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Towards a Human Science

Margaret Mead

The ceremonial character of the annual address by the president of the American Association for the Advancement of Science makes it impossible for me to disassociate myself as a person, a woman, and a cultural anthropologist from the office. However deeply I may feel as an individual, I must be wary because inevitably whatever I say will reflect in some manner, for better or worse, not only on the 116,000 members of our organization but also on the far greater number of American scientists who do not yet feel sufficiently strongly about the objectives of the Association to become members (*1*).

The principal topic to which I shall devote myself is the significance of multisensory experience and the value of specific kinds of instrumentation in the development of a fully human science. My spoken address was a multimedia presentation in which I used still photographs, films, and tapes to illuminate the discussion. It was accompanied by a translation into the sign language of the deaf as a way of expressing the concern of the AAAS for the handicapped and my own wish to demonstrate the necessity of always taking into account the multisensory nature of human functioning. In this written version of my address, I can include only a small number of illustrative photographs, which will cross-reference to the oral presentation, but in addition I have asked to abandon tradition and include references to provide background for the points I wish to make.

The ceremonial aspect of the occasion also has advantages. It has long been customary for presidents to draw on the thinking of their predecessors in office as a most felicitous way of linking past and present and also significant themes in different disciplines. In deference to this custom I have chosen two of my predecessors whose addresses show a progression in the definition of the role of the Association as each of them looked to a future we are still in the process of attaining.

As the first I have chosen Franz Boas, the last anthropologist to hold this office, in 1931, and my professor. Franz Boas was the founder of American anthropology as a scientific discipline and also one of the first social scientists to address himself fearlessly to the problem of race as an issue on which anthropologists must take the central responsibility. Characteristically, in his address, "The Aims of Anthropological Research" (*2*), Boas confined his remarks to the role of anthropology and he concluded that "by a study of the universality and variety of cultures anthropology may help us to shape the future course of mankind."

As my second predecessor I have chosen Warren Weaver whose presidential address, "Science and People" (*3*), was given in 1955 in Atlanta, only a few months after the Supreme Court, in Brown *vs.* the Board of Education of Topeka, ruled that all segregation in public schools is "inherently unequal" and denies black pupils in segregated schools equal protection of the law as guaranteed by the Fourteenth Amendment. At that moment of transition to a new era for Americans, Warren Weaver declared that "science belongs to all the people." And in his conclusion he quoted J. Bronowski, a scientist, on the responsibility of scientists to "develop an informed public opinion," and William Faulkner, a great artist, on the need for "the scientist and the humanitarian" to save our dream of our civilization. It was at that same Atlanta meeting that a committee on Science and Society was established which later was commissioned to pursue the goal of "science in the promotion of human welfare"—a goal that has become increasingly salient in the work of the Association over the past 20 years.

Weaver discussed the dangers that arise when the public attitude toward science combines "mistrust, fear, and overestimation" and scientists are regarded "one-third of the time as amusing but beneficial eccentrics, one-third of the time as sorcerers, and one-third of the time as irresponsible rascals" and "careless dabblers with danger." He attributed this negative attitude principally to the belief, shared by many scientists and the public alike, that the ideas of science are too difficult for the ordinary citizen to grasp. The pervasiveness of such beliefs about science and scientists among Americans, particularly young, school-age Americans, was abundantly documented in a study which Rhoda Metraux and I carried out on behalf of the AAAS and reported in 1957 (*4*). The findings showed not only what the public response to science and scientists was then but also predictively how Americans, in spite of (perhaps also because of) intensified exposure to formal science education, would continue to respond in years to come. And in 1957, when the Soviet Union launched Sputnik, outspoken black Americans bitterly attributed the American failure to be first to the waste of talent resulting from segregated education (*5*). Science, politics, and ethics were merging in a civil rights movement.

In his address Weaver asked what had been "man's major successes" and grouped what "men have really done well" in two pairs: the understanding of physical and organic nature; and the development of ethical principles and the enrichment of life through the arts. "Probably the most conspicuous, the most universally recognized, and the most widely applied success," he said, "lies in the understanding and control of the forces of physical nature. Coupled with this, I would place the progress that has been made—even though

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it is but a start—in the understanding of organic nature."

He listed certain characteristics of physical nature which had made possible the success of the physical sciences as loose coupling, the possibility of studying it "bit by bit, two or three variables at a time, and treating these bits as isolated." In contrast, what makes progress in studying animate nature so difficult, he suggested, is that it "presents highly complex and highly coupled systems.... It takes a lot of variables to describe a man, or for that matter a virus; and you cannot often usefully study these variables two at a time. Animate nature also exhibits very confusing instabilities, as students of history, the stock market, or genetics are well aware."

