modern linguistics to ten-year-olds is not easy, given the limit on time, but not as difficult as we had feared. There are certain pedagogic precautions to be respected if children are to be attracted by the subject. The subject must not, to begin with, be presented as a normative one—as an exercise in how things *should* be written or said. It must, moreover, be dissociated from such traditional grammar as the child has encountered. There is nothing so deadening as to have a child handle the form classes as traditional "parts of speech," "recognizing" one category of words as "nouns" and parroting, upon being asked what he means by a noun, that it is a "person, place, or thing." It is not that he is either right or wrong, but rather that he is as remote from the issue as somebody would be who attempted to account for grief over the assassination of a President by citing the Constitution on the division of powers. And finally, the discussion needs to remain close to the nature of language in use, its likely origin, and the functions it serves.

Whether it is true or not that a ten-year-old has a complete grammatical repertory, he is certainly capable of and delighted

in intuitively recognizing linguistic phenomena when confronted with instances of them. The chief aid to such recognition is contrast—the opportunity to observe the oppositional features that are so much a characteristic of human language. What comes hard is to formulate these features conceptually, to go beyond the intuitive grasp of the native speaker to the more self-conscious understanding of the linguist. It is this task—getting children to look at and ponder the things they can notice in their language, long enough to understand them —that is most difficult, and it should not be pushed to the point of tedium.

Our section on language includes a consideration of what communication is—by contrasting how humans and animals manage to send and receive messages. The early sessions have proved lively, and in the course of them nearly every major issue of linguistics is raised and allowed to go begging. This preliminary exercise has the great virtue that it can be repeated on later occasions, when students have achieved varying levels of sophistication, with the result that they readily recognize how much progress they have made.

The opening session (or sessions, for students often want to continue the arguments over animals and humans) usually indicates which among several openings can best be pursued in later units. The discussion tends to lead naturally to the properties of communication systems in general, including human language. We have found that progress comes faster when the children have something with which to compare human language, and Von Frisch's description of the round dance and tail-wagging dance of the bee serves us well. In our preliminary work, we find that children come very swiftly to a discussion (in lay and intuitive terms) of such matters as how one refers by signs and symbols to "things," the difficulties of reference when what is referred to is not present to point to, the relative advantages of a voice-ear system, the difference

between an inherited and a culturally transmitted language, and so on down the list of classic issues.

Our next objective is to present the powerful ideas of arbitrariness, of productivity, and of duality of patterning so called, the last the exclusive property of human language. We have approached arbitrariness by the conventional route of comparing how pictures, diagrams, charades, and words refer to things. There are nice jokes to be used, as in seeking to find some relation between length of name and size of child. With respect to productivity, we have had considerable initial success with two exercises. The first is with a lexicon containing four word classes (how, what, when, and where words), with a limited number of tokens of each type (by hand, by weapon, by trap, are tokens of the "how" type), and we use word-class orders to refer to different food-related activities. By this means we readily establish the notion of word *type* and *order* as two basic ideas. Children readily grasp the possibility of substituting tokens within a type. (Indeed, given the interest in secret codes based on substitution of words or letters for code breaking, they need little instruction on this score.)

Once the ideas of type and order are established, we begin the following amusing exercise to illustrate the interchangeability of language frames. We present:

1	2	3	4	5
The	man	ate	his	lunch
A	lady	wore	my	hat
This	doctor	broke	a	bottle
My	son	drove	our	car

and the children are now asked to provide "matching" examples. They can do so readily. They soon discover that so long as they pick words in the order 1 2 3 4 5, from any place in each column, something "sensible" can be got: even if it is silly or not true, like "My doctor wore a car" or "A lady ate a bottle," it is at least not "crazy," like "Man the lunch his ate."

Our students need no urging to construct new frames and to insert additional types into frames already set up (like a new first column the tokens of which include *did, can, has, will*). Interesting discoveries are made—such as the relative openness of some positions and the closed nature of others, and the difficulties of some tokens within a type. We hope to devise methods to help the children discover some of the deeper features of grammar, better to grasp what a language is—for example, that one can start with relatively simple sentence frames, "kernel sentences," and transform them successively into negatives, queries, and passives, or any two or even three of these, and that more complex forms can be returned to simpler forms by applying the transformations in reverse. Finally, a game has been devised (a game involving signaling at sea) to illustrate duality of patterning, that most difficult feature of human language. Each human language combines intrinsically meaningless sounds into a unique system of phonemes that make up words or morphemes. A change in a phoneme alters the meaning of a word. In English *rob* and *lob* are different words, but they would be the same word in Japanese, where *r* and *l* belong to the same phoneme, just as the plosive *p* of *pin* and the nonplosive *p* of *spin* are "the same" for us but not for others. In our game we set out to construct a language initially with a very limited set of phonemes as our building blocks. Three kinds of blocks can be arranged in various ways in a three-block frame, making twenty-seven possible "words" or morphemes. Some combinations mean things, some not. It is very quickly apparent to the children that the blocks as such "mean" nothing, but the frames do—or some do and some do not. We go from here to more complex notions of morphophonemics if the children are interested.

