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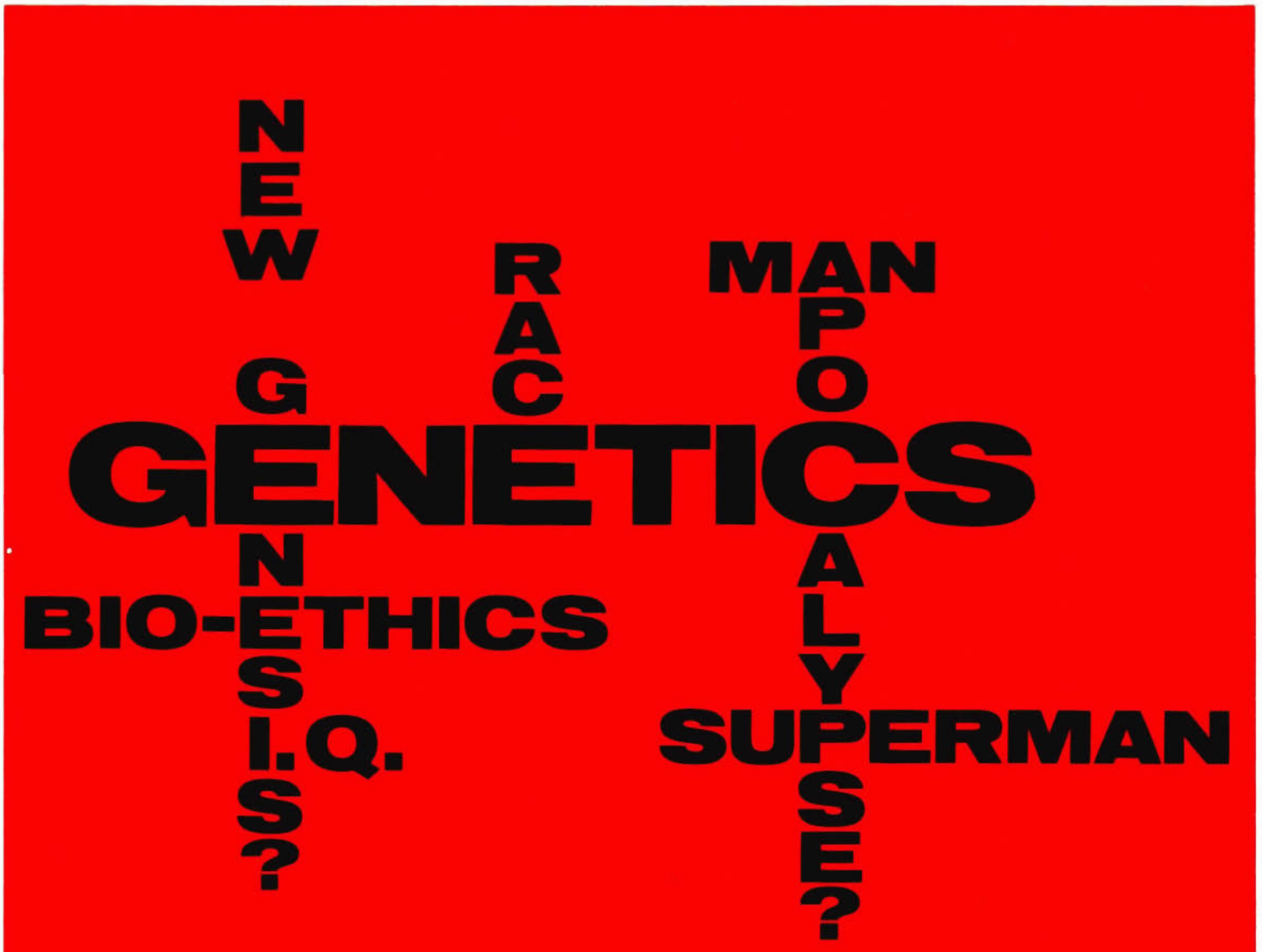
An evangelical perspective on science and the Christian faith



"The fear of the Lord is the beginning of Wisdom." Psalm 111:10

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JOURNAL OF THE AMERICAN SCIENTIFIC AFFILIATION

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An Ethical Evaluation of Biogenetic Engineering

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The Ramm Defect

In his article on the "Prenatal Diagnosis of Genetic Diseases" Dr. Friedmann[1] tells us that there are 1600 diseases traceable to genetic defects. May I add one more. It is the Ramm defect. It is a defect which prevents a person from saying "no" to a request beyond his education, experience and competence.

Some unknown biologist describes it (by anticipation) as follows,

> Oh chromosomes, my chromosomes,
> How sad is my condition!
> My grandsire's gift for writing well
> Has gone to some lost polar cell
> And so I write this doggerel,
> I cannot do much better.[2]

If I knew when I was asked to discuss this issue what I know now, I would never have accepted the request. The more I read the more impossible seems the task. Many times I wanted to send in a letter of resignation but I was restrained by Christian charity. I knew that I would be hanging the weight of the dread anchor on some other dear Christian's neck.

Purpose: To Propose Ethical Guidelines

My purpose was to read the literature on the subject, to attempt to sort out the ethical issues, and to propose some guidelines of an ethical nature in the matters of genetic engineering – the latest of the scientific explosions.

I make no pretense of being a quasi-doctor or quasi-lawyer. The technical details, statistics and mathematics of the subject can be learned from the informed literature on the subject. My specialization in this issue is in ethics. I have never delivered a baby. I have never seen genetic materials through a microscope. I have never tried a case at law. My practice of surgery has been limited to extracting slivers from the hands and feet of my children.

When I read the genetic materials, I had one aim in mind: what were the ethical implications of what was

being said? When I read an article, I would ask myself: "What are the writer's ethical presuppositions?" "What criteria of an ethical bearing is he using to sort out the right from the wrong?" "What ethical imperative dictates his conclusions if he makes such conclusions?" It is this sort of specialized reading of the literature that gives me the confidence to write this paper.

The most difficult part of my assignment was that the materials on genetic engineering were so heavily loaded with factual material, and so little with ethical issues.[3] Perhaps ethical opinions about some specific procedure were expressed but we are far more interested in broader ethical theorizing. For the most part it was left for me to do the ethical diagnosing or interpreting. This involves risk and I simply had to take the risk. There is also the dilemma of bibliographical materials. *Time* magazine reported in a recent issue in its essay on man that in a given year 25,000 books on science were published and 1,000,000 articles.[4]

A Basic Cultural Shift Concerning Genetic Defects

The first major fact that I encountered as I started reading the materials is that a major cultural shift has taken place in our society in the past century.

In my reading of the sermons of the nineteenth century I found that the general prevailing opinion about defective children was that God had sent them to us that we might learn the lessons of grace (Calvin had said earlier that God sent us idiots from time to time that we might thank him for our reason.) The care, the labor, the money and the love given to a defective child were to teach us how God loves poor, needy sinners. Our care of defectives, whose whole existence depended on our sacrificial care, would enable us to grasp with some depth the meaning of divine grace for helpless and guilty sinners.

This kind of mentality has not ceased to exist. A very lucid illustration of it can be found in Dale Evans Rogers' book, *Angel Unawares*.[5] In this book she relates how she, her husband, and her other children learned depths of compassion and love far beyond them if they had not cared for a defective child.

In the mid-twentieth century married couples have come to look at defective children as a heavy burden. They are apprehensive of the implication that there was "insanity in the family." But even more. The care of such a child interferes with their social life as well as their vacations. Besides the special hours of care and energy spent, there could also be hundreds of dollars of medical bills per month. They also read of the damage that a defective child could have psychologically on the other children of the family. Hence a defective child is no longer looked upon as a lesson through which we learn of God's mercy and patience with sinners, but as a terrible burden on one's time, a severe limitation of one's social life, and a heavy strain on the family's financial resources.

The proof of this transition in mentality is substantiated in genetic counseling.[6] One of the most significant things to inform parents who have had a defective child is the statistical possibility of having a second such child. The figures vary with the nature of the disease so they may run from 1 out of 4, to 1 out of 400. Surprisingly the most important factor in the minds of couples with regard to having another child is not the statistical possibilities but the sheer bother of having a defective child. Stated another way this means that the prime concern of the couple being counseled is the nuisance potential of another defective child.

In the mid-twentieth century married couples have come to look at defective children as a heavy burden.

Why Ethical Guidelines are Difficult to Formulate

Most of the definitive original statements about medical ethics have been made by Roman Catholic moralists prior to the time of our current detailed medical information. A moral rule without adequate factual basis can be a very mistaken one. Our first task is to unburden ourselves from decisions made in the past without adequate medical knowledge.

General moral virtues such as wholeness, love, "the good," or redemption are difficult to translate into the specifics of medical ethics. Two Christians dedicated to the same ethical virtue may arrive at opposite conclusions.

It sounds as if this next observation contradicts the previous one but in reality it does not. Medical ethics is a special case of ethics. Ethics in turn emerge out of one's total outlook on life. Hence to have a system of ethics one needs first a philosophy; from this philosophy one proceeds to construct his ethics; and from ethics in general one goes on to medical ethics and finally to genetic engineering. We have been asked to fill out a questionnaire (*Journal ASA*, June 1974) with several specific items. The list of questions gave me the impression that the Christian was to attempt to find the Christian solution for each question as he worked his way through the questionnaire. My point is that a really comprehensive Christian view of life and reality is required before one is able to answer the particular questions.

The speed of the acquisition of new knowledge poses a very difficult task for any person working in the field of ethics. Scientific knowledge is supposed to double every five years. On the other hand, moral principles and systems of values take decades and centuries to pound out. A new breakthrough in science may come overnight. A moral evaluation of the implications of the breakthrough may take a century to mature. With the principle advances in genetic engineering hardly a decade old, the ethicist simply has not had the time to think through all their implications.

Our American society is becoming increasingly pluralistic. The more pluralistic a society becomes, the smaller becomes the common ground to which appeal can be made for ethical decisions. This "paralysis of pluralism" spills over into medical and biological ethics and makes it difficult to arrive at common ethical interpretations.

Our society has no methodology for resolving the very difficult nest of ethical problems our technological explosion has produced. This technological explosion is felt the strongest in the embarrassing position into which it has placed medical ethics. Let us look at the ways this problem has been attacked.

(a) Leroy Augenstein reports in *Come Let Us Play God*[7] that he would present a typical problem in medical ethics to a congregation. Then slips would be passed out and a vote taken. It was not unusual to get back 80% of the slips blank! Apparently we cannot solve our medical ethical problems by appealing to the common consent of Christian conscience. Such problems are too bewildering for the lay mind to interpret.