Franz Boas in his presidential address 25 years earlier stated what he believed to be the limitations of the study of man in terms of the methods of that day. Like Warren Weaver, Boas differentiated between those activities of humankind which are broadly cumulative in nature—that is, knowledge and invention—and other activities which he regarded as essentially noncumulative.

Boas had concluded that both human biology and human culture must be studied historically. But he recognized that there is "one fundamental difference between biological and cultural data which makes it impossible to transfer the methods of the one science to the other. Animal forms develop in divergent directions, and an intermingling of species that have once become distinct is negligible in the whole developmental history. It is otherwise in the domain of culture. Human thoughts, institutions, activities may spread from one social unit to another.... Undoubtedly there are dynamic conditions that mould in similar forms certain aspects of the morphology of social units. Still we may expect that these will be overlaid by extraneous elements that have no organic relation to the dynamics of inner change. This makes the reconstruction of cultural history easier than that of biological history, but it puts the most serious obstacles in the way of discovering the inner dynamics of change."

Boas expressed his feeling that because of the extreme complexity of cultural phenomena, such general laws as can be established "will be necessarily vague and ... so self-evident that they are of little help to a real understanding." He also considered that "moral behavior, ***except in so far as it is checked by increased understanding of social needs*** [emphasis added], does not seem to fall into any order."

He spoke with the greatest certainty when he discussed race and the indispensability of founding "the study of the race as a whole on that of the component genetic lines and of their variants, and on inquiries into the influence of the environment and selection upon bodily form and function. The race must be studied not as a whole but in its genotypical lines as developing under varying conditions" (*6*).