Later we move on to the question of how language is acquired by young humans. We use the considerable resources provided by recent studies of language acquisition to show the manner in which syntax emerges from certain very elementary forms. We hope to contrast human language learning with the learning of baboons mastering their signaling system. The subtle problems of "traditional" and "hereditary" transmission are bound to emerge.

Finally, and with the benefit of the children's increased insight into the nature of language, we return to the question of the origins and functions of human language and the role of language in shaping human characteristics and thought. We hope first to cover the newly available materials on the universal characteristics of all human languages—encouraging the children to make informed guesses on the subject. Then we shall consider the role of language in the organization of the early human group and the effectiveness it might add to such group activities as hunting. To go from this point to a consideration of myth and its nature is not a difficult step.

It is plain that language can occupy the whole of a year—or two or three. Some teachers may want to devote much time to language, or little, and we hope to make it possible for them to do either. Whether a teacher wishes to concentrate the language material or to distribute it among the other sections is, we believe, a matter of taste, and we hope to design the material in a way that makes both approaches possible. But above all, we hope to provide material and exercises that stimulate a livelier sense of the distinctively human nature of human language.

TOOL MAKING

One starts with several home truths about children and tools. Our children have usually not used many of them, and do not find them of much interest. This may derive from the

deeper truth that, in general, children (like their urban parents) think of tools as objects to be bought in hardware stores. Children in our technologically mature society usually have little notion of the relation between tools and our way of life. Production takes place in factories where they have never been, and its products are so packaged as to minimize or cosmetize the production process that brought them into being.

Our section on tools is animated, first of all, by a philosophical approach to the nature of tool using. What is most characteristic of any kind of tool using is not the tools themselves, but rather the program that guides their use. It is in this broader sense that tools take on their proper meaning as amplifiers of human capacities and implementers of human activity.

Seen as amplifiers, tools can be conceived to fall into three general classes—amplifiers of sensory capacities, of motor capacities, and of ratiocinative capacities. Within each type there are many subspecies. There are sensory amplifiers, like microscopes and hearing aids, that are "magnifiers," others, like spirit levels and bobs, that are "reference markers," and so on. Some implement systems "stretch out" time (slow motion cinematography) and others condense it (time-lapse registration). In the realm of motor amplifiers, some tools bind things together, some separate them, some only steady the hand—one of our pupils described a draughtsman's compass as a "steadying tool." And, of course, there are the "soft tools" of ratiocination such as mathematics and logic and the "hard tools" they make possible, ranging from the abacus to the high-speed digital computer and the automaton.

Once we think of tools as imbedded in a program of use—as implementers of human activity—then it becomes possible to deal with the basic idea of substitutability, an idea as crucial to tools as it is to language. If one cannot use or find a certain word or phrase, another near-equivalent can be substituted.

So too with tools: if a skilled carpenter happens not to have brought his chisel to the job, he can usually use something else in its place—the edge of a plane blade, a pocket knife, a sharp stone. In short, tools are not fixed, and the "functional fixedness" found by so many psychologists studying problem solving comes because so much thinking about tools fixes them to convention—a hammer is for nails and nothing but nails.

Our ultimate object in teaching about tools is, as noted before, not so much to explicate tools and their significance as to explore how tools affected man's evolution and still affect his life. In other essays of this volume we have commented on natural selection, how it favored the user of improvised pebble tools and how, in time, survival depended increasingly on the capacity to use and make tools. There are many fascinating concomitants to this story. Better weapons meant a shift to carnivorousness. This in turn led to leisure—or at least less roaming after roots—which in turn made possible permanent or semipermanent settlement. Throughout, changes in tools meant changes in way of life, changes in culture and social organization, changes finally in child rearing (as in the invention of the school).

All of these matters are now challengingly documented by excavations in South Africa and East Africa. We hope to get our pupils to speculate on the changes in a society that accompany these early changes in technology, to get across the idea that a technology requires a counterpart in social organization before it can be used effectively by a society.

