

Mental Retardation: Challenge to Mental Advance  
Presentation by Joshua Lederberg, Ph.D.  
Dedication Ceremony - Mental Retardation Center, UCLA  
October 15, 1969

Thank you Jolly, George, friends. I felt like I was being dedicated the last two or three minutes. That's not what we're here for. In fact, my wife asked me why I was coming down to L.A. today, and I told her something of the deep bonds of friendship and admiration for George Tarjan, and for Jolly West and my other friends here that made it impossible for me to refuse the opportunity to join in this celebration. But she said, "That isn't what I mean -- why do they want you?" And I was a little nonplussed, not to have thought of asking that question myself. And I guess I thought that some tribal ritual is usual and necessary in the nature of human psychology at events of this kind. A great many efforts have gone into the beginning of a laboratory. But that didn't answer the question entirely why they wanted me. I'm not reputed for giving empty praise or making fullsome speeches, and I very rarely dedicate anything. I think Dr. West knows me well enough to know that I would take an opportunity of this sort for candid criticism, some of it, I hope, positive. And having said that, let me state my profound admiration and respect for the work that is going on here, for the team of scientists and the ideals and the focus that are established here today. I haven't looked at the quarters -- and I'm not sure I'd want to take very much time to . It's the opportunity for the working together on some of the most important problems that face medicine and society that buildings of these kind afford. That's the central issue and this is one noble group of men and scientists.

I should turn to first things first and I will impose on you the remark

that the Asian war has been so pervasively disgenic, has done so much to disrupt the integrity of Western culture that I have made it part of my usual business to reflect upon it as part of my job as academic critic and teacher, and I don't propose to make an exception today in the name of the moratorium.

Robert S. McNamara will surely go down in history as the prototype of the modern rational statesman. He is a man of great human feeling, as well as tight logic. The trouble with a rational approach to politics is that you have to get every detail of your argument just right - - and this is not easy in a complicated world inhabited by capricious and imperfect people. I have been re-reading Robert McNamara's book, The Essence of Security, where he refers to the aims of the United States in Asia. After remarking on the conflict between the Soviet Union and China, he points out, "Our real concern is not over which of the two rivals will emerge dominant. Our concern is that no great power dominate the area. The United States has no desire to compete with either the Soviet Union or Red China or Ho Chi Minh in Southeast Asia or either to achieve any special position there." These remarks have a certain degree of persuasion to them. Rather than quarrel with them, I would accept them for the moment. But I must say that I'm left with a nagging doubt as a conclusion from these premises whether there was just one small flaw in our policy in Southeast Asia and that is whether we intervened on the correct side. Not the most implausible summary of the tragic events of the last years is to say that the Kremlin has cuzzened us into it by every act of positive and negative policy that they have displayed in respect to our position in that arena. Much has been said about the morality of war, of this war. I have to dismiss most such remarks with the thought that no war is moral and the fact no action of any state can be fundamentally moral. There is nothing in politics more

immoral than failure unless it is the unwillingness to recognize it.

I hope you will not judge me sternly for my performance on the remaining and more modest aims of my presentation today.

My credentials are not very well formulated and possibly lack something in relevance for an occasion of this kind. I'm not a specialist in mental retardation. I can claim very little expert knowledge of this field. My own professional discipline is molecular genetics and I have rarely strayed away from the use of microorganisms as the subject of my own personal experimental interests. It's hard to make much of a case for mental retardation research in bacteria, although when they don't behave one may call them stupid.

But in fact, as is the case for our view of mental retardation of the individual, mental retardation is not just a private deficit of a single unfortunate human being. It is also our collective ignorance about producing the appropriate responses to the failure in normative development that we observe in these individuals. My main interest in mental retardation and my qualification as a somewhat detached observer is still for the humane care of afflicted and unfortunate human beings, the sufferings that their families undergo which, in many respects, far exceed what are perceived by mentally retarded children themselves. And I would not be very patient with any view of our present prospect that minimizes the importance of humane care of our existing load.