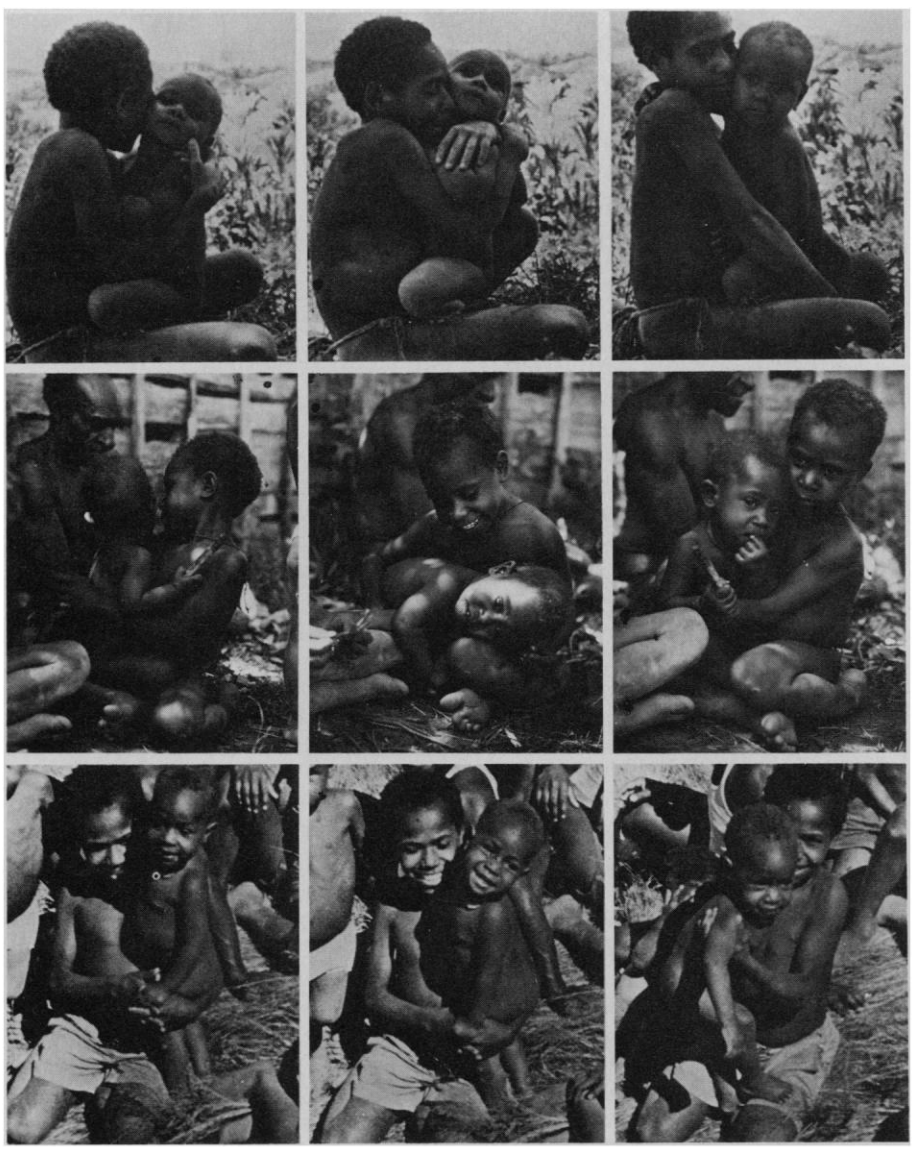

Fig. 1. Child caretakers in a culture which emphasizes affectionate relationships between siblings. Fore, Papua New Guinea, 1963. [Source: R. Sorenson, ***The Edge of the Forest: Land, Childhood and Change in a New Guinea Proto-Agricultural Society*** (Smithsonian Institution, Washington, D.C., in press)]

Boas, in 1931, and Weaver, in 1955, selected the biological field as the human domain within which the methods of science can be applied—but only within limits. And both men placed the study of man in a context which to a degree is outside the domain of science in its more usual sense as a pursuit in which the aim is to establish regularities. Boas denied the possibility of arriving at any generalized conclusions "that will reduce the data of anthropology to a formula which may be applied to every case, explaining its past and predicting its future.... The phenomena of our science are so individualized, so exposed to outer accident that no set of laws could explain them. It is as in any other science dealing with the actual world surrounding us. For each individual case we can arrive at an understanding of its relation to inner and outer forces, but we cannot explain its individuality in the form of laws."

In addition, both men placed those human activities which are least dependent on the universals of physical functioning and geographical limitation—art and the humanities—essentially in another realm, one which Weaver feels that science "must thoroughly respect and perhaps should envy."

Both men—as scientists speaking a generation apart and representing quite different fields of science—visualize scientific method as it originated in the attempt "to understand and control the forces of physical nature" and both emphasize its limited usefulness in the search for a fuller understanding of human beings. Boas points to the discontinuities inherent in the historical process through which varieties of culture have developed, whether in contact with other cultures or in isolation; Weaver refers to confusing instabilities and the consequences of small causes. And, finally, both men advocate humility. Weaver castigates the arrogance of the physical scientist who is convinced that the methods of science can be applied to all problems and Boas expressly describes limits to the usefulness of these methods in informing us about the nature of man.

My intention in discussing in some detail the comparable positions taken by my two illustrious predecessors has not been to treat them as straw men to be knocked down. On the contrary, I want to emphasize how very difficult it was to achieve such clarity about the relationships between theory and existing methods. Both the methods of science and the conflict of views about their more general applicability were developed within Euro-American culture and it is never easy to break out of such deeply felt but culturally bound conceptions. But because of the clarity which has been achieved I believe we can move from conflict toward a new kind of integration.

As a first step in this direction I suggest that it is necessary to recognize that our knowledge of ourselves and of the universe within which we live comes not from a single source but, instead, from two sources—from our capacity to explore human responses to events in which we and others participate through introspection and empathy, as well as from our capacity to make objective observations on physical and animate nature.

It is also necessary to recognize that the inappropriate extension into the physical world of human beings' understanding of themselves harms rather than enhances the development of the kind of objective understanding that we call science. Equally we must now come to realize that the extension into the human world of the methods of the physical sciences can be stultifying and dangerous. It is only when we do recognize that there are two distinct complementary—rather than antagonistic—sources of knowledge that we can fully develop methods appropriate to each and consider how such methods can serve to support and reinforce each other.

Within this wider context, introspection which becomes anthropomorphism is a vice when the problem has to do with the nature of the relationship between the sun and the moon, and is decreasingly useful in studies of the behavior of other primates, mammals, invertebrates, and finally, viruses. But disciplined introspection and empathy are essential to the study of the unique characteristics of humankind.

The wonder and curiosity of early human beings began to produce two kinds of knowledge. Observation of relatively stable physical phenomena, such as the tides, the seasons, and the movements of heavenly bodies, allowed men to build up knowledge of the natural world. But human beings also have the capacity to understand their fellows because they are sufficiently like themselves so that attention to their own internal states provides information about the internal states of others. Obviously, such understanding is enhanced by language and the development of appropriate and accurate vocabularies through which people can communicate to one another what they feel, how they perceive others and themselves, and how they conceptualize internal and external events proprioceptively and exteroceptively. The limiting case, then, is the human neonate who cannot yet communicate except through expressive sounds and movements. Nathan Kleitman once accused me of anthropomorphism when I ventured an interpretation of the behavior of human infants.