Some interesting exercises are being worked out to give a more vivid sense of what tools are. One calls for the taking of a "census of skills"—the tasks that children know how to perform—along with some effort to examine how they were learned (including tool skills). Another revolves around trying to design a tool, so that the children can have some notion of the programmatic questions one asks. The tool in question is

an orange peeler (defined narrowly), but more generally the question is how one skins anything. The first attempt in a class produced devices (and ideas) that the children thought superior to anything comparable to be found in the kitchen at home.

There will be some treatment of tools to make tools to make tools, as well as of tools that control various forms of natural power. A possible route into this discussion is an overview of the evolution of tool making generally—from the first "spontaneous" or picked-up tools, to the shaped ones, to those shaped to a pattern, to modern conceptions of man-machine relations, as in contemporary systems research. Indeed, we are trying to devise a game of tool design involving variables such as cost, time, specificity of function, skill required, with the object of making clear the programmatic nature of tools and the manner in which tools represent selective extensions of human powers.

SOCIAL ORGANIZATION

The section on social organization has as its objective to make children aware that there is a structure in a society and that this structure is not fixed once for all. It is structured in the sense that you cannot change one part of the society without changing other parts with it. The way a society arranges itself for carrying out its affairs depends upon a variety of factors, ranging from its ecology at one end to the irreversible course of its history and world view at the other.

A first task is to lead children to recognize explicitly certain basic patterns in a concrete society, patterns they know well in an implicit, intuitive way but which require some special underlining to make them explicit. We plan to use a variety of means to achieve this end.

We should like children to infer from concrete cases that, within most human groups beyond the immediate family, con-

tinuity depends not so much upon specific people as upon "roles" filled by people: again, as with language and tool use, there are structures with substitutability. Such social organization is marked by reciprocity and exchange—cooperation is compensated by protection, service by fee, and so on. There is always giving and getting. There are, moreover, forms of legitimacy and sanction that define the limits of possible behavior in any given role. They are the bounds set by a society, and do not depend upon the individual's choice. Law is the classic case, but not the only one. One cannot commit theft legally; but then, too, one cannot ignore friends with impunity, and law has nothing to do with it. A society, moreover, has a certain world view, a way of defining what is "real," what is "good," what is "possible." To this matter we turn in a later section, mentioning it here only because it is one of the ideas we hope to introduce in this part of the course.

We believe these matters can be presented to children in a fashion that is gripping, close to life, and intellectually honest. The pedagogy is still not clear, but we are on the track of some interesting approaches. The difficulty with social organization is its ubiquity and familiarity. Contrast may be our best way of saving social organization from obviousness—by comparing our own forms of social organization with those of baboon troops, of Eskimos, of Bushmen, of prehistoric men as inferred from excavated living floors in Europe and Africa. But beyond this we have now developed a family of games designed to bring social organization into the personal consciousness of the children.

The first of these games, "Hunting," is designed to simulate conditions in an early human group engaged in hunting, and is patterned on the life and ecology of the Bushmen of the Kalahari desert. The game simulates (in the manner of so-called Pentagon games used for increasing the sensitivities of generals) the problem of planning how far one wishes to go in

search of various kinds of game, how resources need to be shared by a group to go beyond "varmint" hunting to larger game, how differentiation of labor can come about in weapon making and weapon using, how one must decide among different odds in hunting in one terrain or another. Given the form of the game, its content can be readily varied to fit the conditions of life of other hunting groups, such as the Eskimos, again with the object of contrast.

What has proved particularly interesting in our early work with this game is that it permits the grouping of a considerable amount of "real" material around it—accounts of the life of the Kalahari Bushmen (of which there is an extraordinarily rich record both on film and in written form), their myths and art, the forbidding desert ecology that is their environment. And so too with the Eskimos, for we are in possession of an equally rich documentation on the Netsilik Eskimos of Pelly Bay.

Another approach to social organization is through the concept of the family, particularly the extended family and the general idea of classificatory kinship. We have devised exercises that involve first the "representation" of one's own family by models made of blocks of balsa wood and dowels, all to be shaped and colored as needed. Ten-year-olds have idiosyncratic ways of conceiving of their families, far from the "up-down, right-left" representations of the kinship chart and genealogy. From their own family they go to a "generalized" family, a representation carried out jointly rather than individually. Once they are armed with a new and more ordered mode of picturing an extended family, the lessons then move to a Bushman village and its three generations, with its avoidance patterns, joking relationships, revealing kin terms, and the rest. The children delight in playing "clue" games in which they have to identify who it is on a kinship chart that is being described by such clues as "She makes jokes with Koko." From

such kinship analysis one goes easily to division of labor and so on into the fabric of Bushman society.