(b) Suppose that we appeal to Christian theologians who have specialized in medical ethics. Unfortunately there is no consensus here. Paul Ramsey is very cautious and conservative; Joseph Fletcher is very pragmatic and utilitarian; and Gabriel Fackre is open-ended and wide-eyed in his medical ethics.

(c) We may turn in another direction. Perhaps we could appeal to a representative committee from the community, as if such a carefully chosen committee would represent the common moral consciousness of the community. This was done by the Swedish Hospital in Seattle and is known in the literature as "the Seattle experiment." The problem in this situation has already been anticipated. In our pluralistic society we have no common value system. How, then, can we determine who is the most valuable man for a community among a list of candidates for a dialysis machine? Is it the pharmacist who is the important link between the doctor and the patient with our healing medicines? Or is it the social worker working on healing the ills of the community? Here again we encounter failure or at least seroius difficulty in practice.

(d) Then some one approaches us from our blind side: the lawyer. Perhaps it will not be the scientist, nor the philosophers, nor the theologians, nor the priests who will write our text-book on medical ethics, but the lawyers.

As seen in Michael Hamilton's book, *The New Genetics and the Future of Man*,[8] and in *Should Doctors Play God*,[9] edited by Claude Frazier and Morris Fishbein, the lawyers have already entered the discussion. The suggestion now comes that the new medical ethics will be worked out in hard cases at law.

Germain Grisez has written the most thorough book on ethics and abortion in recent years,[10] (*Abortion: The Myths, the Realities and the Arguments*). He has made the most thorough investigation of the decisions of courts, especially about the legal status of the fetus. He has found that the general trend of the law is to treat the fetus as a legal person and not merely a piece of tissue in the mother. My point here is not to settle anything about abortion, but to show how large a role the courts play in settling matters of medical ethics.

A new breakthrough in science may come overnight. A moral evaluation of the implications of the breakthrough may take a century to mature.

Recently we have had the Supreme Court itself making a decision about abortion. It did not make a mere general ruling about abortion, but set out the legal status of the fetus (by implication) during the three periods of pregnancy.[11] The point again is not to comment on abortion, but to comment on how medical ethics is being settled by courts, and not by theologians, philosophers, rabbis, priests, or doctors.

The Seriousness of Ethical Issues

Why has such an enormous literature mushroomed up around genetics and ethics? How much is at stake?

1. The public and the academic worlds respond more strongly toward developments in the life sciences because they eventually may be applicable to man, whereas there are not the same kinds of existential implication in the more impersonal sciences. The one exception is ecology; here physics and chemistry are part of man's concern because their use in industry is part of the infection of the planet upon which he must live.

2. In genetic engineering the biologist and doctor are working with the building blocks of life itself. Granted the division between our genetic cells and our somatic cells is not as sharp as once thought, the distinction still remains in a broad sense. Hence to experiment with genetic cells is to experiment with our future in a way that is not done in working with somatic cells.

3. There is the factor of irreversibility. One of the reasons scientists deplore the extinction of a species is that with its extinctiou goes the loss of its genetic materials. It brings us to the end of a line. By the very nature of genetic materials we can go down a street so far that we cannot turn around and come back.

4. Doctors can now keep alive 90% of babies born with genetic defects. This success in lifesaving leads to what is called the contamination of our genetic pool. Just as some have spoken of the heat-death of our world, others now project the genetic death of the human race through such genetic contamination.

5. There are the "weirdo" speculations about genetic warfare (drop virus dust over the enemy and so weaken him genetically that he has no will or capability to fight), cloning soldiers, geniuses or athletes (which will affect the Olympic Games!) or modifying men so that we can have legless astronauts, etc.

6. We should do all we can to eliminate as many as possible of the approximately 1600 genetic oriented diseases. By amniocentesis we can detect at this point (according to Dr. Friedmann) about forty genetic

diseases; we must seriously face what this means for the current practice of medicine.

7. Genetic counseling is one of our newer specialties. Fewer defective children will be born the more expert genetic counselors we have. If I interpret the nature of sickle cell anemia correctly it would be eliminated by expert genetic counseling with no recourse to abortion.

Alternative Ethical Systems

The literature soon made apparent to me that writers in the fields of genetics and medicine were making ethical decisions based on a larger ethical system. For me, then, the issue was to attempt to locate and define these larger ethical systems. The systems that I present are to be seen more as programs or policies rather than as a set of tight ethical rules. To some measure they overlap and for purposes of communication I have given them labels. Some scholars consider a label a libel, but I felt for the purposes of clarity I would run the risk of this criticism.

Theory I: Person-centered medical ethics. Each patient is a person before he is a patient and when he becomes a patient he is still first a person. He is a unique center of values and must be so respected. If he becomes only another case, another bed or the unwitting subject of experimental medicine his dignity as a person has been violated. All biological and experimental and genetic work must be done within this framework. (Ramsey. Kass).[2]

There are five reasons why person-centered ethicists think the way they do. These five reasons are also criticisms of the utilitarian view which we review next.

1. They are apprehensive of the amount of unannounced medical experimentation that is taking place today in medical practice. This raises the problem of consent, which is one of the stickiest in medical ethics.[13]

2. They are still apprehensive of the terrible abuse of medical experimentation by the Nazis – a paradigm of what may happen whenever the state makes the rules in medical ethics.

Recently it was suggested that each baby be tatooed with his social security number in his arm pit upon birth as his permanent identification. The arm pit was chosen, as in all kinds of accidents that part of the human body was most likely to survive destruction. The protest of the Jewish doctors present was immediate and forceful, for still strong in their minds was the Nazi practice of branding people with numbers on their arms.

3. They are very apprehensive of the recency of the major advances in genetic engineering–most from the 1960's–and therefore the tentative character of our knowledge. We are in no position as yet to have any sort of policy or program in genetic engineering for the masses.

4. They are very apprehensive of a certain amount of double-talk in the literature. The word "therapy" is used many times when it is not therapy at all. To eliminate a person from existence is not therapy! For example, an abortion, no matter how well it may be justified, is not therapy. The notion here is that certain practices may not be contested if called "therapy," but might be if more accurately labeled as "feticide."

5. The theological wing of this school believes strongly that Genesis 1-2 set out the pattern in which our true humanity is discovered and realized. It is in the male-female, husband-wife, and parent-child relationships in which we realize our humanity. Our humanity is destroyed and not established in the world of test tube babies, plastic wombs, frozen embryos and computerized ovum and sperm banks.

In our pluralistic society we have no common value system. How can we determine who is the most valuable man for the community among a list of candidates for a dialysis machine?

Theory II: Utilitarian medical ethics. Utilitarian is not used here in a pejorative sense. Rather, it is the best description of the general policies governmental agencies follow in matters of public health. The health of a large population cannot rest upon personal choices. We do things on the principle of the best possible good for the most number of people. Rules of immunization, sanitation, purity of food, and control of drugs are all city, state or national policies. This is the only way we can live together in safety and freedom from plagues and epidemics. Therefore in that we are all part of the one human genetic pool such matters of medical decision should eventually be made on a utilitarian basis as they are with infectious diseases.

I register this as a dominant mood in the literature although I cite no names. However it was the implication of numerous articles and books, although the authors might be startled to know that in essence they were arguing for a utilitarian ethic.

For example, one segment of Jewish descent suffer a high incidence of Tay-Sachs disease. Deterioration and death occur within four years in infants so affected. As far as I could ascertain in my reading, all Ashkenazy Jews wish that they were free from this disease; this is a utilitarian judgment.

Or all blacks could wish that sickle cell anemia could be eliminated from blacks in America. In fact some extremists have charged the practice of medicine by white doctors as a form of racial genocide in their ignoring of sickle cell anemia among blacks. The black desire for the elimination of this disease among all blacks is a utilitarian judgment.

The logic follows, then, that if 1600 of our diseases are of a genetic origin, there should be some sort of law that helps to reduce that number. Further, the more extreme of these diseases of genetic origin cause such suffering, demand so much money and care, and require so much personnel for maintenance of life, that some sort of across-the-board law should exist for the decrease and at best elimination of these severe diseases. We are all together in the human genetic pool. Hence only a ultilitarian ethic is adequate to cope with the problems.

Already Denmark has adopted the utilitarian ethic: no couple in Denmark with a serious genetic defect in their heritage may marry without sterilization. The beginning of a genetic, utilitarian ethic is found in the U.S.A. in states like Massachusetts and New York which have a mandatory sickle cell anemia test for children entering their school system.[14]

There are two opposing points that should be made with respect to a utilitarian ethic. First, does the very nature of genetic diseases (being involved in the reproductive process) keep the ethics of practice of our genetic knowledge forever in the personal dimension? To many the obvious answer is "yes." Second, if genetic diseases do affect the total genetic pool, and if way down the line we may even dream of the genetic death of man, does not this demand that to some measure our ethics about genetics be utilitarian? Those who believe that as we eliminate infectious diseases and other diseases that kill especially children, we also materially increase the incidence of genetically originated diseases, will say "yes."

Theory III: Utopian or Futurologist medical ethics. Given enough time with the growth of our knowledge of genetics we may eliminate most if not all of man's genetically caused diseases. Furthermore, we may use this knowledge for the continuous perfection or use of the human race. (Gabriel Fackre, A. J. Muller, R. L. Sinsheimer).

A. J. Muller has written in most technical detail of the continuous contamination of our gene pool. Although he does not have the dreams that Fackre does, he does believe something remedial must be done to preserve the relative purity of our genetic pool.[15]

In glowing terms Sinsheimer projects a genetic utopian future:

> We now glimpse another route—the chance to ease the internal strains and heal the internal flaws directly—to carry on and consciously to perfect, far beyond our present vision, this remarkable product of two billion years of evolution. We are, it is true, very young for this task—young in skills, young in wisdom—but also fortunately young in heart.[16]

Gabriel Fackre has written many articles on man's genetic future, characterized by "futurology." This is a new mood in theology called neo-optimism or even neo-postmillennialism. According to Fackre, God has turned the universe over to man to subdue it. This means to Fackre not only to clean up crime, poverty and injustices, but to do miracles with our new genetic knowledge. He operates with the categories of liberation and *shalom*. Among the many things meant by liberation is liberation from all genetic defects. By *shalom* (the Hebrew word for peace) he means wholeness, richness, and the healing of defects. If man is guided by *shalom* in his genetic engineering, he will not do the terrible things the Nazis did. Fackre has written much more on futurology, science and genetics but we cannot give his views more space.

Both Christian and non-Christian are slowly coming to the conviction that the supreme norm in ethics is the quality of life and not the sheer fact of life.