I wish to emphasize in the midstream of my argument that I am here concerned with the form of knowing that we call science—that is, with knowledge that can be arrived at and communicated in such a way that it can be shared with other human beings, is subject to their independent verification, and is open to further exploration

Fig. 2. Child nurse responsibility in a culture which emphasizes hostile sibling rivalry. Bajoeng Gede, Bali, 19 August 1937, 14 B 1,2,3,4,5,6,7. [Source: Plate 79 from G. Bateson and M. Mead, *Balinese Character* (The New York Academy of Sciences, New York, 1942)]

by investigation in accordance with agreed-upon rules. True, Warren Weaver pleaded for a recognition that every man, to the extent that he makes a correct analysis of some physical situation, is "a good scientist." In this sense Weaver said "even primitive men were scientists, and in certain aspects of accurate and subtle observation it would probably be hard to beat the ancient skilled hunter." In this view modern science involves mainly an increasing refinement of procedures rather than the emergence of new procedures, different in kind.

However, I am not including in this discussion the accumulation of knowledge, either of the natural world, animate and inanimate, or of human behavior which is not a conscious, purposefully directed activity. We may well speak admiringly of the knowledge that a primitive people has of the stars or of the animals they hunt or of the therapeutic properties of plants, but the mere acquisition of this knowledge, valuable as it is, and its transmission from members of one generation to the next, is not the practice of science in the sense I am using the term (*7*). There are, I believe, contextual differences between the protoscientific activities of the ancient hunter—as well as those of the ancient plant gatherer—and the scientist's systematic, organized pursuit of knowledge.

The capacity of human beings to observe and understand and systematize their knowledge of the behavior of other human beings has proceeded discontinuously, as Boas pointed out, but progressively as human beings have organized themselves into larger, more complex social units and have included a larger portion of humankind within their definition of humanity. But as long as the understanding of human behavior was not arrived at by methods that included systematic recording in ways that can be shared and tested, I would not speak of a human science. In the past, each great integrator of knowledge had to rely chiefly on his own capacity as a whole human being to observe the behavior and speculate about the past of members of his own species in ways that were—and are—unique to the human mind and dependent on the development of human culture. In more complex cultures, sharing the same traditions and education opened the way to an understanding of the insights of a philosopher, a historian, or an ethical leader who reported his observations in a shared language or demonstrated his ideas through artifacts or great works of art familiar to everyone involved. But just as in communication among physical scientists, more than a shared natural language is essential.