Finally, and again by contrast, there now exists a vast store of material on the social organization of higher primates—a considerable portion of which is also on film—that serves extremely well to provoke discussion on what is uniquely human about human social organization.

CHILD REARING

The section on child rearing pursues three general themes, in the hope of clarifying them by reference to particular materials in the areas of language, of social organization, of tool making, and of childhood generally. One general theme is the extent to which and the manner in which the long human childhood (assisted as it is by language) leads to the dominance of sentiment in human life, in contrast to the instinctual patterns of gratification and response found to predominate at levels below man. That is to say, affect is aroused and controlled by symbols—human beings have an attitude about anger rather than just anger or not anger. The long process of sentiment formation requires both an extended childhood and access through language to a symbolized culture. Without sentiment (or values or whatever term one prefers) it is highly unlikely that human society or anything like it would be possible.

A second theme is organized around the human (perhaps primate) tendency toward mastery of skill for its own sake—the tendency of the human being, in his learning of the environment, to go beyond immediate adaptive necessity toward innovation. Recent work on human development has underlined this drive for competence. It is present in human play, in the increased variability of human behavior when things get under control. Just as William James commented three-quarters of a century ago that habit was the flywheel of society, we can now say that the innovative urge is the accelerator.

The third theme concerns the shaping of the man by the patterning of his childhood—the fact that, while all humans are intrinsically human, the expression of their humanity is affected by the manner of childhood they have experienced.

The working out of these themes has only begun. One exercise is to get children to describe differences between infancy, childhood, and adulthood for different species—using live specimens brought to class in the case of nonhuman species, siblings for the human species. The specimens for study can be rendered on film; yet the success of a session, say, with a live ten-day-old stub-tailed macaque suggests that the real thing should be used when possible. Various films are in preparation, however, on baboon, macaque, Bushman, and Eskimo childhood.

The effort to teach the unit on childhood has taught us how useful is the concept of the life cycle and how much can be gained by comparing the life cycles of different species and different peoples. It provides, as it were, a matrix in which the facts of growth take on a deeper meaning for children.

WORLD VIEW

The fifth section is concerned with man's drive to explain and represent his world. While it concerns itself with myth, with art, with primitive legend, it is only incidentally designed to provide the stories, the religious images, and the mythic account of man's origins. It would be more accurate to describe the subject as "beginning philosophy" in both senses of that expression — philosophy at the beginning as well as philosophy for young beginners.

Our central conception is that men everywhere are humans, however advanced or "primitive" their civilization. The difference is not one of being more or less human, but of how particular human societies express their human capacities.

A remark by the French anthropologist Lévi-Strauss puts it well:

> Prevalent attempts to explain alleged differences between the so-called primitive mind and scientific thought have resorted to qualitative differences between the working processes of the mind in both cases, while assuming that the entities which they were studying remained very much the same. If our interpretation is correct, we are led toward a completely different view—namely, that the kind of logic in mythical thought is as rigorous as that of modern science, and that the difference lies, not in the quality of the intellectual process, but in the nature of things to which it is applied. This is well in agreement with the situation known to prevail in the field of technology: What makes a steel ax superior to a stone ax is not that the first one is better made than the second. They are equally well made, but steel is quite different from stone. In the same way we may be able to show that the same logical processes operate in myth as in science, and that man has always been thinking equally well; the improvement lies, not in the alleged progress of man's mind, but in the discovery of new areas to which it may apply its unchanged and unchanging powers.[1]

At first glance, it may seem that Lévi-Strauss takes a position that is at variance with the view expressed earlier—that tools amplify the powers of muscle, sense, and mind, and the more powerful the tools, the better the amplification. But the difference is on the surface. The great step forward is in the act of linking human powers to expression through tools. Man gains better technical control of his world through modern science than he does through mythic explanation; but in science and in myth the same component processes or logical operations provide the base. It is in this sense that we try to make clear that man is equally human whether he uses a stone ax or a steel one, explains eclipses by astronomy or by spirits, murders with a gun or by the use of magic.

[1] Claude Lévi-Strauss, *Structural Anthropology*, trans. by Claire Jacobson and Brooke Grundfest Schoepf (New York: Basic Books, 1963), p. 230.

All cultures are created equal. One society—say, that of the Eskimo—may have only a few tools, but they are used in a versatile way. The woman's knife does what our scissors do, but it also serves to scrape hides, clean and thin them, and so on. The man's knife is used for killing and skinning animals, carving wood and bone, cutting snow for building blocks for the igloo, chopping meat into bites. Such simple weapons are "the mother of tools," from which by specialization a number of tools derive. What is lost in variety is won in versatility.