Utopian ideals indicate that genetic engineering is concerned not only with clearing up problems of health and disease, but also with those speculative and positive things it might do. We may gradually increase the "intelligence quotient" of the entire population; we may breed a man with more moral and artistic sensitivities; we may clone geniuses by the dozens and accelerate science, or art, or whatever we wish. It has already been prophesied that the Olympic Games twenty years from now will reflect genetic engineering to produce better athletes. Cloning may also solve the problem of tissue rejection in transplants. Perhaps we shall solve some of our pressing problems in the area of aging. The greatest achievement of all was suggested by a theologian, no less, who said that we should locate the gene which carries original sin and knock it out with a laser beam!

Fackre faces the issue raised by Ramsey about Genesis 1-2 and the meaning of life. He thinks there are many ways of creating meaningful human relationships other than the Genesis pattern. Therefore the new world of genetic engineering does not disturb him at this point. We might add that the Russains and Chinese apparently consider children the ward of the state and have set up massive day care centers with minimum contact of mother and child. In time we will know if such a distrubance of the traditional family pattern is harmful or not.

Theory IV: The humanitarian ethics of scientists. It is unfair to pick out the biologists and doctors and make them special targets for discussions about ethics. They are scientists among scientists. They have their own internal control and standards. They do not torture animals. If pain is involved in any experiment it is treated as humanely as possible. If we trust physicists, chemists, and geologists, why not trust biologists and doctors? Their aim is the good of man and we may then trust them in their laboratory work and not mark them out for subjects of ethical harangues.[17]

The argument is not difficult to construe. Scientists make progress only as all options are open to them. Geneticists and doctors need this breathing room too. If society puts restrictions upon them in the name of humanity they may be doing a very inhumane thing inadvertently. A certain experiment may outrage somebody's sensibilities, but it may lead to a cure for schizophrenia. What may appear to some person as a barbarous treatment of a colony of rats may lead to the cure of cancer.

If there are 1600 diseases of a genetic origin, the genetic engineer should be encouraged in every way and not hemmed in by law or censorship.

There is another assumption which goes with this theory. In fact, the assumption may be the theory itself. If scientists achieve the cure of a disease it is then assumed that the cure is moral. If the cure is moral, then the means of achieving the cure is moral.

It could be argued that this is the history of medicine. We no longer consider the dissection of a body as desecration of the human body. When a surgeon operates on us we want him to know our interior geography very expertly. We no longer consider anaesthesia an attempts to avoid the pain from our "curse unto death". Millions of surgeries performed every year to heal bodies and save lives would be impossible without it.

In short, if the proof of the pudding is in the eating, then an edible pudding is an ethical pudding. This comes out clearly in the study of Roman Catholic medical ethics. The Roman Catholic laymen are steadily drifting towards a medical ethics which virtually says

that what cures or helps is moral, rather than taking their guidance from Roman Catholic moralists. About 100% of the girls brought up with strict Roman Catholic training will (prior to the time of their marriage) consider birth control to be wrong. After they have had five or more children, 60% and perhaps more will accept it as moral.

Applied to genetic engineering, this approach means that as geneticists rid us of our genetic diseases or greatly reduce their effects, we will consider their work as ethical. Reenforcing this is the concept that the fundamental consideration in medical ethics should be the quality of life and not the mere existence of life.

Concluding Observations

1. I think that, of the four options mentioned, the first is the most viable for most Christians. At least they are more comfortable with it. It is a general conviction that the more morally sensitive portion of our population (theologians, priests, rabbis, ministers, humanitarians, scientists) should have a larger say in medical ethics than lawyers and politicians (speaking of them as a class and not as persons).

2. I think that the medieval moralists were generally right in arguing that ethical decisions must grow out of a total worldview. Their program was right; their error was a lack of knowledge and perhaps some of the additional stuff that must go into such a total world view. Unfortunately Christians suffer from pluralism as much as society. Hence there is no great evangelical Christian synthesis today. This is an embarrassment for the contemporary evangelical, for he is as tormented about medical ethics as others who investigate the subject.

3. I think that both Christian and non-Christian are slowly coming to the conviction that the supreme norm in ethics is the quality of life and not the sheer fact of life.

This issue comes out critically in the unnecessary prolongation of life. It is more and more felt that the notion that the patient is to be kept alive at all costs is less and less capable of defense.

It also comes to the surface over the question: "When does human life begin?" Supposing we consider that to be a false question or a misguided question. There is no agreement on the issue. For the first ten days or two weeks of pregnancy there is no way of knowing whether the woman actually has a fetus or a growth. But if we ask: "What is human life intended to be?" perhaps we can get around this highly emotional question. If the goal of life is a mature, rational integrated adult, then we may say that any human life that is way off course and can never reach that goal can never fulfil what it means to be a complete human person. When medical ethics becomes passionately concerned with what is headed way off target and deciding if such a monstrous or defective fetus ought to survive, then the endless question, which to this point has defied all moralists and biologists, "When does human life hegin," is avoided.

Although the ethical content of the material on genetic engineering stresses the moral and humanitarian goals of such engineering as well as physical well-being, the emphasis comes down hard on the latter. Perhaps with scientists doing all the experimental work in this area, this emphasis on man's physical well-being is inevitable.

However it has been the contention of the Christian Church that people who suffer from illness, disease, and bodily defects may nonetheless reach spiritual maturity if not sainthood. Disease itself need not be seen as necessarily damaging spiritual self-fulfilment.

The greatest Christian drama of the twentieth century is judged to be T. S. Eliot's *The Cocktail Party*. It is a study of modern man's discontent, unhappiness and undiagnosed sense of emptiness. The solution to this spiritual disease is found by the heroine Celia. Celia finds herself and beatific happiness by the hard route of self-denial, cross-bearing, identification with the suffering of Christ and finally martyrdom. One's true humanity, identity and sense of fulfilment in life are found by the way of suffering and self-renunciation. Modern medicine unintentionally creates the illusion that a perfect genetic heritage and a healthy body are the achievement of the fulfilment of our humanity. T. S. Eliot's *The Cocktail Party* is a brilliant reminder that man treads not only a pathway of physical evolution, growth and improvement but he also treads a spiritual pathway which is governed by far different rules than the former.

Modern medicine unintentionally creates the illusion that a perfect genetic heritage and a healthy body are the achievement of the fulfilment of our humanity.

This intense concern with the physical side of man in which modern medical science (and again I believe unintentional) gives the impression that good health and the realization of our humanity are identical, is given a satirical commentary in Paul Ramsey's rephrasing of the twenty third Psalm. Ramsey wants to "blow the whistle" on those moderns who are so occupied with the problems of man's physical well-being as achieved through science as to be completely dense about man's spiritual journey. Hence this paraphrase will be understood only if the satirical element in it is grasped.

The Lord is my Genetics Counselor, I shall not want for risks.

He maketh me to lie down in genealogies; he nondirects me beside karyotypes.

He restoreth my inborn errors; he leads me in the paths of reproduction for my name's sake.

Yea, though I walk through the valley of amniocentesis or under the shadow of fetoscopy, I will fear no evils for thou, the Greatest Good of the Greatest Number, art with me; thy chromosome counts and thy enzyme assays they comfort me.

Thou preparest multiphasic screening before me in the presence of my illnesses; thou anointest my head with check-ups; my profile runneth over.

Surely mutations and heterozygosity shall follow me all the days of my life; and I shall dwell in the house of computerized biomedical information forever.[18]

FOOTNOTES

[1]Theodore Friedmann, "Prenatal Diagnosis of Genetic Disease," *Scientific American*, 225:34-51, November 1971

[2]George B. O'Toole, *The Case Against Evolution* (New York: The Macmillan Company, 1925), p. 42.

[3]For example McClearn has written a very thorough survey on the whole territory of genetics but not a line on the ethical implications of genetics. "Genetic Influences on Behavior Development." Paul H. Mussen, editor, *Carmichael's Manual of Child Psychology*, Vol. I. Third edition (New York: John Wiley and Sons, 1970), pp. 39-76).

[4]*Time*, 101:84, April 23, 1973.

[5]Westwood: Revell, 1953.

[6]Cf. V. Elving Anderson, "Genetic Control and Human Values" (Minneapolis: Dight Institute of Genetics, The University of Minnesota, unpublished paper, October 20-21, 1972).

[7]New York: Harper and Row, 1969.

[8]Grand Rapids: Wm. B. Eerdmans, 1972.

[9]Nashvilled: Broadman Press, 1971.

[10]Cf. R. J. Gerber, "Abortion: Parameters for Decision," *Ethics*, 82:137-154, January 1972.

[11]Cf. James De Borst, "'A New Constitutional Right,' The Supreme Court and Abortion," *The Reformed Journal*, 23:7-10, April 1973.

[12]Paul Ramsey is the most articulate developer of this viewpoint. Cf. his *The Patient as Person* (New Haven: Yale Press, 1970) and his opinions on cloning, etc. in *Fabricated Man* (New Haven: Yale University Press, 1970).

[13]Cf. Frazier and Fishbein, *ibid.*, pp. 83-98.

[14]One of the developments of this that is bothering the ethicist is that insurance companies have been able to get hold of these tests and feed them into their computer system. Hence the rates of patients with sickle cell anemia runs much higher. This is just more of the continuous erosion of the rights of privacy in our American democracy.

[15]A. J. Muller has written many articles on the subject. His article which stands as a kind of summary of all his articles is "Should We Weaken or Strengthen our Genetic Heritage?" *Daedalus*, 90:432-450, Summer 1961.

[16]Robert L. Sinsheimer, "The Prospect for Designed Genetic Change," *American Scientist*, 57:134-143, 1969, p. 141. One of the finest summaries of the issues of this paper will be found to be that of R. J. Berry, "Genetical Engineering," *Christian Graduate*, 26:3-8, March 1973. In it he cites Sir Macfarlane Brunett who strongly asserts that the possibility of knocking out a defective gene and inserting a healthy one is so remote that it will perhaps not happen "to the last syllable of recorded time." p. 5.

Furthermore the conference at San Diego indicated how tentative amniocentesis is at the present time. Some criminals have been found to have the XYY pattern at the sex chromosome which made them anti-social, bence criminal. But other men with the same XYY pattern are normal in their social relationships. In other cases a parent will have the same chromosome defect as the defective child yet the parent will be a normal person.

[17]This attitude is clearly stated in Gerald Leach, *The Biocrats: Ethics and the New Medicine* (New York: McGraw Hill, 1970), p. 14ff.

[18]Cited in the JAMA, March 13, 1972 and reproduced in *Bulletin of the Atomic Scientists*, p. 16, December 1972, Vol. 27.