I must confess, however, that a more cerebral side of my concerns has to do with the expectations that mental retardation research is the essential avenue for an understanding of the human intellect -- in both the normative sense, and in the sense of our own evolutionary and individual progress. That in studying the aberrations of the development of thought that are observed in the pathology of mental retardation, we should, in the long run, have the most incisive approach to understand how we think well and how we might think better. I try to be exuberant in laying out the prospects for

approaching this horizon. I try to think of the particular, wonderful ways in which these laboratories over the space of the next three or four or five years are going to revolutionize our outlook on human mentation, but I cannot honestly do so. I think I must, instead, point to the very grave difficulties that face us in any direct attack on the multitude of different problems (which is the collective problem of mental retardation) and on the deficiencies of our instruments and of our understanding of the details. We face here what is, if not the largest challenge in medicine, one that stands right next to it - next to the general field of mental health and the aberrations of thought and personality. And we have only very feeble tools, indeed, to do more than scratch the surface of what is apparent to us at the present time. Now, it's fair to say that the purposes of mental retardation research, or of an attack on mental retardation, have indeed already inspired a great deal of the most important work on fundamental aspects of human biology. One need merely point to the discovery of the chromosome diseases in man which followed (in Lejeune's hands) just a few years ago the elucidation of the correct chromosome number as being 46 - only about 15 years ago. The first discovery of a chromosome disease - that Down's syndrome was a consequence of an accident in the distribution of chromosomes in the formation of the egg -- has been followed by a large number of the richest kinds of observations on the chromosome complement of normal man, and in a number of the cruder deviations that arise from a large set of comparable kinds of accidents. I could not overestimate the importance of this line of research as an entry into the objective analysis of man as an organism. But I think it's still fair to say that even this work has given us very little of substantial value and insight into the fundamental processes of the development of mentation. Even knowing the Down's syndrome, which has an outcome of a very serious deformation in the development of the brain functions, and that we can pin this down to one object that can be seen

under the microscope (an extra small 22nd chromosome, in the most usual circumstances), tells us nothing, and we have so far learned virtually nothing about the pathway of action of that excess of chromosome material. I can think of almost nothing new in our understanding of mentation that has derived from that, or, in fact, from any other avenue of research along these lines. This is a discouraging outcome, but it's not an unreasonable one when we ponder how uniquely complex the human mental function is. It's at the end of the longest road both in evolution and in development. It is subject to interference from innumerable sources, any one of which can result in the continued ramification of difficulty and failure. And when we see the Down's infant, or any other example of severe retardation, we can be sure that we're looking at a process that has had wheels within wheels within wheels before we can come to its ultimate genetic mechanism. It is of the utmost importance that we unravel such mechanisms, and we're at the stage now where we are spending most of our time in beginning to build the tools to be able to do so. And here, of course, is where research in molecular genetics is of the utmost relevance.

It is then, generally true that the direct observation of mentally retarded children, while absolutely essential for developing the most appropriate and the most humane means of management of the diseases that are collectively lumped together here, has not often reached to the fundamental issues. I will posit one large exception to this and, if I were to be asked to help map out a research strategy, I would perhaps give it even more emphasis than the very large emphasis that it receives in the stated program of the Research Institute here. And this has to do with maternal and fetal nutrition.

I asked myself what new outlooks have appeared during the last six or seven years of the burst of energy and enthusiasm about mental retardation research and, in my view, this stands out above everything else. Not a totally new observation, not very surprising, not very profound in terms of

fundamental mechanisms -- but the realization that, from a global point of view, the deprivation in the feeding of the pregnant mother and of the early newborn can have the most profound consequences for the development of that child's brain is critical. From the point of view of the whole planet, I think that there can be no quibble with the assertion that this is the outstanding problem of mental retardation. It's very difficult to do controlled experiments in a field of this kind. Obviously, one does not wish to do so. One wishes to apply whatever remedies are available immediately in pursuit of any direct observations. It's also rare to find clinical situations in which populations that are nutritionally deprived are not also subject to many other kinds of environmental insults. And one could quibble whether the malnutrition has directly affected the development of the brain of the deprived fetus, or has done so indirectly by making it more vulnerable to virus infections, and so on and so forth. But it is probably a conservative estimate that one tenth of the children born today are seriously afflicted in the arena of mental retardation as a consequence of their malnutrition. We tend to think of this as a problem mainly of the other world, of the third world. We have a great deal of that resonant in our own country, and its total magnitude is something we do not properly understand except that we know it is much larger than we had ever thought possible, even a few years ago.

There are some other avenues of clinical investigation that have given some yield, but not very much. We know that virus infections influence the normal development of the brain. We know that early rubella is a particular hazard and we've begun to do something about it. But I don't think it could be honestly said that we're in any better position today than we were 10 years ago in elucidating the actual mechanism by which this virus infection, differing from others, impairs brain development. We have simply not reached fundamental issues in this field although, through such a straightforward development as the development of vaccines, we may be in a position to achieve

considerable practical progress in prevention.