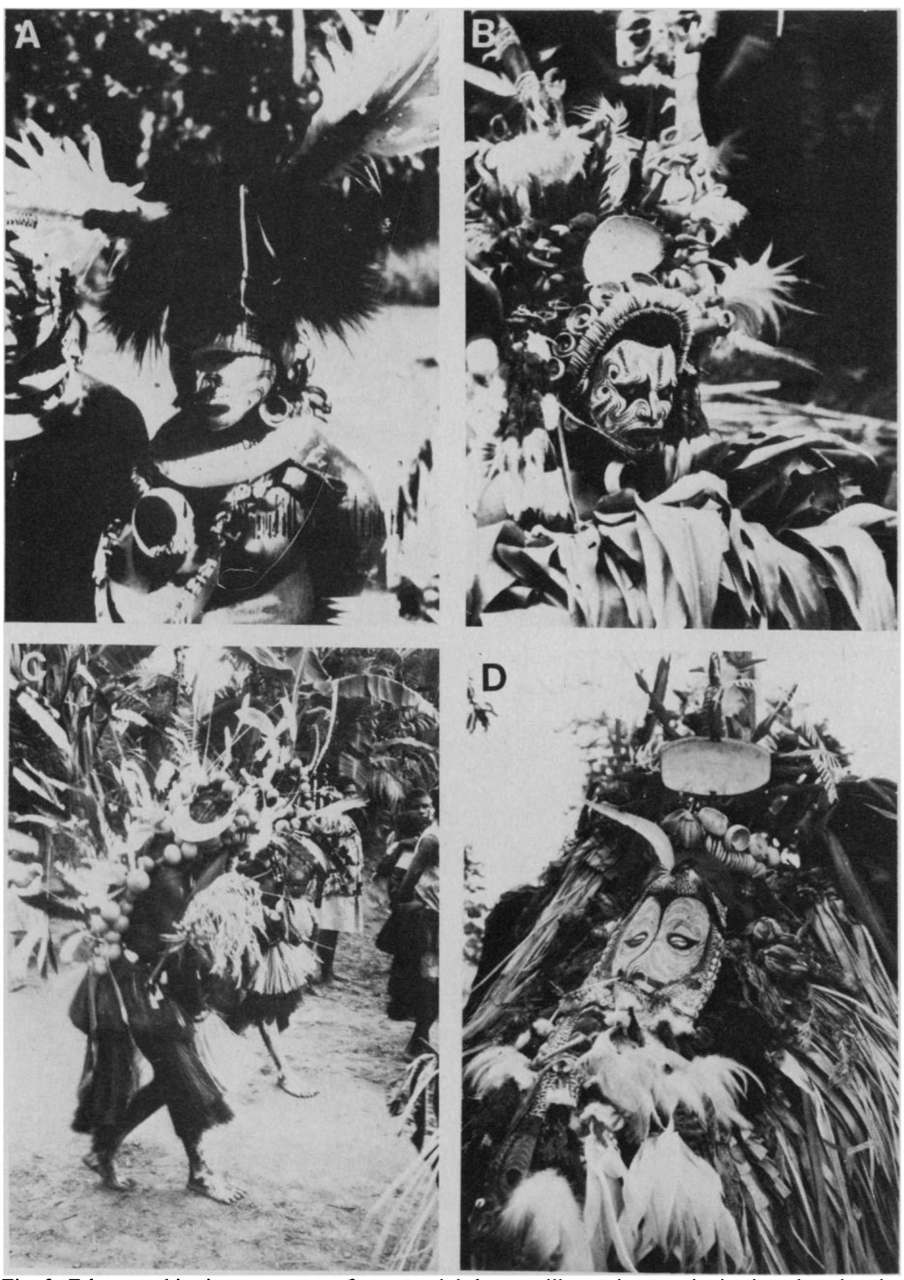

Fig. 3. Ethnographic time sequence of ceremonial dancers illustrating continuity in cultural style. Iatmul, Sepik River, Papua New Guinea. (A) 1931 and (B) 1938 by Gregory Bateson; (C) 1971 and (D) 1972 by Rhoda Metraux. [Source for (A): Plate XIX(A) from G. Bateson, *Naven* (Cambridge University Press, Cambridge, 1936; Stanford University Press, Stanford, 1958)]

Human speech itself was the first condition for shared understanding, and the recognition that languages can be learned and are not intrinsic to any specific bodily form, skin color, or geographical location made possible the first objective understanding of the nature of culture (*8*). It is significant that Boas and his early students made extensive use of written records of oral communications—that is, chunks of organized speech, folktales, descriptions of procedures such as cooking recipes or the formulas of love and hunting magic, and other complexly organized materials. Once phonetic transcription had been invented and interlinear translations had been made, all these materials became accessible and, even without a knowledge of the particular language, intelligible to other students. Even today, Claude Lévi-Strauss, working with essentially impoverished records—interlinear texts at best—has captured the fascinated attention of anthropologists and lay persons alike (*9*).

As long as we lacked photographic and acoustical techniques of recording, we were dependent for a scientific approach to the whole domain of human behavior on fragmenting methods of quantification of evoked behavior (evoked, for example, by questionnaires) or of records of partial observations coded in ways that give the results an illusory appearance of science. In some types of studies human individuals were—and still are—treated like parts of an aggregate and in others like entities that can be understood only through culture-bound tests of isolated traits like speed or accuracy of response.

Today, certain of the most important concepts of the human sciences have failed to enter constructively into the thinking of many scientists and lay persons principally because full understanding depends on the completion of an apprenticeship training of a peculiarly intense kind, such as the experience of a tedious and time-consuming procedure like psychoanalysis (*10*) or the experience of prolonged actual immersion in the life of more than one unfamiliar culture (*11*). Formerly, anthropologists were trained in techniques of what was rather vaguely known as "participant observation." For, unlike the data of the physical sciences which are required to be of a kind that can be replicated and reexamined, the data of the human sciences are in great part derived from time-consuming shared experiences that cannot be replicated.

True, many of the findings of physical science are accepted uncritically by those who do not have any real comprehension of the nature of the scientific enterprise. But there is still a tremendous difference between the very precise techniques of communication—and of sharing experience—which have been developed in the physical sciences and the inevitably imprecise communication by the human scientist who has been dependent on words alone for communicating his observations. While he is studying an individual or the members of a culture, the human scientist observes thousands—or more likely hundreds of thousands—of items of behavior; the greatest difficulty comes when he must condense his observations into words alone—words that may very well convey meanings alien to the experience described. He may make what he considers to be a bare verbal statement, for example: "the men put on their masks and their ornaments . . . and thence sally forth to dance and perform before the women" (*12*). Yet such a statement inevitably evokes discrepant and irrelevant images in the mind of the reader who is unfamiliar with the Iatmul or any other Papua New Guinea culture.

There is the added difficulty that pencil-and-paper recording was at best selective and depended not only on the trained awareness of the observer but also on the speed with which he could record what he experienced and, to a large extent, on his having highly developed verbal skills, including the ability to translate from the various types of linguistic and nonverbal communications of one culture into the accepted literary language of another.