So too with symbolic systems. The very essence of being human lies in the use of symbols. We do not know what the hierarchy of primacy is among speech, song, dance, and drawing, but, whichever came first, as soon as it stood for something else than the act itself, man was born; as soon as it caught on with another man, culture was born; and as soon as there were two symbols, a system was born. A dance, a song, a painting, and a narrative can all symbolize the same thing. They do so differently. One way of searching for the structure of a world view is to take an important narrative and see what it ultimately tells. A narrative, or at least a corpus of narratives, may be what philosophy used to be. It may reflect what is believed about the celestial bodies and their relation to man; it may tell how man came into being, how social life was founded, what is believed about death and about life after death; it may codify law and morals. In short, it may give expression to the group's basic tenets on astronomy, theology, sociology, law, education, even aesthetics.

In studying symbolic systems, we want the students to understand myths rather than to learn them. We will give them examples from simple cultures for the same reason that the anthropologist travels into an isolated society. Our hope is to lead the children to understand how man goes about explicating his world, making sense of it, and that one kind of explanation is no more human than another.

We have selected, for our starting point, two hunting-gathering societies—Eskimo and Bushman—to show what the life experience of hunting peoples is. From the scrutiny of the myths of these groups, it is immediately clear that you can tell a society by its narratives. The ecology, the economy, the social structure, the tasks of men and women, and their fears and anxieties are reflected in the stories, and in a way that the children can handle. One good example of Eskimo narrative or Eskimo poetry, if skillfully handled in class, can show the child that the problems of an Eskimo are like our problems: to cope with his environment, to cope with his fellow men, and to cope with himself. We hope to show that wherever man lives, he manages not only to survive and to breed, but also to think and to express his thoughts. But we can also let the children enjoy the particulars of a given culture—the sense of an alien ecology, whether the bush or ice and snow—and gain an empathic understanding for alien styles.

We introduce an origin myth, of things taking their present order, the sun shining over the paths of the Bushmen, and the Bushmen starting to hunt. But we should suggest some possible theories to make the discussion profitable, theories not in words, but in ways of reading and understanding a myth. If the narrative is called a myth, the state of things it deals with is radically different from the way things are now, and these differences are worth examining. It is possible to devise ways for children to analyze a plot. If done with one story variant only, such an analysis may yield something akin to a phrase-structure grammar; if done with a group of myths, something comparable to a transformational grammar. It is intriguing to see how stories change. Children sense the structure of narratives intuitively and can be helped to appreciate them more powerfully.

Why should the structure of myth be taught so early? Why not postpone it until the student can handle the "theory" itself,

not only the examples? There is a reason: if such things are new to a twenty-year-old, there is not only a new view to learn, but an old established view to unlearn. We want the children to recognize that man is constantly seeking to bring reason into his world, that he does so with a variety of symbolic tools, and that he does so with a striking and fully rational humanity. It is a big order, but worth the try.

But it is also necessary that the children "feel" myth as well as understand it—for it is different from "explanation" or "narrative." We have found that this requires much care in the teaching. At least two methods have been used, each with what seemed to be striking effect in gripping the children's imagination. In one, a week-long conference, the children are introduced abruptly to Eskimo society by a film of the family of Zachary, Marta, and their four-year-old son Alexei (a family that is followed through the year by our films shot at Pelley Bay). It is one in which they are jigging through the spring ice for salmon, and catching a good share, until a howling gale rises and the film comes to a close. It is particularly useful as an "introduction" to Netsilik life, at once full of humanity and the wildness of the terrain and weather. There follows an extended discussion of seals, and how much of what they wore and lived in and used in daily life was derived from the seal. Following this, there is a short film of Zachary, technically extraordinary, stalking a seal on the ice, creeping up on it slowly and with evident guile, hoping to harpoon it before it can get back into the water through its breathing hole. Zachary fails. The children try their hand at writing a dream that he might have that night. They need a fair amount of encouraging to avoid the "slick" dream pattern of the mass media. Why did Zachary miss? With his beautiful skill and tools and experience, why did the seal get away? Let the dream be about that. The stories and illustrations are sometimes startling, very often "mythlike," always dramatic. Only

after these are the children introduced to Nuliajik, the myth of the origin of seals, the Eskimo orphan girl who tried to climb on the raft and was refused, her fingers cut off and turned to seals, and left with an ever unfulfilled sense of vengeance against humanity, holding back the seals over whom she exercised dominion.