Now I don't suggest that we just sit and wait while the experimental laboratorians develop their tools. A great deal of factoring out of rare but specific and identifiable syndromes has been done in the field of mental retardation, and we can approach these at a phenomenological level even if we don't understand the exact mechanisms of action. And new syndromes, new amino acid metabolic failures, and other biochemical alterations are and should be picked up and examined -- and examined closely -- new ones, every few weeks. They are statistically individually not very important. None of the new ones is likely to represent more than a very small percentage of the inmates of a hospital for mental retardation. But each syndrome that we begin to understand at its biochemical roots gives us some hope for some fundamental knowledge of the entire process of mental development.

Some of you may quibble that I'm mixing in a bag of neurological syndromes together with those of mental retardation. If I were to bring in a Tay-Sach's disease, and the recent discovery that a specific enzyme deficit is involved in the accumulation of storage materials in the nerve cells of these infants, some of you may say, "well, that's a neurological problem -- not one of mental retardation." So be it, if you wish. But that, I think, is going to be characteristic of every advance that's made in this particular field - - that when we begin to understand the mechanism of a failure in mental development it will clearly always have to do with the development and function of a particular organ in the brain that belongs to the nervous system. And it's very much our job to continue the translation of the problems of mental retardation into those of neurology. And one of the creative aspects of the organization of this Mental Retardation Center is the unification of disciplines -- the bringing together of neurology, biochemistry, pediatrics, and psychiatry under some common leadership and intense communication, which is a very positive trend and, I would say a little different than what has been going on in the last

years.

What are some of the tools that the basic scientist, myself speaking in a defensive mode, might point to as in the pipeline? I have to give the greatest emphasis to the means for studying the protein metabolism of the brain. And this has to do with every stage from the assimilation of amino acids and their metabolism as low molecular weight metabolites, to the mechanisms of assembly into the formation of proteins, and, particularly, to the regulatory mechanisms that determine when which aspect of the genetic code are going to be translated into specific protein products.

Ten years ago we knew there was a genetic code but we didn't know what it was. We had a rough idea that proteins were assembled under the impetus of information from the sequence of nucleotides in the DNA. During that 10 years we have worked out, in very considerable detail, what that process consists of -- and we now have one important piece of the armament in examining the operation of this process in the brain itself. It's important to further research on the culture of brain cells, and I won't quibble with whether they're neuroglia or neurons. Each of these classes themselves may have greater importance in some mental retardation syndromes. It's important that we pursue the study of the morphogenetic factors that determine the growth of the brain as morphogenetic factors determine the growth of every other organ in the body. Recent studies on a rather specialized hormone, the nerve growth factor, are not less interesting for mental retardation research because they happen to affect mainly the development of sympathetic ganglia and have no very obvious function in the later development of the central nervous system itself. They represent a model system that's the best we have at the present time for the regulation of the growth of nervous tissue and, believe me, a mental retardation syndrome is going to be found, if it has not been already, that reflects some aberrations in just this factor, not to mention thirty or forty thousand similar factors that will be found when we get around to looking for them. The typing of RNA, particularly of



messenger RNA, is in it's infancy, but these are the immediate products of the genes and they represent the most incisive approach that one can visualize for determining the actual content of the DNA neuron (or of any other kind of cell) in scanning for genetic deviances the source of various syndromes.

I don't want to neglect grosser physiology. There are very complicated issues of the regulation of fetal blood supply. They are patently of the greatest importance in actual outcome of pregnancy and they are issues about which we understand very, very little. If you dispute that please explain for me such a simple phenomenon as the fact that the birth weight increases with further pregnancies in man. It is a very common observation, indisputable on a clinical basis, and to which no really satisfactory explanation has been produced so far. Second and third babies are heavier than the first one.