In the conscious pursuit of knowledge about the natural world on the one hand, and of knowledge about human beings on the other, progress has depended on the development of more refined techniques of collecting and analyzing data, that is, on the development of instruments that extend our human capacities to observe, record, and reproduce data and to carry out the various functions of analysis (*13*). In the physical sciences, great advances have come about through the development of reliable instruments that permit observations of the very small and the very distant, instruments that can record in accurate codes various forms of sensory experience and instruments that make possible various kinds of measurement that are independent of the human observer. In the human sciences the principal emphasis in training has been on teaching the human scientist how to function as a very complex instrument, to use his body's own sensory equipment as a multifaceted recording device. The next advances have come as we have acquired forms of instrumentation that record and later allow for the replication of the observation without the intervention of verbal description. Instrumentation which makes possible the recording in full detail of auditory (*14*) and visual (*15*) aspects of events by means of tapes, still photographs, and films can provide us with records of nonrecurrent phenomena (*16*) (Figs. 1 and 2) so that we can juxtapose events separated in time and space (Figs. 3 and 4) and provide material for later comparison and analysis by others (Figs. 5 and 6) who did not share in making the original observations.

In effect, the basic techniques of observation and recording in the physical and the human sciences are complementary. The human scientist has had to learn how to relate self-knowledge of him- or herself as a multisensory being with a unique personal history as a member of a specific culture at a specific period to ongoing experience and how to *include* as far as possible this disciplined self-awareness in observations on other lives and in other cultures (*17*). In contrast, the physical scientist has had to learn how to *exclude* as far as possible the effects of temperament, individual life experience, and culture on his observations and interpretations of data (*18*). Without appropriate instrumentation neither can go beyond certain limits or com-

Fig. 4. Still photographs showing postural similarity between a child's trantrum and trancer. (a) Bajoeng Gede, Bali, 12 October 1937, and (b) Dendjalan, Bali, 26 May 1936. [Source: Plate 57 from G. Bateson and M. Mead, *Balinese Character* (The New York Academy of Sciences, New York, 1942)]

municate to others what has been observed.

It is in the sciences of living things that we find the greatest confusion but also the clearest demonstrations of the ways in which the two kinds of observation—the observation of human beings by human beings and of physical nature by human beings—meet. One group of students of living beings have attempted to adopt as far as possible the methods of the physical sciences through the use of controlled experiments, the deliberate limitation of the number of variables to be considered, and the construction of theories based on the findings arrived at by these means. The other group, taking their cues from our human capacity to understand through the observation of natural situations, have developed their methods from a natural history approach in which the principal reliance is on the integrative powers of the observer of a complex, nonreplicable event and on the experiments that are provided by history and by animals living in a particular ecological setting.

Students of human behavior who derive their methods of obtaining data from the physical sciences have constructed ingenious puzzle boxes and mazes and artificial stimulus situations. In research carried out by means of these techniques, the behavior of experimental animals and, even more, the behavior of human subjects has been fragmented in increasingly refined ways in order that aspects of behavior may be studied "bit by bit, two or three variables at a time, and treating these bits as isolated"—that is, by using in their investigations methods which, as Weaver pointed out, were eminently successful in studies of physical nature.

In research carried out by the other group of human scientists, the basic methods of observing whole events as whole human beings have now been supplemented by vastly improved techniques of recording and preserving recordings of whole events (*19*), techniques of keeping intact whole archeological sites or the full record of elicited materials—first in the form of verbatim linguistic and folklore texts and finally, within the last quarter-century, through the use of actual visual and sound recordings.