We were struck by how strongly the children sensed the mythic qualities of the Nuliajik tale, how much (through their own efforts) they had become adept at judging an imaginative "explanation." Some still preferred their own stories to Nuliajik, but no matter. The exercise in question, having been carried out in a hurried summer session, might have been carried further to include what another class had done—constructing "stories that include opposites," exercises to elucidate the formal structure of myths. The children first made a long list of opposites: cold-warm, man-woman, brave-scared, and so on. They then chose one or as many as they wished from the list to write about, to "reconcile" or "get together." They were absorbed by the task and, in the process, developed a deeper sense of what a myth is, discovering by their own efforts at composition what, by other analytic exercises, they were also able to discover about a corpus of Netsilik myths that they had been reading.

PEDAGOGY

The most persistent problem in social studies is to rescue the phenomena of social life from familiarity, without at the same time making it all seem "primitive" and bizarre. Four techniques are proving particularly useful in achieving this end. The first is contrast, of which much has already been said. The second is the stimulation and use of informed guessing, hypothesis making, conjectural procedures. The third is participation—particularly by the use of games that incorporate the formal properties of the phenomena for which the game is

an analogue. In this sense, a game is like a mathematical model —an artificial but often powerful representation of reality. The fourth is the ancient approach of stimulating self-consciousness. We believe there is a learnable strategy for discovering one's unspoken notions, one's unstated ways of approaching things.

Before considering each of these let me say a word about a point of view quite different from ours. It holds that one should begin teaching social studies by presenting the familiar world of home, the street, and the neighborhood. It is a thoroughly commendable ideal; its only fault is its failure to recognize how difficult it is for human beings to see generality in what has become familiar. The friendly postman is indeed the vicar of federal powers, but to lead the child to the recognition of such powers requires many detours into the realm of what constitutes power, federal or other, and how, for example, constituted power and willfully exercised force differ. We would rather find a way of stirring the curiosity of the children with particulars whose intrinsic drama and human significance are plain, whether close at hand or at a far remove. If we can concurrently activate a passion for bringing order into what has been studied, the task is well started.

A word first about contrast. Its use in pedagogy is ancient, and so is its place in learning theory as an important factor in establishing conceptual categories. We hope to use four principal sources of contrast: man versus higher primates, man versus prehistoric man, contemporary technological man versus primitive man, and man versus child. We have been gathering materials relevant to each of the contrasts—film, stories, artifacts, readings, pictures, and, above all, ideas for pointing up contrasts in the interest of achieving clarity.

Indeed, we hope to achieve for our pupils a sense of continuity by first presenting them with what seems like contrast and letting them live with it long enough to sense wherein

what before seemed bizarrely different is, in fact, closely akin to things they understand from their own lives. So it is particularly with our most extensive collection of material, a film record, taken through the full cycle of the year, of a family of Netsilik Eskimo. The ecology and the externals are full of contrast to daily life in an American or European setting. But there is enough material available so that our pupils can work into the year's cycle of a single family and get a sense of the integrity not only of a family, but of a culture. It is characteristic of Netsilik Eskimos, for example, that they make a few beautifully specialized tools and weapons, such as their fishing lester or spear. But it is also apparent that each man can make do with the stones he finds around him, that the Eskimo is a superbly gifted *bricoleur*. Whenever he needs to do something, improvised tools come from nowhere. A flat stone, a little fish oil, a touch of arctic cotton, and he has a lamp. So while the Eskimo footage provides a sharp contrast to modern technological man, it serves perhaps ever better to present the inherent, internal logic of a society, any society. Each has its own approach to technology, to the use of intelligence. It is in the recognition of this unique integrity in human society—wherever it is found—that children are led from what first seemed like contrast to what is finally seen as continuity.

About the hypothetical mode, I think I can sum up our attitude by saying that it avails little to give information that is not asked for. Let me illustrate. We have a film of Zachary, the father of the Netsilik Eskimo family we have filmed, hunting seal alone by waiting for the seal to come to the surface of a breathing hole in the ice. A seal has about a dozen breathing holes. Which one to stalk? And if the hunting party were six in number, how distribute them? In fact, we have film of a group hunting seal by watching the breathing holes. But before we show it, we like to get the children figuring out the problem on their own. So too with the organization of a baboon

troop of adult males, adult females, juveniles, and infants. How do they arrange themselves to get through territory where there are predators? It is far more interesting to learn the facts *after* one has tried to figure them out for oneself.

Games go a long way toward getting children involved in understanding language, social organization, and the rest; they also introduce, as we have already noted, the idea of a theory of these phenomena. We do not know to what extent these games will be successful, but we shall give them a careful try. They provide a superb means of getting children to participate actively in the process of learning—as players rather than spectators.