As the reader will note my article is far more general than the specific topic of amniocentesis. The discussion at San Diego centered more on the issues amniocentesis raised than the general subject of medical ethics. Amniocentesis enables the doctor to know about the fourteenth week of pregnancy if the fetus is bearing one of the forty genetic defects which can be so detected at this time all of which may have serious effects upon the neurological system of the baby when born. Furthermore, at our present state of knowledge, predictability in amniocentesis is very low, i.e., we cannot always assume with certainty that a given chromosome pattern means that the child will actually be born with these defects. But granted all of that, the central ethical issue is whether such prenatal knowledge of serious physical defects is a new and justifiable basis for abortion. There is no meaning to doing amniocentesis unless it is already assumed that abortion of defective fetuses is morally justifiable.

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Biblical ethics recognizes three poles to the moral decision: (1) the need for as complete a knowledge of the situation as possible (contra legalism); (2) the need for as complete a knowledge of God's law as possible (contra situation ethics); (3) the need for the moral agent to act in Christian love.

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Making New Men: A Theology of Modified Man

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Revolutionary Times

You and I are living in revolutionary times. In this, of course, we are far from unique. Most ages have been revolutionary in one way or another. And yet I believe there may be a profound difference between today and earlier times. While previous revolutions have undoubtedly exerted a considerable influence on numerous parameters in the life of man, including the structure of his societies, his physical and mental well-being, and his philosophical and religious outlook, they have principally been *external* in origin. And so, although they have increased man's control over his environment and to a lesser extent over himself, and although they have served to modify man's view of himself, they have had only a limited effect on man *as man*.

There is however, a revolution currently under way with implications for man as man far beyond anything yet experienced. And this is what I will refer to as the *biological self-identity revolution*. This is just one of the revolutions in progress at the present time and yet I consider it underlies all the others and is basic to them. The biological self-identity revolution is a crisis in the life of man, stemming from the control man is beginning to exercise over his very existence and destiny as a biological and spiritual being. In other words, this revolution has its origin in what man *is* and in what he is *going to be*. If this revolution comes to fruition it may well force us to revise our concepts of man and of his role and status on this planet. This is because the man who may emerge from the biological self-identity revolution could be radically different from the man we now know.

Let me quote a few examples from writers concerned with this question.

> Coming: the control of life. All of life, including human life. With man himself at the controls. Also coming: a new Genesis—The Second Genesis. The creator, this time around—man. The creation—again, man. But a new man. In a new image.
>
> What we believe about man, what we want for man, will profoundly influence what actually happens to man.[1]

> Man, who has already learned to remake his physical environment, will now acquire . . . . the capacity to remake himself. The dust of the earth, having become conscious of the dust of the earth, will be able to recreate itself without benefit of the original creator's breath—and to recreate itself in virtually any image, thus becoming an active participant in the new Genesis.[2]

> Man himself is a part of nature, and he *is* now capable of changing the rules. It is not vanity to say that man has become like a god. Since, god-like, we can now alter nature, including that part of nature which is man himself, we can no longer console ourselves with the thought that a search for scientific knowledge is its own justification. It has ceased to be true that nature is governed by immutable laws external to ourselves. We ourselves have become responsible.[3]

> Man is already so marvellous that he deserves all our efforts to improve him further.[4]

> The development of biology is going to destroy to some extent, our traditional grounds for ethical beliefs, and it is not easy to see what to put in their place. I think that in time the facts of science are going to make us become less Christian.[5]

> Biomedical scientists are encouraged by that curious new breed of technotheologians who, after having pronounced God dead, disclose that God's dying command was that mankind should undertake its limitless, no-holds-barred, self-modification, by all feasible means.[6]

These quotations, from writers with varying viewpoints, demonstrate very clearly the concern and hope currently being expressed at the directions in which some areas of biological research are pointing. Basic to them all is the belief that man's nature is capable of radical modification, and will indeed be radically modified, in the foreseeable future. The consequences of such modification will probably be momentous for the human race, and will pose questions of major importance for scientists, lawyers, sociologists, philosophers, theologians and last, but not least, the ordinary human being.

My aim in this paper is to analyse the implications of some of these advances from the stance of one hav-

ing Christian presuppositions. I will therefore be primarily concerned with theological repercussions, and not with sociological, biological or legal consequences, legitimate as these latter concerns are.

Christians and Relevance

The reasons for my interest in this topic may be worth outlining. In the first place, I believe Christians should be *prepared to meet the future,* meaning the future in all its guises—tomorrow with its very practical problems, 1984 with its inevitable overtones of totalitarian regimentation and strict biological control, the year 2000—that climactic finale to a century of madness and chaos or the dawn of a new age pregnant with boundless, undreamt-of possibilities. And on into the distant future so optimistically depicted by Julian Huxley and Teilhard de Chardin, those mid-twentieth century dreamers of scientific humanism. And finally, into the mists of eternity, radiant with hope for those committed to the lordship of Jesus Christ, dark and mysterious for so many others. It is my contention that evangelicals have for long felt at home in "eternity", being expert at arguing out a particular view of the millenium and second coming and yet tragically uninterested in presenting a cogent Christian position regarding the social and biological problems looming over us. It is these issues with which I will be dealing here, although the more distant future encompassing the cosmic role of Christ is one which Christians should also be seriously studying.[7]

In the second place, I am convinced that if theology is to be relevant it must encompass what may be termed secular issues. As a biologist I find it distressing to turn to the theological works on "man", and find nothing of direct relevance to a contemporary understanding of man with his specifically twentieth century problems. If theology therefore is to speak to *real man,* it must delve into the issues which confront man in a real world. And it is at this point that the Christian grounded in biblical and theological principles and trained in a particular professional discipline has his specific contribution to make. He alone is in a position to enhance that wider body of theology, by seeking to enunciate theological principles relevant to his sphere of interest. It is for this reason that I have subtitled this paper "a theology of modified man".[8]

Third, and more specifically, the human race is heading at alarming speed into a totally unknown and unexperienced realm where man himself becomes the controller and potential manipulator of his own body and brain. This is where the novelty so alarmingly described by Toffler[9] comes into its own. This is where "the human body . . . until now a fixed point in human experience, a 'given' . . . . will no longer be regarded as fixed".[10] This new biology will raise, and has even started to raise, questions with far-reaching implications chief amongst which must be "what is man?" Will the old answers stand up to the assault of previously unimagined changes? If not, how may our view of man be altered, and what guidelines will be required in formulating new concepts? The contribution of Christian thinking to this debate should be a central one, indeed *must* be a central one, if man is to survive.

The man who may emerge from the biological self-identity revolution could be radically different from the man we now know.

Areas of Critical Importance

I want to deal with three principal areas of research, because it is these which are most likely to eventuate in the near future and which pose the most serious questions for the human race. These are the areas of (1) prenatal manipulation including genetics, (2) organ transplantation and (3) brain research. Each of these is well-under-way at present, and each has already brought about marked changes in human attitudes. There is every prospect therefore, that within the next 10–20 years research within these fields will bring us face-to-face with the profoundest of questions concerning the meaning of man and the extent to which he can be changed and still remain human.

It is these areas of investigation and debate which lie at the heart of *biophilosophy,* or as Rosenfeld has termed it *biosocioprolepsis,* i.e., the anticipation of biology's impact on society.[11] The prospect of men *making new men,* which implies different or modified men using biological techniques, may not readily appeal to us and yet is in sight. What I now want to do is to spell out briefly the evidence for such a prospect and the questions which inevitably follow.

Prenatal Manipulation

> One egg, one embryo, one adult—normality. But a bokanovskified egg will bud, will proliferate, will divide. From eight to ninety-six buds, and every bud will grow into a perfectly formed embryo, and every embryo into a full-sized adult. Making ninety-six human beings grow where only one grew before. Progress.
>
> Standard men and women; in uniform batches. The whole of a small factory staffed with the products of a single bokanovskified egg. 'Ninety-six identical twins working ninety-six identical machines!'[12]

> The wife is stimulated with hormones to produce several ova in a mentsrual cycle. By means of minor surgery under general anaesthesia one or more ova are withdrawn through the abdominal wall, a procedure that can be done repeatedly. The ova are then fertilized with the husband's sperm, and within five days or so have grown in the laboratory to more than thirty-two cells. The last step to be taken when more is known about the embryonic development will be to replace the embryo in the wife so that it will implant and grow to full term to be delivered naturally.[13]

In vitro fertilization

The gap separating Aldous Huxley's *Brave New World* (written in 1932) and Robert Edwards' embryology research of the late 1960's and early 1970's may appear a formidable one. I would suggest however, that this is more illusory than real, because once it has been proved possible to interfere with the early stages of human development *outside* the body, the remaining far-more dramatic developments will be accomplished given time.

What is the state of the art? The quotation I have given from the paper of Edwards and Sharpe describes *in vitro* fertilization of human ova, that is, fertilization outside the body. In 1966 Edwards demonstrated how

ova extracted from human ovaries could be cultured in the laboratory ("test-tube") with the development of ripe eggs. This was followed in 1969 by the fertilization of such ova using human sperm, and subsequent, apparently normal development of the fertilized ova. Taking these techniques further Edwards, together with a gynaecologist Patrick Steptoe, reported that they had been successful in taking some eggs as far as the blastocyst stage, by which time the fertilized egg had divided into as many as 60-100 cells.[14] This is true "test-tube fertilization", and while the blastocyst represents a very early stage in development it is sufficiently advanced for implantation into a woman's uterus to undergo subsequent maturation.

Recently the first reports have come to hand of the implantation in women volunteers of ova fertilized *in vitro* and the subsequent normal development of these fetuses. The applications of this technique put forward by Edwards and his colleagues as justification of their research are (1) the alleviation of infertility brought about by a blockage in the wife's uterine tubes; (2) the ability it bestows on investigators for sexing the embryo—this in turn is important because, since many genetic disorders are sex-linked and hence usually occur in males, these could be avoided by replacing only female blastocysts; and (3) modification of the embryo itself in an attempt to mask various genetic diseases.[15]

In spite of these assurances, the technique of *in vitro* fertilization even in its present stage of development raises problems. The very act of growing human eggs outside the body means that a large number will "die" in the laboratory. This is implicit in the technique because in order to guarantee one successful implant as many as ten or so eggs will have to be used. While there is probably nothing illegal in destroying or allowing to be destroyed unimplanted blastocysts,[16] some may object on ethical grounds to the deliberate destruction of fertilized human eggs. The fact that certain contraceptive devices, such as intra-uterine devices (IUD), probably act in much the same way is no solution to this problem.