Well, I'll come back again to the issue of maternal nutrition in biochemistry as being the most vulnerable point of application of a large ensemble of already available biochemical knowledge that's just crying out to be applied in more detail for prognostic, diagnostic, and therapeutic advantage -- and about which we know surprisingly little, once you start getting into it. I'm particularly provoked by an observation (which I must make some apologies for because it is not very well documented) that John Churchill, now at the NINDB, made in testimony before Senate committee. He's probably published it again since, elsewhere. This comes from the very productive and very extensive survey of perinatal diseases that has been conducted as a cooperative project under the auspices of that institution for the last six or seven years and which has involved a prospective study of up to about 50 thousand pregnancies. Unselected with respect to the likelihood of a deleterious outcome, these pregnancies were rather closely monitored. The children were watched closely as they

came out and they have been examined serially -- and, of course, 3% of them have come out definably in the category of mental retardation. He has verified that there is, indeed, a correlation between intellectual outcome measured in early tests for IQ and the mother's blood amino acid levels. Again, corroborating that part of the story which can be contributed to maternal nutrition. But the provocative observation is that they were surprised to find these variations in blood amino acid levels. They were not obviously correlated with dietary problems, or with deficiencies in dietary intake as perceived by rather crude observations of this point. This suggests that there may be more insidious and more subtle variations in the ability of diverse people, particularly in combination with other environmental insults, for the utilization of their diets than is customarily recognized. It very much needs to be followed up. If it's true, we have to shake out our whole conception of adequate nutrition from top to bottom.

There may be genetic factors involved in the efficiency of assimilation. I'm going to make a few remarks about some problems of race genetics in a few moments and I must say that my own general outlook on this question was very profoundly shaken by the observations that were first reported three or four years ago which have been amply confirmed by a variety of others about racial differences in the utilization of lactose by adults. It looks as if Caucasians are rather unique -- and a minority of the peoples in the world in being able to use milk sugar as a source of caloric energy as adults. There are a number of rather rare genetic diseases that afflict infants -- and the pediatricians have known about for a long time -- that are manifest as deficiencies in intestinal enzymes and disaccharides including those for lactose. But this is not what I'm referring to. I'm referring to the fact that most blacks, most Orientals, and, I was told by an avid digger of Science News, Mr. Nelson from the L.A. Times, most American Indians are incapable as adults of utilizing milk sugar. This has some obvious

consequences for just how much good one does by distributing surplus milk powder to peoples of non-white races, when they suffered rather poorly. This is surprising for two reasons. One, that an observation of this kind, as elementary as this, that adult black and adult Chinese will often get diarrhea from a large dose of milk, as contrasted to whites, should have lain unobserved for such a very long time. I have not done my own investigations to the point, and every now and then I wonder whether it can really be true. But here have been four or five independent studies on this point, and there have been enzyme assays for the production of intestinal lactose of a very direct kind. It's very easy to do indirect tests by lactose tolerance tests and no one has reported a deviant result. It's something like 90%-95% of American Negroes have this failure of assimilation and fewer than five percent of American whites do so. Besides my surprise at it's having lain fallow for so long, I'm also surprised that there can be, with respect to a gene of serious biochemical consequence, something more than a merely statistically significant difference along racial lines. I think we have to start from this observation to ask again a number of objective questions about biochemical differences among racial groups. I do not suggest that they are necessarily all important and I certainly do not suggest that they necessarily all point to an advantage for one racial group versus another. But I think the lactose story cannot be denied as a rather neutral example and I think we simply have to look into it again or we'll be applying the wrong kind of medicine, the wrong kind of nutrition, and the wrong kind of public health to the majority of the peoples on the earth based on the wrong premises with respect to some of the biochemical differences that may be distributed among such peoples. If a difference in the utilization of lactose can have been buried for all this time, there is no other dogma about nutrition that I do not suspect on very similar grounds until it has been explicitly and directly examined. There is a surprising dearth of information about such matters as daily nutrient requirements for

other than standard WASPS as experimental subjects in our nutritional studies.

Well, plainly for mental retardation research to continue in an intellectually inspired and productive way it must maintain the closest and aggressive contact with other surrounding fields. I was very glad to see Dr. Zamenhof in the audience, hi Steve. It reminded me of an experiment I remember hearing about at the time it was done in 1941 and I remember very well thinking, and it was rather arrogant, (I was a Freshman in college at the time), that was really mad. Dr. Zamenhof's experiment was to look for the possibilities of a hormonal influence in the rate or extent of brain development in rats and what a foolish thing to do. He injected human pituitary growth hormones into pregnant rats and claimed the report that the rats from the treated mothers had larger brains and behaved more intelligently than did the controls. Except for the fact that two or three other groups have repeated and corroborated this experiment, and he has done it again himself 25 years later, and has been building the technical apparatus needed to document this sort of result in an extremely objective way, I would never have believed it. But I think it's true, and I think it's an extremely important finding, and I think it's one that ought to be a lesson to those who require a detailed rationale for the examination of the effects of substances of high biological potency when in fact we don't know very much about what they're doing in the first place.