As for stimulating self-consciousness about thinking and its ways, we feel that the best approach is through mastering the art of getting and using information—learning what is involved in going beyond the information given and what makes it possible to take such leaps. Richard Crutchfield has produced results in this sphere using nothing more complicated than a series of comic books in which the adventures of a detective, aided by his nephew and niece, are recounted. The theme is using clues cleverly. As children explore the implications of clues encountered, their general reasoning ability increases, and they formulate more and better hypotheses. We plan to design materials in which children have an opportunity to do this sort of thinking with questions related to the course —possibly in connection with prehistoric materials, where it will be most relevant. If it turns out to be the case that the clothing that people wore was made from the skin of the ibex, what can they infer about the size of a hunting party and how would they look for data?

Children should be at least as self-conscious about their strategies of thought as they are about their attempts to commit things to memory. They should be conscious, too, of the tools of thought—causal explanation, categorization, and the rest.

One of those tools—perhaps the principal one—is language, and we shall try to get the children to have a look at it in this light.

The most urgent need of all is to give our pupils the experience of what it is to use a theoretical model, with some sense of what is involved in being aware that one is trying out a theory. We shall be using a fair number of rather sophisticated theoretical notions; they will be intuitively presented rather than formally stated, to be sure, but they will help to give children the experience of using alternative models.

We shall, of course, try to encourage students to discover on their own. Children need not discover all generalizations for themselves, obviously. Yet we want to give them opportunity to develop a decent competence at it and a proper confidence in their ability to operate independently. There is also some need for the children to pause and review in order to recognize the connections within what they have learned—the kind of internal discovery that is probably of highest value. The cultivation of such a sense of connectedness is surely the heart of the matter. For if we do nothing else, we should somehow give to children a respect for their own powers of thinking, for their power to generate good questions, to come up with interesting informed guesses. So much of social studies till now has been a congeries of facts. We should like to make the study more rational, more amenable to the use of mind in the large rather than mere memorizing.

THE FORM OF THE COURSE

It is quite plain that the success of any course depends upon how well it is handled by a teacher, and this is particularly so in social studies, where the attitude of the teacher speaks as eloquently as any materials in the course itself. We are mindful of the problem and are trying to deal with it by the nature of the guides we are providing teachers. For it is one thing to

describe the nature of a course in terms of its underlying discipline and its pedagogical aims, and quite another to render these hopes into a workable form for real teachers in real classes. Teachers are sufficiently constrained by their work loads so that it would be vain to hope they might read generally and widely enough in the field to be able to give form to the course in their own terms. The materials to be covered in this particular course, moreover, are so vast in scope as to be forbidding. The materials, in short, have got to be made usable and attractive not only to the highly gifted teacher, but to teachers in general, and to teachers who live with the ordinary fatigue of coping with younger pupils day by day. They cannot be overburdened with reading, nor can the reading be of such an order as to leave them with a feeling of impotence. At the same time, the material presented should be loosely enough woven to permit the teacher to satisfy his interests in forming a final product to be presented to children.

That much said, we can state what we mean by *units*, the elements of which the course is made. A unit is a body of materials and exercises that may occupy as much as several days of class time or as little as half a class period. In short, it can be played to the full and consume a considerable amount of the course content, or be taken *en passant*. Indeed, some units will surely be skipped and are intended only for those teachers who have a special interest in a topic or a particular kind of exercise. There will be more units than can possibly be fitted into a year's course, and teachers will be encouraged to put them together in a form that is commodious to their own intent.

In a manner of speaking, a collection of such units constitutes a course of study. But the image is unfortunate, connoting as it does so many beads strung together by some principle of succession. It is our hope that after a certain number of units have been got through, a unit can then be introduced

to "recode" what has gone before, to exploit connection. Some units only review and present no new material.

A master unit sits on the teacher's ready shelf, and consists of six constituent elements.

1. *Talks to teachers.* These consist of lively accounts of the nature of the unit—particularly the nature of its mystery, what about it impels curiosity and wonder. Our experience in preparing these indicates the importance of staying close to the great men in the field, if possible to find a great article that can be presented in somewhat abridged form. The design of a language (taken from Hockett) or the nature of kinship (taken from Radcliffe-Brown) or how a thing should be called (Roger Brown)—these are examples. The genre needs further study and we are exploring the kind of writing required—something that is at once science and poetry. If it should turn out that a student finds "talks to teachers" worth reading, so much the better.