The ethical issue is taken further when we consider that a fetus produced *in vitro* may be malformed. A considerable percentage of naturally fertilized eggs are malformed, most of which are spontaneously aborted. There is no reason for believing the percentage will be any lower with *in vitro* fertilized eggs. Indeed the manipulation processes themselves could conceivably increase the possibility of malformation. At present there is no way of guaranteeing that the fetus will be normal, as it is not yet possible to check that the implanted blastocyst is free of damage. It is not difficult to imagine the psychological trauma which may be experienced by a couple whose infertility has been overcome by *in vitro* fertilization, only to be presented with a malformed baby. This possibility however, is also present after other forms of treatment for infertility, and therefore should not be unduly emphasized.

What then should our reaction be to this dilemma? There are, it would appear, three major approaches. In the first place there is the attitude of researchers like Edwards and his colleagues. Their aims are chiefly guided by the needs of their patients, and by the medical well-being of any resulting children. Edwards has written: "We believe it essential that doctors and scientists are free to pursue research into aspects of knowledge that could contribute to the well-being of humanity provided the rights of the patients, including those of the fetus, are safeguarded as far as possible."[17] He sees no objection to "selecting against afflicted blastocysts"[18], that is, discarding those with genetic abnormalities, believing this course of action to be preferable to either aborting affected fetuses or producing handicapped children. He is fully aware of the controversial nature of his work and that it will bring him into conflict with established social attitudes. He contends however, that "the rights of blastocysts must be subordinated to the general good of society",[19] a position he defends by reference to prevailing liberal attitudes on abortion.

If theology is to be relevant it must encompass what may be termed secular issues.

In the second place there are those who, while not unsympathetic to this position, feel that human experimentation should wait until equivalent animal experiments are further advanced.[20] Embryo transfer experiments have been confined mainly to mice and rabbits, while embryos of these species have been maintained for about one-third of their total gestation periods in various laboratory media. Linked to these developments are efforts aimed at designing an artificial placenta. Experiments of this nature using laboratory animals present ethical objections to only a limited number of people, and from a broad developmental biology point-of-view have many advantages over human material.

A third approach to human *in vitro* fertilization is that typified by Paul Ramsey who has written: "The decisive moral verdict must be that we cannot rightfully *get to know* how to do this without conducting unethical experiments upon the unborn who must be the 'mishaps' (the dead and the retarded ones) through whom we learn how."[21] Basic to this attitude is the possibility of harm to the fetuses as a whole, and coupled with this the objection that a hypothetical or unborn child is being submitted to a dangerous procedure.[22] This leads into the consideration of when in the course of development a living human embryo acquires *protectable* humanity.[23] While this latter point raises many well-known, and virtually unanswerable, questions, it also introduces a new principle for this debate. This is that, in contrast to abortion where a fetus already exists *in utero*, a fetus is deliberately being created in this new situation by experimental procedures. Does this introduce new ethical considerations?

For myself, I would prefer much greater emphasis at present on animal experiments, particularly primate ones. As with all experiments on human patients, techniques should previously have been brought as near as possible to perfection using animal trials. I can see no reason for abrogating this principle with respect to *in vitro* fertilization. Assuming this principle is adhered to, and human trials are one day inaugurated with a substantial chance of success, what then? I would tend to agree with Edwards that the needs of couples and the welfare of their children are paramount. Blastocysts

and even much later stages of fetal growth must be viewed as of secondary importance. There are however, two important points to be borne in mind at this juncture. The first is that these procedures are carried out within the family situation. The second is that in adopting this position I am allowing inroads into the control man is exerting over his reproduction and hence over himself. In doing this I am aware of at least some of the consequences. Using the well recognized "wedge principle", what I am allowing is but a start. Once this form of control has been successfully exploited, far greater degrees of control will follow. These are on the horizon at present and I will discuss them in a moment.

My reason for allowing this is that man has been given responsibility by God for exerting authority over his environment and over himself. Later on I will return to this principle. At this point I simply wish to suggest that the techniques I have been describing do not contravene this principle, as long as they are carried out for the benefit of society. Of course this type of control over human reproduction is itself simply an extension of current, and generally-accepted practices. This does not justify *in vitro* fertilization, but it should make us question current methods of controlling and modifying human reproduction and ask what ethical issues they too may raise.

Certain contraceptive techniques prevent the implantation of blastocysts, while A.I.H. (artificial insemination by the husband) removes by one step the human aspect of reproduction. A.I.D (artificial insemination by a donor) introduces many further difficulties, ethical, psychological and legal, and yet it is estimated that up to 10,000 A.I.D. children are born each year in the United States alone. It is not my intention to discuss A.I.D., except to point out that it, plus its extensions, sperm bank A.I.D. and "space-time" sperm banks,[24] are procedures currently in use or feasible at present. They reflect a considerable degree of manipulation over human reproduction and represent half-way houses between natural reproduction and rigorously controlled reproduction. The future is very close and prenatal manipulation plays a role in many of our lives. But where is our theology of prenatal manipulation?

Prenatal adoption

I have spent some time in discussing *in vitro* fertilization because it is a contemporary development and constitutes the springboard for all other forms of prenatal manipulation.

I would agree that needs of couples and the welfare of their children are paramount. Blastocysts and even much later stages of fetal growth must be viewed as of secondary importance.

The implantation of a fertilized ovum need not be into the same woman from whom it came. It could be donated by another woman, the gestational or host mother as opposed to the biological mother, who would then carry the developing embryo to term. This has been characterized *prenatal adoption* by Bentley Glass[25] who sees its use in the future, adapted for eugenic purposes. He writes: "In the future age of man it will become possible for every person to procreate with assurance that the child, either one's own or one prenatally adopted, has a sound heritage, capable of fully utilizing the opportunities provided by society for optimal development".[26]

The possibility of host mothers to incubate someone else's fertilized ovum has led to extravagant pictures of "wombs for rent", given the appropriate social structure. After all there have been "wet nannies" in the past, why not "host mothers" in the future? This is far from idle speculation. It is an accepted method of transporting a number of embryos within an adult animal of the same species, for example, in sheep and rabbits.

Such a technique could be used, in theory at least, for maintaining an ovum fertilized in the normal way where the wife has uterine abnormalities either preventing the implantation of the blastocyst or maintaining a normal pregnancy. The disadvantages of the technique would appear enormous. The parent-child relationship may be dramatically altered, bearing in mind that it is questionable whom the child would regard as its parent. Apart from psychological uncertainties regarding identity, it is likely that by the time such a procedure became feasible it will be possible to bring fetuses to term in the laboratory.

Fetal Experiments

It is presently against the law of the United States to experiment on any "living" human fetus, before or after induced abortion, unless the purpose of the experiment is to save the life of that particular fetus—an unlikely circumstance. The law does not say what it means by "living," which, in this case, is not easily defined, but one minimum rule of thumb appears to be that, if the fetus has a beating heart, hands off.

The controversial moratorium on fetal research, which will be in effect at least until early next year, is a provision of the National Research Act, better known as H.R. 7724, which deals with both the training of biomedical and behavioral researchers and the ethics of human experimentation.

Barbara J. Culliton, *Science* 185, 426 (1974); copyright by the American Association for the Advancement of Science.

Chimeras

Moving further into the realm of manipulation brings us to the mixing of cells within a fetus. The injection of donor cells into an embryo, and their subsequent multiplication during fetal growth leads to the partial colonization of organs. The resulting fetus is a *chimera* or *hybrid*. The emotional way of envisaging chimeras is in terms of man-animal hybrids[27] or cross-species cannibalization.[28] It is difficult to know how seriously to take these nightmarish fantasies, except that intraspecies donation of cells is far from fantasy and opens the way for genetic engineering and composite organ transplants within pre-implantation embryos.[29]

Genetic engineering

Genetic engineering must be distinguished from *negative eugenics* which is the elimination of bad genes

from the population and *medical genetics* which involves counselling prospective parents on the risks of serious hereditary diseases in their children. Genetic enginering, by contrast, is the attempt to impart new characteristics to forthcoming generations by manipulating the genetic material. In other words, this is *positive eugenics* or, to use Lederberg's term, *euphenics* –the engineering of human development.[30]

The substitution of one gene for another by replacing DNA (deoxyribonucleic acid) with "better" DNA is possible in organisms with a very simple chromosomal apparatus, and amazing results have been reported from a variety of plants and animals including peas, bacteria, tadpoles and newts. Whole genes have been transferred from one cell to another, suggesting that gene transplants may be possible; inactive genes in cells have been "switched on" to produce enzymes which those particular cells normally do not prdouce, while RNA (ribonucleic acid) foreign to a cell has been introduced into cells to induce them to behave in novel ways.

The controversy surrounding genetic engineering is intense, even in scientific circles.[30a] The one reaction which is not warranted is *complacency*. Even a few years ago geneticists would have put genetic engineering in the twenty-first century. Today however, many geneticists would view it as a human possibility on a limited scale within 15 years.[31]

While the processes I have just sketched apply to relatively simple organisms, an increasing range of procedures is now possible in mammals. For example, specific genetic material has been introduced into a mouse cell to replace a deficiency. This is still a very long way from what is generally envisaged as successful genetic engineering in the human, which will involve germ cells rather than body cells and which will have to be exceedingly exact. This will require major technical advances, and yet such is the rapidity of genetic advance that a discussion of its implications is in place.

On the positive side genetic engineering will enable a genetic defect, say haemophilia, to be remedied by fertilizing a couple's eggs and sperm in the test tube and inoculating blastocysts with normal non-haemophilic cells. The resulting child, which will be carried in the normal way, will be a haemophilic–normal mosaic, who will in all probability be normal. Many other so-called "missing gene" defects could probably be rectified in a similar manner.[32]

While the replacement and modification of single genes in the human lies in the future, these procedures are well within the bounds of reality, and will be seen one day as *gene therapy*. And so just as today complete blood tranfusions are caried out on unborn children suffering from severe rhesus incompatibility with the mother, very early embryos will have 'gene transplants' to overcome a wide variety of genetic disorders.

But what about the *misuse* of genetic engineering? This is one of the supreme realms in which the writers of scientific futurism strive hard to outdo the writers of science fiction. Rosenfeld writes,

> When this kind of biochemical sophistication has been attained, when man can write out detailed genetic messages of his own, his powers become truly godlike. Man will presumably be able to write out any set of specifications he might desire for his ideal human being. And who can find fault with ideal human beings?[33]

I will return to this question later on. For the moment though, how likely is this prospect? In the foreseeable future it would appear to be very slim, simply because complex qualitities such as intelligence are determined by numerous sets of genes. And of course the final product of genetic inheritance, that is, the individual human being, is considerably influenced by his environment and the diverse pressures resulting from the environment. Even if it were ever possible to produce our "ideal human being" in genetic terms, the resulting genetic/environmental product might be far from ideal unless, of course, the environment too were ideal.