The other zone of confrontation with other disciplines, as represented here, is the use of quantitative measures of DNA content of a brain, in verifying that the nuclei have the expected normal DNA level as a method of being very sure that you know how to count brain cells. This, by itself, is a technical advance of the utmost importance. I find it difficult to overestimate how important it will be, and I can do so only in the light of the awareness that I hope I can share with you of how little we know

about the most elementary parameters of brain growth in the normal human being. I do not know within a factor of 30% how many brain cells I have -- and I do not know within a factor of 50% what the relationship of that number is to the ones that I had when I was born. And I certainly do not know which ones were important, and where they are, and how this can be distributed among different individuals. It's often said that most mental retardation syndromes are associated with no morphological changes in the brain whatsoever -- that they must, therefore, represent functional differences. I'll be willing to bet a dollar with any or all of you that we're going to find numerical counts of neurons, when it can be properly done, as a productive method of finding organic differences in brain defects in a large number of such syndromes. We just don't have the tools to do it at the present time. When we say there is no structural difference, the statement is really that we have not built the tools to find it.

Now of course one of the most serious impediments to serious research in mental retardation is that we do not have a good animal model. We cannot compare the intellectual function of the human brain with that of any other animal. We are born more plastic, less mature, and less differentiated than any other species that we can refer to, and there is, therefore, only a limited relevance to those effects that can be demonstrated in animals. I think it works mostly in one direction, an influence that can, in fact, be shown in an animal brain is very unlikely not to have an even more pervasive influence in man. But we can be confident that since human intelligence has represented a further evolutionary step (and I say that without blushing) and is, therefore, also a further developmental step over the development of the brains of lower animals, that there are many new processes involved in human mentation subject to interference in ways that we will have no way of examining in the mouse. We see very good examples of this in other fields which may be more familiar to many of you. For example, it is difficult to set up a good

model for the effects of marijuana or LSD on animals other than man.

I'm not advocating that we look into brain biopsy as an experimental approach, although I suspect that there is more horror than objective consideration might warrant on this. We cannot get the patients' permission to perform an operation of this sort when we're dealing with mentally retarded children -- and we must give the utmost respect to those considerations of human dignity and human rights. But I do want to point to another resource which is only partially utilized at the present time and that is fetal material from abortions. Both from abortions for therapeutic indications, having nothing to do with mental retardation that can provide some of the baselines for the development of the normal human brain and, in the present context even more particularly, those abortions that can be done legally in this state because of the impact on the mental health of the mother of the foreknowledge that a baby will be born deformed. But there is a side advantage to the performance of therapeutic abortions on this indication and that is access to the fetus itself at a prehuman stage of its existence but where there may still be some promontory signs of what will go wrong. For example, it is a tragedy to let any Down's syndrome fetus go down the drain when it has been aborted on the basis of a prenatal diagnosis of chromosome defect. That brain, and there are not going to be very many of them available in condition for experimental investigation, can be absolutely invaluable for learning what it is that goes wrong under the impact of this chromosome defect, and in a way which respects our concerns for human rights and human dignity, as is not possible after birth. This opens up a rather general territory of very great interest and concern, the establishment of banks or libraries for the preservation of crucial genetic information. These are easily preserved in liquid nitrogen, cold storage, well enough that one can resuscitate tissue cultures from tissue specimens. I do not lay out the hope of resuscitating the intact organism, but a few

cells do survive and well enough to be able to be used as seed inocula for growing out examples of a wide variety of genetic defects. And it's particularly those defects about which genetic basis we do not yet know that we need the widest repertoire of material for further experimental investigation. So I do put it as one charge to a Center of this kind, which should have extraordinarily good facilities for this type of tissue work, to look to the organization of that kind of repertoire.