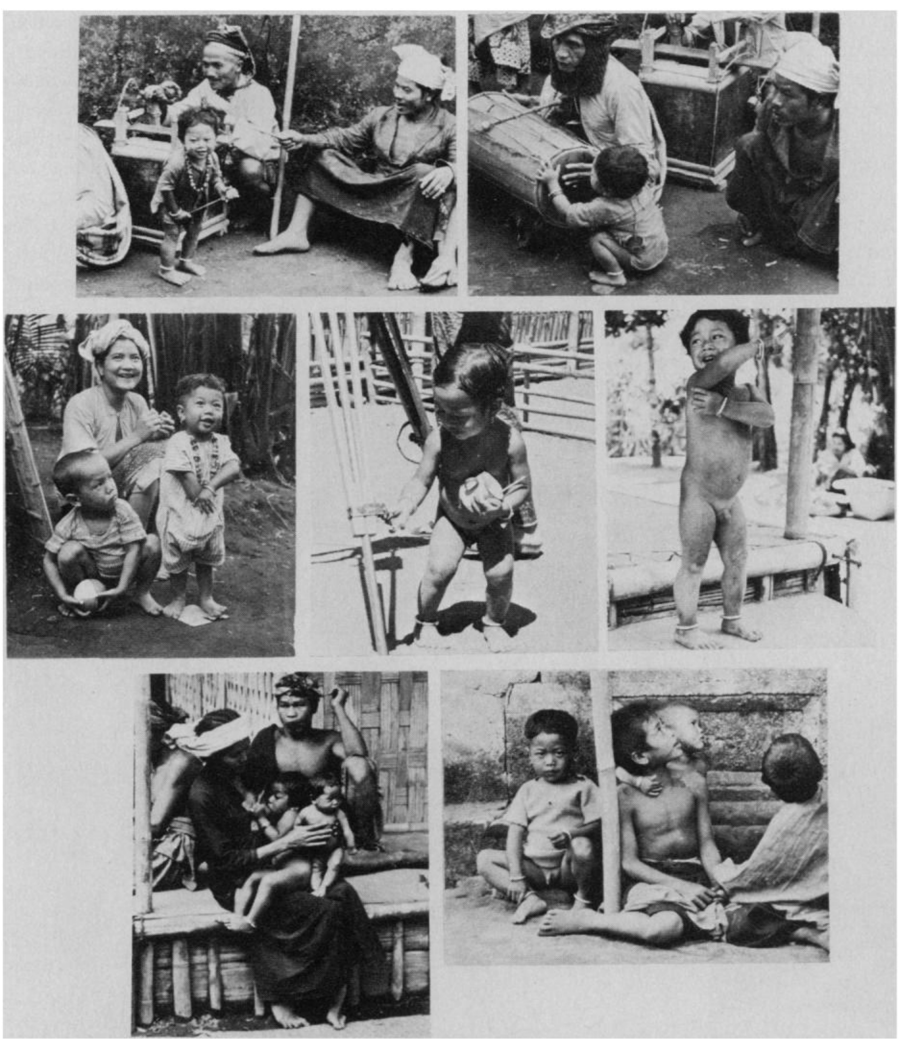

Fig. 5. Selected still photographs by Gregory Bateson showing Karba's maturation from gaiety, responsiveness, and provoked jealousy to sulkiness. Bajoeng Gede, Bali, 9 June 1937 to 12 February 1939. [Source: Plate II from M. Mead and F. MacGregor, *Growth and Culture* (Putnam, New York, 1951)]

I would argue that it is not by rejecting one or another but by appropriately combining the several methods evolved from these different types of search for knowledge that we are most likely in the long run to achieve a kind of scientific activity that is dominated neither by the arrogance of physical scientists nor by the arrogance of humanists who claim that the activities which concerned them cannot meaningfully be subjected to scientific inquiry.

New forms of cooperation among scientists are already prefigured in the new field of ethology which draws on methods of research with many different origins. Two sets of interdisciplinary conferences for which ethology provided the central focus—the four annual conferences on child development, 1953–1956 (*20*) and the five annual conferences on group processes, 1954–1958 (*21*)—illustrate the fruitfulness of using methods originally developed far apart and for very diverse purposes. For example, Konrad Lorenz was persuaded to apply the case history method of psychological study to the behavior of individual geese (*22*) and Helen Blauvelt used her experience with observing newborn kids and lambs to discover that newborn human infants have the capacity to propel themselves up the human body (*23*). Discussions of ritual were illuminated by comparisons between species-typical ritual behavior in birds and culturally transmitted rituals in human societies (*22*). Electroencephalographic explorations of the brain threw light on discussions of the relationship between imagery and human creativity (*24*). The experimental use of models was complementary to studies of color preferences and imprinting processes among birds (*25*). I believe that ethology will continue to be in the forefront of innovation and interplay in new kinds of scientific creativity (*26*).

In conclusion I wish to touch briefly on certain more general social implications of our advances in the human sciences.

There are, I believe, important implications for education, which today oscillates uneasily between emphasizing mastery and freedom from restraint, discipline and spontaneity, conformity and originality of the kind usually associated with the arts and religious inspiration. These dichotomies are expressions of older, culturally limited conceptions of the human person. What we need now is to develop systems of education that are consonant with human development—in which precision is cultivated in relation to spontaneous multisensory involvement and the disciplined use both of the mind in the usual sense and of the whole body in the light of our new knowledge about the participation of the whole body in thinking as well as in overt action (*27*) and in fostering the growing child's undistorted sense of its own body (*28*).