The controversy surrounding genetic engineering is intense, even in scientific circles. The one reaction which is not warranted is complacency.

Perhaps J.B.S. Haldane best summed up the issue. According to him, the only problem with creating a race of human angels is to find the genes for wings and for moral perfection. Humorous as that statement may be, it contains a profound truth geneticists and anatomists are rarely willing to face. There is more to life than genes, organs and ideal bodies.

Linked to this, there is an ethical issue we need to consider. The preceding discussion has assumed that conception has taken place or will take place regardless of genetic or other difficulties, even when the likelihood of such difficulties is recognized. It is then up to the medical geneticist to rectify the abnormality, even if it involves dispensing with the fetus. It has become unfashionable to question the wisdom of these steps. Paul Ramsey however, sides with the unfashionable.

Preventive genetic medicine

> has a number of familiar, proven options more desirable than gametic manipulation. If we want to promote responsible parenthood by means of our knowledge of genetics . . . the first question is not whether, assuming the child must be, we should make it of this or that genetic composition, but whether a conceptus should be conceived at all. We ought not to choose for another the hazards he must bear, while choosing at the same time to give him life in which to bear them and suffer our chosen experimentations.[34]

Taken to its logical conclusion this position precludes practically the whole of genetic engineering, and this is the direction in which Ramsey himself tends. It does however, have even wider connotations than this, because with or without genetic engineering we *are* responsible for bringing children, some of whom are known to have medical defects, into the world. We choose to give them life. They have no choice. This is the ultimate dilemma of certain existentialists, including Sartre. Man is responsible, but never for his own birth. Quite apart then from the potential of modern scientific investigation, we must accept the momentous re-

sponsibility of ushering into this world further lives. This is the essence of our God-given responsibility as members of the human race, and from this stems all our actions on the unborn fetus.

Cloning

This may be termed *biological predestination*. It is the process of producing carbon-copies of individuals or, more dramatically, "people from cuttings."[35] It is this technique which will allegedly enable us to produce an endless stream of exact copies of Mozart or Einstein, or Hitler, of course. Alternatively if your preference is for an army of a few thousand identical soldiers, all appropriately selected for certain conditions of battle, cloning will be the technique of choice. And so one could continue. Probably more alarming nonsense has been written about this technique than any other in the genetic arena, ideas put forward including plans for establishing international boards of control and the best age for cloning in various groups of the population.[36]

In essence cloning is *asexual* reproduction, with the result that the new individual or individuals are derived from a *single* parent and are genetically *identical* to that parent. Hence the exact copies. Cloning is brought about by the removal of the nucleus from a mature but unfertilized egg and replacement by the nucleus of a specialized body cell of an adult organism. The egg with its transplanted nucleus proceeds to develop *as if* it had been fertilized, and produces an adult organism which is genetically identical to the organism which served as the source of the transferred nucleus. In this way it is possible to produce an unlimited number or clone of identical individuals. Up to the present cloning has been effected in animals such as frogs, salamanders and fruit flies.[37]

There is no theoretical reason to prevent human cloning and it will probably be feasible within the next few years. It is difficult however, to find reasons for doing it. Organ transplantations between members of a clone would present no problems; if one partner in a marriage had a severe genetic defect the other could be the clone-parent; it would be a sure way of selecting the sex (and much else) of a child. These dubious benefits of cloning are hardly worth serious consideration as there will relatively shortly be other, far more responsible, ways of overcoming these drawbacks.

Cloning may be termed "biological predestination." It is the process of producing carbon-copies of individuals, or, more dramatically, "people from cuttings."

On the deficit side cloning is almost universally condemned, even by relatively liberal commentators.[38] The major problem is that cloned "specimens" would lack any sense of individuality. It denies to these specimens "the right to be one's self", and if ever such specimens should exist they will be in the unenviable position of *knowing* without a shadow of doubt that they are merely biological replicas, who are essentially preordained and whose biological future is mirrored in someone else.[39]

This is a truly frightening possibility because it means we will be able to produce people who are not people in that they are denied the chance of themselves experimenting with life. They will simply reflect a previous experience. The psychological trauma which may result from this is unimaginable. Of course it is possible to argue that they will *not* be identical to their cloned-parents or even to their cloned-siblings, because of their different environments. If this is the case, and it probably is, why clone? Instead of the original genius, one may end up with a pathetic travesty of the great man.

Cloning is an extreme technique and yet it is valuable in that it points to the extent of dehumanization which will be possible via prenatal manipulation. Kass has put forward a valuable principle which sums up this section: "We may *not* be entitled, in principle, to a unique genotype, but we *are* entitled not to have deliberately weakened the necessary supports for a worthy life. Genetic distinctiveness seems to me to be one such support."[40]

Organ Transplantation

I will not deal at length with this topic as the ethical decisions which principally surround it are not directly related to modifying man. They have chiefly to do with the definition of death, which results from the use of cadavers as donors. Important as these issues are they are peripheral to my main concern in this study.

The transplantation of kidneys, hearts, livers, lungs and eyes does not usher in the brave new world. Some of it may be heroic surgery, other aspects are virtually routine surgery, but the patient plus his transplanted organ is still much the same original human being. What about brain or head transplants? For very many reasons, including technical ones and difficulties concerning the supply of donors(!), such transplantation while making good science fiction reading is out of the question.[41]

A more profitable line-of-investigation, although still remote in the future, if even realistic, is the concept of the *cyborg*. This is the term used for a cybernetic organism or automated man, in which the machine component of the organism receives instructions from the man and also informs him of the conditions it is encountering.[42] For instance, one can imagine a cyborg designed for astronautics. He may resemble a man but many of his bodily functions, such as respiration and communication, would be carried on cybernetically by artificial organs and sensors. However fanciful this sounds, far more fantastic man-machine schemes have been suggested. While I am not concerned with the details of such prophecies it should be remembered that they are based on two current developments: the increasing efficiency and growing use of mechanical prostheses, and the development of the computer.[43]

Arthur C. Clarke envisages that *Homo sapiens* will give way in the distant future to *Machine sapiens*.[44] However likely or unlikely this speculation may turn out to be, it is based on the belief that machines capable

of *greater* intelligence than man will be evolved. This in itself is a highly debatable point, and I will not enter that controversy. The modification of man by way of machines and the computer, however, has its roots in man's *present* dependence on these artifacts, and we should ask ourselves to what extent man has *already* been modified by them.

Machines are simply extensions of ourselves, because in one sense our bodies are machines. It is true we identify with our bodies, and it is this which enables me to refer to "my body" and to "me". Is an artificial limb or are artificial heart valves a part of "me"? For those possessing such gadgets, normal life would be impossible without them. To what extent then, do artificial protheses affect our identify? To what extent does our body, or parts of our body, contribute to our knowledge of ourselves as individual and distinct beings? In the end we are faced with that perplexing question: "Who am I?"

In the light of our answer to this question we may be able to decide what modifications a human body is able to undergo and still retain its identity. This applies to protheses and transplants as well as to genetic manipulation and assaults upon the brain. Apart from our heredity, the greatest present contributor to our identity is undoubtedly the brain. And the brain is particularly vulnerable to external assault, which is an application of our technological expertise.

Brain Research

> The possibilities of misapplication of the results of brain science are already frightening to many people. Could it be, they ask, that here at last we face the ultimate Pandora's Box, a secret whose uncovering would be the destruction of human society? Has brain research gone far enough, if not too far, already?[45]

These words of Donald MacKay written in 1967 are even more appropriate today than then. Brain research has burgeoned over the past few years, and while we are still on the threshold of any overall understanding of it, our potential for manipulating various aspects of its functioning is increasing daily. So real is this advance that some people are throwing up their arms in despair and complaining about the "rape of the mind."

There is a major difference betwen the application of this type of research and that considered previously in the realm of prenatal manipulation. Whereas intervention before birth affects the lives and characteristics of those not yet in existence, brain manipulation will be carried out on those with *known* personalities which may consequently be modified during adult life. Investigations upon the brain therefore may pose an even *greater* threat to the integrity of individuals already conceived and already possessing recognizable identities. It may not be an overstatement to say that the power to change the brain confers a corollary power which is the ability to change personality and even self-identity. This is the crux of the biological self-identity revolution, and the issues it raises lie at the heart of biophilosophy and, dare I say it, contemporary theology.

I will deal with the two areas, which it seems to me are crucial in this debate. These are the electrical stimulation of the brain and mood-controlling drugs.

Electrical stimulation of the brain (ESB)

In very general terms we can say that the brain consists of a number of lobes which are interconnected and which, by virtue of their relationship to the rest of the body and the outside world by way of the spinal cord and peripheral nervous system, constitute a functioning whole. There is therefore constant interplay between the brain of an individual and the world that individual has to cope with, the brain receiving continuous stimuli from the surrounding world and putting out appropriate information to deal with that world. The picture which an individual gives of himself to other individuals is very much the result of these interactions.

Machines are simply extensions of ourselves, because in one sense our bodies are machines. Is an artificial limb or are artificial heart valves a part of "me"?

It is not difficult to appreciate then that damage of the brain upsets these interactions and may well alter the picture others have of the affected individual. In other words, brain damage may alter the individual's personality and in so doing may alter the person himself. Brain damage may dramatically change a person's behaviour patterns, and the question may then be asked: what *is* a person's *real* nature? Do we have a basic personality on which life, and certainly disease, imposes distortions, or is our personality nothing more than the construct of our experience?[46] These questions become the more pressing when we turn from disease to interventions in the brain, because issues which were previously unavoidable now become subject to man's control.

Within the lobes of the brain there are various areas which have relatively specific functions. For instance there are areas concerned with speech, vision, hearing, motor and sensory functions etc. In addition there is a region involved in organizing the metabolism of the body and hence with sensations of hunger and thirst, fear and rage. One of the principal ways in which these functions have been localized to specific regions in both laboratory animals and humans is by inserting small electrodes into the brain under local anaesthesia and observing what happens when a small current is applied. For example if a motor region is stimulated an arm or leg may involuntarily move, while with an auditory region the patient may hear a non-existent conversation or weird sounds.

Using this technique Dr. James Olds found in 1953 that when he stimulated a region of the brain known as the *hypothalamus* in rats, they appeared to enjoy it.[47] Olds concluded that the parts of the hypothalamus giving this reaction constituted *pleasure centers*. Further research indicated that of the pleasure centers one appears to be associated with eating and another with sexual emotions. Besides these pleasure centers there is also evidence that *aversive* or punishment centers exist in the hypothalamus, while other centers are apparently involved in the development of obesity, thirst and hunger. An area close to the hypothalamus, know

as the *amygdala,* gives a variety of actions when it is stimulated, the best known being rage.