Our tools are very crude. We don't want to wait. But mischief is often the work of idle hands. I think we can see what is possibly a good example of this in the speculations that have become very newsworthy in the last year or two about genetic differences with respect to intelligence among the races. This is an issue, let me say at the outset, about which I believe it is impossible to make a scientific decision. We simply do not have the objective scientific tools by which we can unravel the possible, that's even plausible, genetic differences among races that might bear on brain development for better or for worse, on the one hand, and the environmental impact, which is something not plausible, but actual, that's sitting right in front of our eyes and one has to be multiply blind not to see it. The fact remains that there are pretty good statistics about performance on IQ tests, about reading accomplishment in schools, and we do face an extremely serious national and, very often personal problem, about the acculturation of black groups into our society through the most vital route of teaching in the schools, of learning to read effectively, of staying on the ladder of academic accomplishment, of being able to compete within the framework of a white-dominated society, at least for such a period of time as society has to offer the economic and material goods that are necessary for the further upbuilding of all people. That, I think, we have to take as a fact and there's no blinking at it. We are in serious trouble in our academic systems if we're talking about population comparisons of the blacks in this country, as a whole, with the whites in this

country, as a whole. I will allude to Professor Arthur Jensen of the University of California at Berkeley who has worked very hard to bring the issues to the attention of educators and psychologists, and has, undoubtedly, played into the hands of the press into making an explosive issue out of these kinds of genetic attributions and investigations. What I have to recommend to you is that you read not Joe Alsop or Newsweek, nor be content with my comment on what he has had to say. Let those of you who have enough interest in this question to react to the issues as they have been raised in the newspapers, read what he himself wrote in an extremely interesting, sometimes irritating article in the Harvard Educational Review, for winter of this year. There's further comment in the Spring issue. It has been reissued as a separate publication by the Harvard University Press, and should be rather readily available to you. In many respects, Dr. Jensen personally is a victim of the commentators who have read much more into his writings than he himself is willing to admit to. But I think he's also a victim of his own academic objectivity and aloofness, and I think he's a victim of his sense of need to react to the essential total neglect of the issue of genetic differences by psychologists and by educators. In the course of that reaction I believe he has made a number of overstatements. There are, in fact, a number of inconsistencies -- and when he's in a reactive mode, I think you'll readily recognize it. I think that when you see him in his more thoughtful paragraphs that you'll find a great deal that he has of interest to say.

The main thrust of Jensen's discussion has had directly very little to do with the question of race difference. And he himself has done no work on the genetics of race difference. In fact, he has done no genetic investigations at all. But he has made what I must state to be a very penetrating and articulate and beautifully summarized review of the existing literature on the heritability of intelligence among whites. He is the first



to stress that we cannot casually or correctly transfer any of the conclusions that have been reached about heritability within the white cultures to the question of the difference between the races. But he comes back to that again later, and I will too. He also spends a great deal of time in what I think should not be necessary, namely, that there is some possible a priori plausibility to the idea of genetic differences among races. I think this is an issue about which one has to look for evidence and there's been no good evidence one way or the other on this particular matter. It's exactly as plausible as any hypothesis is when it enters an arena where there is no evidence one way or the other.

Racial differences in physiognomy and pigmentation -- the trouble is we don't have the tools for an objective investigation and one may correctly ask why you bring up the question at that stage. The studies of heritability of intelligence depend very largely on examination of twins and correlation between twins. The paradigm is to find a pair of twins, these are monozygotic twins which, by definition have identical heredity, and to look for twin pairs which have been separated at birth, or soon after birth, into presumably randomized environments, and to look into the question of the difference it makes when one can compare the similarity of twins reared together in what is presumably a common environment with the disparity of twins reared apart in what is presumably a randomized difference in environments. One can, if one assumes that a pair of twins shares their common heredity but shares nothing else in common (any more than any randomly chosen pair of individuals) calculate a statistical parameter called the heritability. And the heritability in studies on white populations is, I must say, extraordinarily high. It varies in different studies from being something like 55% to something like 75%, and that is to say that, if the assumptions are correct, that about 55-75% of the variance in IQ performance among whites can be attributed to differences in their hereditary endowment, and the remaining percentage can

be allocated to differences in their environmental exposure or the interactions between the two. The geneticists have been aware of these studies for the last 20 or 30 years. They all agree with one another. There has been very little doubt in geneticists' minds about these issues as facts. What's new in the present situation is simply that Jensen is a psychologist and he's talking in a very different arena to people who have been accustomed to a very different view of the origins of human development. Geneticists have also criticized these findings. There is one major premise, namely that the twin pair is subject to nothing else common in its experience besides its heredity and we know that there are aspects of the prenatal environment that it also shares. We know that if one of a twin pair has been exposed to a virus infection, the other one is likely to have been; if the maternal nutrition is bad for one twin, it's likely to be bad for the other; if the mother is producing an RH antibody reaction to one twin she surely will be against the other; if her uterine blood supply is constricted, they're likely to be correlated between the two. And the more we look, the more we see that which we had not perceived earlier -- prenatal influences, and the possibility of a considerable element of common prenatal environment, rather than genes, have to be factored into your definition of what you mean by heritability.