2. *Queries and contrasts.* In trying out materials to be taught, we have learned certain ways of getting ideas across or getting the students to think out matters on their own. Often these can be embodied in devices—pictures, reading, and diagrams. But sometimes they are best stated as hints to teachers about questions to use and contrasts to invoke.

"How could you improve the human hand?" turns out to be a useful question. So does the question, "What are the different ways something can 'stand for' something else, like a red light 'standing for' *stop?*"

We have already spoken of our tactical fondness for contrasts, and we are coming up with useful ones in our designing. One such is to have students contrast a cry of pain with the words, "It hurts." Another is to compare the usual words from which phonemes may be inferred, like hit, hat, hate, hut, hot. Or the difference to be found in the two allophones of the phoneme /p/ in the words *spit* and *pit*—the latter of which

will blow out a match held to the lips, the former not—although the two are regarded as the "same letter" or the "same sound," whereas *hat* and *hate* are "different."

3. *Devices.* This part of the unit contains the "stuff"—the material for students. Principal among the devices is, of course, reading material, and we are, like others, struggling to get such material prepared. In good season we hope to understand this obscure matter better. Currently, we are operating, much as others have, to find, or cause to be written, material that is interesting, informative, and in a decent style.

But there are many devices beyond reading that are in need of developing for different units. One is the film loop for use with the Technicolor cartridge projectors that we use increasingly. We are putting together four-minute loops constructed from Eskimo, Bushman, and baboon footage, with the intention of *asking* questions or *posing* riddles. Too often, films have a way of producing passivity. Can we devise ones to do the opposite? Why did *Last Year at Marienbad* abrade the curiosity so well?

We are also exploring what can be done with games, as already noted, and with animation and graphics and maps.

4. *Model exercises.* From time to time in devising a unit it becomes plain that the problem we face is less in the subject matter and more in the intellectual habits of children in ordinary schools. We have commented on some of these problems already—the difficulty many children and not a few adults have in distinguishing necessary from necessary and sufficient conditions, the tendency of children to be lazy in using information, not exploiting its inferential power to nearly the degree warranted, difficulties in categorization.

Model exercises are designed to overcome such intellectual difficulties. We think they are best kept imbedded in the very materials one is teaching. But it is often helpful to provide the teacher with additional special devices. We intend to use

puzzles, conundrums, games—a kind of pedagogical first-aid kit.

5. *Documentaries.* These are accounts, or even tape recordings, of ordinary children at work with the materials in the unit. We would like the documentary to be both exemplary and at the same time typical enough to be within reach of a teacher in his own work.

Along with the documentary goes a more analytic description. The analytic documentary is designed to serve two purposes. The first is to make it plainer both to ourselves and to teachers what in fact are the psychological problems involved in particular kinds of intellectual mastery that we hope to stimulate in children. In this sense, the analytic documentary is a further clarification of our pedagogical objectives. But in another sense, it represents an attempt on our part to accustom teachers to thinking in more general terms about the intellectual life of children. The second objective—call it educational—is to provide teachers with what might be a more useful educational psychology than the kind that is found conventionally in textbooks dedicated to that obscure subject.

It is our hope that as we proceed in our work there will be spin-offs in the form of general research problems that can be worked on by research centers not directly geared to the daily routines of curriculum building and curriculum testing. The work of such centers, as well as research in the regular literature on intellectual development, will constitute a continuing font from which we can draw material for the analytic documentaries.

6. *Supplementary materials.* The final section of the unit "kit" consists of such supplementary materials as paperbacks (and lists of related paperbacks), additional film and game materials, and other devices that might attract the attention of either a diligent student or an aspiring teacher. Without question, it will become clearer what is needed by way of supplement once we have gone further into providing what will be our standard fare. One new type of film has already been discovered to be particularly helpful as supplementary material. In constructing units, we have often brought together the leading scholar who is helping construct materials and a group of pupils who are studying the material. The scholar has been "there"—whether Professor Asen Balikci with the Eskimos, Dr. Richard Lee or Lorna Marshall with the Bushmen, Dr. Irven DeVore with East African baboons—and the children have read and pondered. What ensues is a colloquy in which children and scholar alike show how lively and direct a discourse is possible.

If we were totally successful in planning and teaching the course, we would have achieved five ideals:

1. To give our pupils respect for and confidence in the powers of their own mind.
2. To extend that respect and confidence to their power to think about the human condition, man's plight, and his social life.
3. To provide a set of workable models that make it simpler to analyze the nature of the social world in which we live and the condition in which man finds himself.
4. To impart a sense of respect for the capacities and humanity of man as a species.
5. To leave the student with a sense of the unfinished business of man's evolution.