It is not difficult to understand why many people regard these data as detrimental to a *human* view of the brain. Once these data are assimilated, much of the mystique of the brain, and possibly of the human person, disappears. ESB has therefore, a great deal to answer for. This is not all, because with understanding comes potential control. ESB not only facilitates accurate mapping of the brain, it also ushers in the prospect of modifying human behaviour.

Some of the most dramatic examples of this technique are illustrated by the work of José Delgado.[48] For instance, he has shown that a five-second stimulation of a particular spot in a monkey's brain will make the monkey stop whatever it is doing, make a face, and turn its head to the right, walk on its hind legs around its cage, climb the cage wall and return to the floor. With cessation of the stimulation it grunts, stands on all fours and resumes normal activity.

The point here is that each time the button is pressed the monkey goes through exactly the same ritual. And so one could give numerous examples to illustrate this point. Cats can be induced into either paroxysms of rage or excessive contentment simply by stimulating the appropriate brain region. In one instance Delgado, with an excessive degree of showmanship, went into a bull-ring and stopped a charging bull by stimulating one of its brain regions by remote control. Taking these developments further, it is possible for an animal to stimulate its own brain by pressing a lever or button connected to electrodes implanted in its brain. And it is from this that one gets the terrifying picture of a rat continuously stimulating its own pleasure centers, regardless of food or water, until only exhaustion brings this tragic sequence of events to a conclusion.

There is *no* reason why ESB should not bring about this same kind of thing in human beings. In principle it is possible now. And under certain circumstances it is used now.

At present its use in humans falls into two categories—as a therapeutic tool and in the continuing treatment of emotional disturbances.

The power to change the brain confers a corollary power which is the ability to change personality and even self-identity.

A term often applied to these uses is *psychosurgery.*[48a] By increasing the current passing through the implanted electrodes, brain tissue can be destroyed. This is used to destroy tissue in certain cases of intractable epilepsy and Parkinson's disease and sometimes to gain relief from intractable pain. Frontal leucotomy which was in vogue in the 1930's and 1940's and which was, and still is occasionally, resorted to in cases of severe depression is a rather less refined example of psychosurgery.

Far more difficult ethically is the use of psychosurgery in modifying behaviour. Consequently it may be employed in people characterized by violent outbursts of rage, to destroy the brain region concerned.[48b] Or it can be used not to destroy brain tissues but simply to quiet a violent psychotic individual by stimulating electrodes implanted in his brain. This latter application of ESB is currently used on a limited number of patients in mental hospitals, but its potential is obvious.

Is there any objection to using ESB as an antidote to specific symptoms? We do this every day with drugs and conventional surgery. Why not by surgery on the brain? The underlying question we have to answer is: "What is normal?" What are our expectations of the normal individual? When I am calm, am I any more *me* than when I am angry? How do we distinguish between what may be regarded as "normal" anger and "pathological" anger? And who decides?

"Who controls the controllers?" Rosenfeld states the dilemma very perceptively: "The notion of a man controlling his own brain is one thing. But the prospect that a man's brain might be controlled by another is something else again."[49] This issue is an intensely practical one because it brings us into the area of *criminology* and of the expectations of society.

If it can be shown that there is a high correlation between deviant behavior and brain damage, what is the best way of controlling the deviant behavior? Is it by primitive measures, coupled perhaps with moral coercion, or by a direct approach to the brain of the deviant? An answer to this type of question would take us into deep philosophical waters, as it involves the relationship between the brain and the person. Difficult as this issue is, it requires an urgent answer because increasingly courts are having to decide whether a person should be sent to jail or a psychiatric institution. Who or what is at fault—the man or his mental illness? By what criteria do we decide that a man is or is not responsible for his actions?

Mood-controlling drugs

Many of the questions raised by the use of these drugs are the same as for ESB. The main difference is that these drugs are freely used in the community at present, and so while their effects may not be as dramatic as ESB, their overall significance may be just as great.

There is now a bewildering array of mood-controlling drugs, the principal groups being (1) sedatives or hypnotics, e.g., barbiturates; (2) stimulants, e.g., amphetamines; (3) tranquillizers, e.g., imipramine (Tofranil) and isocarboxazid (Marplan); and (4) hallucinogens e.g., LSD, i.e., the psychedelic drugs.[50]

At present the majority of these drugs while acting within certain general limits, are not unduly specific. They raise or lower the threshold of action of general systems in the *drug–biochemistry–behaviour* triad. Of course this may change. The specifity of these drugs will undoubtedly improve. Are we to be concerned about this?

In my view the principal dangers arising from the widespread use of these drugs do *not* lie in a totalitarian foisting of them on a population. Rather it is the *voluntary* taking of psychoactive agents as a means of escape from the real world that is far more disturbing. While some of these drugs are highly useful in many circumstances and are probably *indispensible* in present-day society, their overindulgence can be a

means of shielding people from pressures they should face squarely and if possible resolve.

Drugs are modifying our behaviour patterns far more profoundly than we may care to realize. What is happening is that we are looking for *technological* solutions to our problems, as opposed to *social* solutions. It is generally far easier to prescribe drugs to alleviate symptoms than to tackle the social situation giving rise to the symptoms. While this use of drugs is undoubtedly justified, the increasing dependence upon drugs by an increasing number of people and by society as a whole may actually lead to a change in the *quality* of life.[51]

A disturbing side-effect of this trend is that seen in society's treatment of certain social misfits. The condition of "minimal brain dysfunction" is a relatively recent condition characterized by children whose behaviour is socially unacceptable. Children who are "hyperkinetic" on the basis of their school reports are regarded as in need of treatment with a daily administration of doses of amphetamines.

Great care needs to be taken in equating unacceptable behaviour or personality disorders with brain malfunction. The latter should first be proven before neurobiological or neuropharmacological action is taken to "cure" it.

We do not know how far the techniques of ESB and mood-controlling drugs will develop. Let us hope the day never comes when men and women will sit down comfortably in their armchairs and stimulate their pleasure centers for hours on end. This is hardly an endearing prospect, but whether it is any different in principle from living on a diet of tranquillisers, alcohol and T.V. is a debatable point.

Perhaps the brave new world is already here, and yet because of our obsession with the *horrors* of technology and not with its benefits, it has quietly overtaken us.

Towards A Theology of Modified Man

The modification of man raises some of the profoundest issues we will ever face. I will briefly outline what appears to me to be some of the essential principles requiring consideration in formulating a theological approach to them.

1. *Research will continue*

There can be *no* moratorium on future biological research, unless this is desired by the scientists involved, as may be the case with certain forms of bacteria research termed "plasmid engineering." It would be fallacious though to rest our hopes on any such limitation. Research will continue, and will probably also continue to escalate.

It could be argued that because the aims of certain workers in these fields are essentially humanistic, this type of research should be opposed on Christian grounds. To suggest this is to confuse philosophical principles and the scientific enterprise. Scientific research is not dependent upon the aspirations of its exponents in this simple manner. Christians therefore are to be concerned with analyzing each technique on its merits rather than inveighing against these areas of research as a whole on questionable philosophical grounds.

2. *Man is viceregent for God*

Man has been given dominion over the created order by God.[52] He is therefore to be responsible for it, in that he is to exercise his power in accordance with God's moral nature. "His sense of responsibility," as Montefiore has written, "no less than his status in creation, must be little less than God's"[53] As Montefiore has further written in regard to the environment,

> Man, because he is in God's image, is a moral being, accountable to God for his actions; and because he is made in the image of God, man is also an intelligent being, under an obligation to use his mind in the exercise of his dominion and therefore unjustified in abusing his environment through indifference or lack of foresight.[54]

These words are just as appropriate in discussing man himself. Man is responsible for the well being of man, as an individual, as a neighbor, as a society and as a species. This further implies that each man is to be treated as a responsible human being with the power of choosing his own lifestyles and destiny. Each person should be able to choose what he does or does not want inflicted upon his own body. This is his prerogative and no one else's. The more technological society becomes the more difficult it becomes to maintain this principle, and yet it is an indispensible one from a Christian angle.

Man is also responsible for *future* generations of man, as much as for the *present* generation. There is a limit therefore to the degree of tampering with future generations which can be permissible in terms of this principle. Future generations have a *right* to be as fully human as this generation.

This biblical position is our life-line when considering modified man. Cast it away and no clear principles remain. Macfarlane Burnet believes that "Man is no longer something made in the image of God, but (is) a part of the whole world of living things".[55] Hence the title of a book of his *Dominant Mammal*. But where does this take us? How does it guide us through the maelstrom of perplexing issues facing us? Leach believes that "we *could* act like gods". To what end? "That we can act confidently with a sense of purpose." We need a sense of *direction* to guide us in the choices we have to make. Furthermore, we need the perspective of *eternity*. Without this it is more than likely that man will exploit himself and his world to the full for selfish and self-defeating purposes.

Apart from man's knowledge of his relationship to God, of God's standards and of God's requirements for the created order, what *model* does man have for modifying man? Jacques Ellul has made the rather unflattering comment that those with the power of remodelling man will make the new human in their own image.[57]

3. *The "ideal" human being*

This leads on to the question of what is the *aim* of modifying man? Is there such a being as the "ideal" man? Is there a holistic view of "man" at all, or is the being we call man composed of a series of almost unrelated normalities and abnormalties?

These are crucial philosophical questions for our generation, because humanism has brought us to the point of denying the existence of a meaningful man. Instead, what it presents to us is a mass of determined, reductionistic pieces of information that, by modifying human beings, it is attempting to build into a "new" man

—the humanistic ideal of a human being.

The concept of the "ideal" is itself a humanistic one, and so the "ideal" human being is a vision of ethics and moral philosophy, not of biology.[58] Carl Henry works out the consequences of this position a little further. He recognizes that

> central to the current conflict over the ideal image of man is the contemporary uncertainty about who or what man really is. It has not yet dawned on our contemporaries that their creative postulation of a novel man, if consistently ventured, must involve a total severance with man as Christianity has known him—man ideally imaged in Jesus of Nazareth, man who owes his existence to a divine creator and preserver.[59]

Man as we know him is therefore the man we are to strive to help, and the guidelines we follow in modern biology are found in man as we now know him. Does this principle then invalidate much of the genetic transplantation and neurobiological developments I have been discussing? My answer is "No". We are surrounded by individuals suffering from defects of one sort or another; the remedy of these defects and the alleviation of suffering are cardinal principles of medicine which apply as much in modern biological medicine as in more traditional medicine. A line must be drawn however, between this approach and that which attempts to *improve* man according to unspecified goals.