The advances in the human sciences also make possible a far more integrated picture of evolutionary and historical human development and of our place in the cosmos (*29*). C. H. Waddington and Julian Huxley have discussed the evolutionary significance of an ethical sense (*30*). A cosmic sense has been identified as the biological root of human curiosity about the universe (*31*). Niels Bohr has pointed out the relevance of complementarity in the fields of psychology and physics (*32*). And finally, the necessity of including the whole of humankind in planetary socioeconomic arrangements is underwritten by our definitive knowledge that all branches of the human race have comparable capacities for cultural growth (*33*).

The recently recognized need to shift away from a concentration on land and water boundaries that must be jealously maintained and defended at all costs toward a concern for the earth's atmosphere that must be protected has created a situation in which it is very desirable—and, indeed, very urgent—to invent new, more appropriate political forms (*34*). We shall have to draw on the resources of all the sciences in order to deal constructively with the chaotic but irreversibly interdependent planetary community. And we shall need still newer kinds of instrumentation—macroscopes that can simplify without distorting the complexity of our knowledge of the biosphere and the cosmos within which a recognition of all disciplined human endeavor must now take place (*35*).

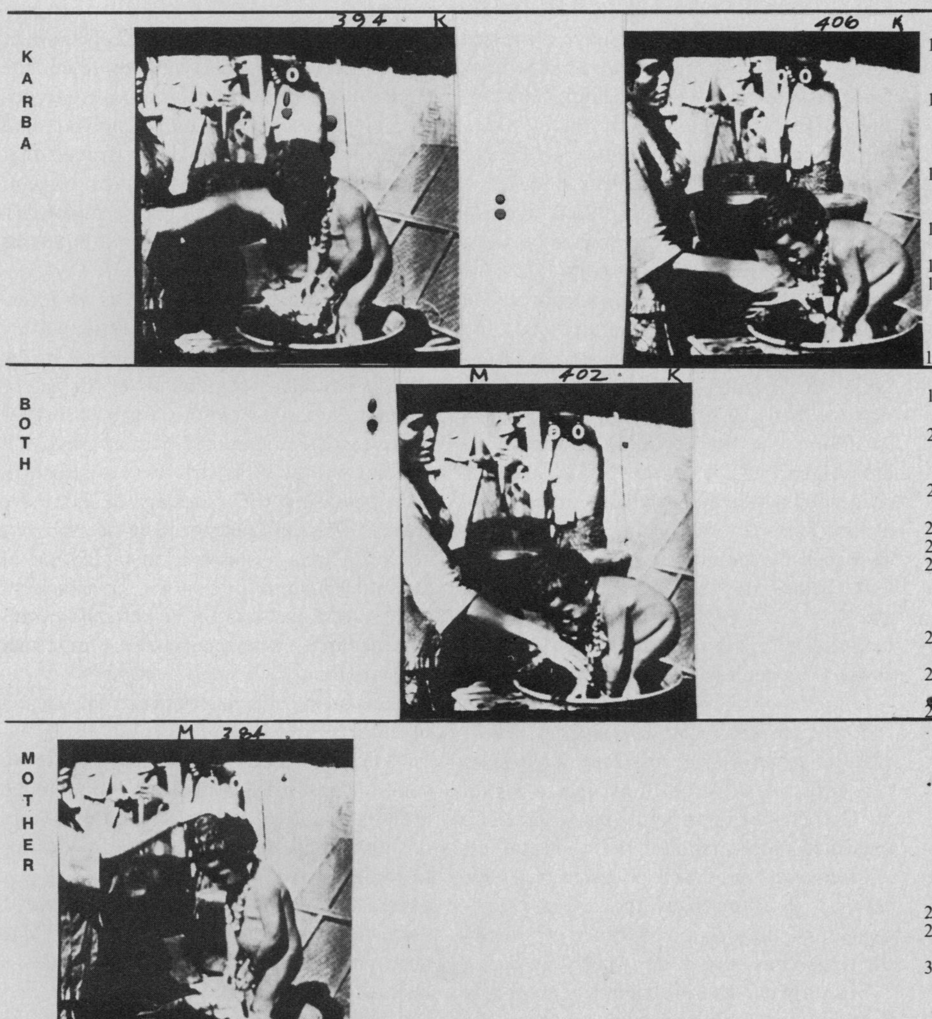

Fig. 6. Selected stills from film by Gregory Bateson in a condensation of interaction between Karba and his mother produced by arranging the stills in the following way:

Karba						394			406
Both	382							402	
Mother		384	386	388	391		397		

Bajoeng Gede, Bali, 29 April 1937, reels 101 to 110. [Source: B. Thompson, "Development and trial application of method for identifying non-vocal parent-child communications in research film" (thesis, Teachers College, Columbia University, New York, 1970)]

References and Notes

1. The objectives of the American Association for the Advancement of Science are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.
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