Nevertheless, these figures are extremely impressive. You can't do another thing with them besides say this is the heritability. We're not in a position to identify specific genes, and it's not at all obvious what particular useful element of social policy has been or is likely to be influenced by this information. Professor Jensen is so impressed by the statistics of difference in IQ performance among groups, and he is the first to stress the group difference as against the issues, moral and political and social and scientific and individual difference, that he is easily willing to attribute the one standard deviation of depression of average IQ among blacks

as a genetic difference of the same sort for which there is some evidence operating between social classes in the white culture. He puts this forward as a speculation and he says that once. I think what's confusing about Jensen's presentation is that the emotional thrust of his argument is not congruent with the intellectual. He has a number of carefully specified reservations about the validity of this extrapolation, and one must read those reservations, and one must respect them when he points to them in the course of argument. But the rhetoric and the overall drama of his presentation is directed in another direction. And you have to be careful to read exactly what he says, not what you think he might have said as a hasty impression of the total output.

The fact is that this speculation is a legitimate one, scientifically viewed. It's not supported by any particular evidence and it would seem to be contradicted by the evidence of our eyes in the examination of environmental differences between groups of blacks and whites. He has attempted to repair that, and I think one must respect these efforts to factor out specific components of environmental differences, although I think he has reached the wrong conclusions. And he has asserted, as his only personal research contribution on this subject, that, even after normalizing control and experimental, or control and black groups, with respect to socio-economic status, with respect to indicators based on income and fathers' occupations and fathers' educations, he still finds striking differences in school performance. I think that's an extremely interesting datum, and I think it's one we have to ponder about a great deal. But it doesn't begin to prove its point. All it does is say that there again it should be manifest to anyone who has looked at it at all, that there are still many environmental insults that are correlated with the black subculture that are not controllable by a superficial examination of income, education, and occupation.

Then the challenge begins to be on the other foot, and I think this is an arena to turn the question right around for the most interesting social investigations to some very useful and relevant purpose. What is it exactly -- not in general, not the total picture (we know it's bad), but what are the specific components of the black environment that are retarding the intellectual development of so many black kids so that the average performance is a year behind at the starting of reading and two and three years behind when it's finished. One way to look at it is to look at the black genius of which we have many examples. What made the difference in the production of these extraordinary individuals so different from the kind of picture that's painted by the broad statistics that are established here. Now one might say, "let's not horse around with that." One might be very impatient, and say, "let us wipe out all social and economical differentials immediately and that will be the answer to the problem." Of course, I advocate doing it -- but I don't know how and I don't know which of the first steps to take until we can factor out the critical considerations so that programs like Head-Start can be translated into something about which there will be absolute unanimity as to their effectiveness, instead of the general ambiguity that there is at the present time.

My own personal view, and it is just a speculation that I can support from no evidence, is that the central issue is alienation. That it is the conflict between the races; that it is the disparagement of white for black, and now of black for white; that it is the closing-off of opportunity by that whole apparatus that we call institutional racism; that it is the discouragement before you even get started, by the unwillingness to truckle to white society and all the rest. This should not be misunderstood, as it sometimes is, as a lack of motivation to take a test. This might be understood as a lack of motivation to attempt to learn the things that are relevant to passing the test that admits one into our advanced society.

The action that we can see, again very plainly, (I don't see how there could be any doubt about this) is to stop dropping out, and to stop it by any means whatsoever. For whatever reason, the child has dropped out of school, whether actually by having left it, or defacto, by not being really part of the educational process because of his and his teachers' mutual alienation, represents an enormous cost to society. And I can think of no place to better begin a program of the guaranteed floor on income than with the student. If we are to channel resources that are not infinite in availability, we have to make some priority decisions. Keeping the child in school, in some way directed towards some productive outcome, has to be our firm aim. That's a philosophy very similar to that which has pervaded approaches to humane care of the institutionalized mentally retarded. We have learned that the sheltered workshop is a step in that direction. We have learned that every struggle to keep the retarded and the handicapped in some contact with the mainstream of society pays back many times any investment that we can give.

Thank you for your time.