Even this principle though may lead to a surprising degree of modification of man within certain limits. It does not justify reactionary cries of alarm. We are to be modern but in a Christian way.

4. *The dehumanization of man*

This is intimately involved in the search for the "ideal" man. The danger is that it ends as a dehumanization, involving a depersonalization, of man. A great deal of thought needs to be devoted to working out the implications of dehumanization. As a start it might be worth suggesting that deviation from the *creation ideal* is implied in dehumanization. As a part of the creation ideal we see a close association of sex and marriage, marriage and parenthood, and child-rearing with home.[60] While these associations may or may not be inviolable rules, they are clear pointers in the direction God intended human life to proceed.

Any major cleavage within them is an aspect of dehumanization. The extent to which any of the procedures I have outlined are dehumanizing will have to be considered. Are there, for example, any circumstances under which A.I.D. would be acceptable from a biblical standpoint? Does it automatically breach the marriage bond? It can be argued that it imparts into the marriage relationship something from outside, something which does not stem from the relationship itself. Viewed in this way it falls short of the creation ideal,[61] and opens the way to mechanistic trends. In relationship to A.I.D. I believe an essential consideration concerns the *reasons* for desiring it. Are these motives humanistic or are they concerned with the welfare of the two parties in the marriage? Does the latter motive ever justify A.I.D. from a biblical perspective?

Similar questions need be asked in all the areas I have considered. Is ESB to control rage ever justified? Again, there may be situations in which biblical principles will allow it, and others in which they will contraindicate it.

Man is also responsible for future generations of man, as much as for the present generation.

5. *Freedom and change*

The biological developments discussed in this paper bring us face-to-face with the reality of *change* in our lives. This presents us with the challenge of confronting change, both in the biological world and in our attitudes, and of deciding what we are prepared to do with it. Are we determined to resist change, come what may, or will we accept it and strive to see it in a Christian perspective so that we can help decide the *kind* of change to be adopted?

Attitudes have already changed enormously. For instance contraception has had a vast effect on attitudes towards marriage, the fetus and perhaps the quality of life for our children. Has Christian thinking promoted any of these changes, or has it been defeated repeatedly as it has unsuccessfully resisted them? We must think through issues concerning modified man, because the issues either are, or will shortly be, on our doorsteps. Change will not slow down to allow the Christian Church to catch up.

Accompanying these changes in the life of man is an increase in his *freedom* and in the extent of his control over himself and others. Man however, is not as free as humanists often assert, and yet he has *greater* freedom than we sometimes like to admit. Society is not a vast laboratory as some would believe, but neither is it a museum. Man *is* on the move, and it is the task of the Christian to remind scientists that the "man" they wish to control is a fellow citizen, a human like themselves. It is also relevant to point out, as Langdon Gilkey has suggested, "that there is *less* freedom in the knower and controller through his knowledge than most descriptions of the potential uses of science seem to assume."[62]

6. *Optimism or pessimism?*

New men have not as yet been made, although the old man can, within stringent limits, be modified. Does this hold out hope for a glorious future? To some humanists, it does.[63] To some scientists, it does; to others, it is more like the brink of catastrophe.[64]

Sir George Pickering confronted with the possibility of an indefinite extension of human life commented: "I find this a terrifying prospect, and I am glad I shall be dead and will have ceased to make my own contributions to this catastrophe before it happens".[65]

For the Christian it should remind him of the conflict between man's old and new spiritual natures, and of the conflict between good and evil within the universe. Whatever man can make of man, it is God who is in ultimate control, and however allpowerful man may appear, he remains the creature in a God-upheld world.

The Christian is to continue living in faith, knowing that God's purposes for him and for mankind are no less exciting in the 1970's than at any period in the past. The Christian is to reflect the image of God in

his life, his thinking and his contribution to society. It is for him to see that, as far as he is able, man is modified according to God's and not man's precepts.

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Science has never impressed me as "pure," and it must by now be strong enough to fend off . . . acts, let alone mere thoughts, of fakery. Those who promote the mystique of science do so both to conceal its reality and to imply that scientists are demigods. . . . It is to be hoped that science will always serve as a refuge from dogma and high priests. Cloaked in mystique, it drifts toward scientism—which is hardly better than any pagan idol.

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The Race and Intelligence Controversy

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Jensen and Shockley have revived the argument that blacks are genetically inferior to whites in intelligence. Jensen has published a number of articles and books which have been responded to by scholars in such disciplines as anthropology, education, population genetics, and psychology. Three areas focal to Jensen's position are discussed here: the concept of race, the nature of intelligence and IQ tests, and heritability estimates. The conclusion is that Jensen uses inadequate data and questionable methods to support his position, which he admits is at best a "not unreasonable hypothesis."

Race and Intelligence

The idea that races differ genetically in intelligence and in their capacity to create and embrace civilization is hardly new. It is periodically presented as a scientifically valid position and each time is criticized because the conclusions are not warranted by the cited evidence.[1] Historically, most advocates of the genetic inferiority of blacks have been so blatantly racist that few scientists have felt the necessity of systematically refuting them.

Two current major proponents of the relationship between race and intelligence are William Shockley, a physicist at Stanford, and Arthur Jensen, an educational psychologist at Berkeley. Shockley has been on the lecture circuit for a number of years warning us that our gene pool is being contaminated by genetically inferior blacks and poor whites. Among his suggestions for alleviating the problem is a voluntary sterilization program which would pay low IQ individuals a bonus of $1,000 for each IQ point below 100.[2] Is is highly questionable whether Shockley would have received so much attention nationally had it not been that in many instances his scheduled lectures at prestigious universities such as Harvard, Yale and Princeton were either cancelled or broken up by shouting students. Shockley's lack of understanding of genetics, intelligence and race are profound, and few scientists take him seriously. His plea to the American Association for the Advancement of Science in 1967 for a crash program to measure genetic differences in intellectual and emotional traits betwen racial groups was rejected as not being feasible and as being unlikely to lead to any conclusive results. The AAAS response stated in part:

> There is no scientific basis for a statement that there are or that there are not substantial hereditary differences in intelligence between Negro and white populations. In the absence of some now-unforeseen way of equalizing all aspects of the environment, answers to this question can hardly be more than reasonable guesses. Such guesses can easily be biased, consciously or unconsciously, by political or social views.[3]

It might be said that a new era in the discussion of race and intelligence began in 1969 when the *Harvard Educational Review* published Arthur Jensen's article titled "How Much Can We Boost IQ and Scholastic Achievement?" His article begins with the statement that compensatory education efforts have failed to produce any lasting effects on the IQs and achievement of children, and then suggests that it is necessary to reexamine the premises on which these programs have been based: that IQ differences are almost entirely a result of different environments of the subjects, and that there is a cultural bias in IQ tests. He then argues that genetic factors are much more important than environment in determining IQ scores, and that furthermore there exist "real average differences among the [racial] groups—differences in the population distributions of those characteristics which are indisputably relevant to educational and occupational perform-

ance."[4] In supporting this conclusion he discusses the nature of intelligence and of IQ tests, estimates of the heritability of intelligence, and the bases for his conclusion that blacks score an average of approximately 15 points below whites on IQ tests. Contrary to the impression given by the mass media at that time, Jensen offers no new data to support his position, only a reorganization of existing data.

A major point made by Jensen is that he has discovered two genetically determined types of learning ability: associative (or rote) learning (Level I), and cognitive or conceptual learning (Level II). He claims that all children have the ability for associative learning, but that not all have the capacity to learn conceptually. Associative learning is seen as characteristic of low socioeconomic status (SES) children and conceptual learning of middle SES children. Since low SES subjects in one test were all black and middle SES subjects were all white, the differences are seen as racial differences. Jensen concludes that we need school systems which will teach children in terms of their abilities to learn, and not require conceptual learning, which could cause failure of those who are capable of only associative learning.

Needless to say, the reactions were immediate, and were both positive and negative. Although it actually comprised a minor portion of the 123 page article, Jensen's views on the relationship between race and intelligence have received the most attention. One discussant states that the article

> is one of those signal events that are rare in any field of science: the appearance of a scholarly work that will for years, possibly for decades, be regarded as the watershed that divides a period of misunderstanding, error and myths from a new era when emergence of the true facts led to the formation of a solid theory upon which future scientific progress can be built.[5]

On the other hand, a black neuro-psychiatrist comments: "As I reviewed this elaborate assortment of truths, half-truths, falsehoods, exaggerations, faulty deductions and speculations, I experienced mixed emotions —including a generous portion of hostility."[6] Martin Deutsch, who had co-edited an earlier book with Jensen,[7] states that the article contains "many erroneous statements, misinterpretations, and misunderstandings of the nature of intelligence, intelligence tests, genetic determinination of traits, education in general, and compensatory education in particular." He then comments that

> Perhaps so large a number of errors would not be remarkable were it not for the fact that Jensen's previous work has contained so few, and more malignant, all the errors referred to are in the same general direction: maximizing differences betwen blacks and whites and maximizing the possibility that such differences are attributable to hereditary factors.[8]

In a paper of this length it is impossible to cover all the points of Jensen's article which are open to question.[9] Instead the focus is on three major areas which are crucial to his hypothesis: the concept of race, the nature of intelligence and intelligence testing, and estimates of heritability.

The Concept of Race

If one is going to deal with the relationship between race and intelligence, one of the crucial concepts is obviously that of race. Almost all who posit such a relationship imply that the races they are comparing are distinguished by biologically relevant criteria. Although the criteria are never stipulated, they so facilely accept this supposition that they never consider it necessary to justify their assignment of a specific person to one race or the other. Jensen does not even consider the problem of definition, but simply states that races are said to be breeding populations which according to geneticists have different distributions of gene frequencies.[10] Of course, in technologically advanced societies such as the United States, there are no such isolated breeding populations, so that cannot constitute an operational definition for his study. Neither does Shuey, whose work *The Testing of Negro Intelligence* Jensen relies on for much of his data, attempt any definition. She only states that "except for small groups of transitional types, the American Negro constitutes a recognizable and clearly defined group, the criterion of membership in which group being that of more-or-less African ancestry."[11]

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It is important to emphasize that race is a statistical concept, which means that it is extremely difficult to positively assign a given individual to a specific race. As Mayr notes, when one looks at different populations he can see that there are different races, but "how to delimit them, how to draw the line between them is not only difficult, it is impossible."[12] In contrast to a racial analysis, Livingstone has suggested the use of a clinal analysis, which would describe *all* gene frequencies. If, for example the variability of a specific gene is continuous from north Africa to south Africa, the variability cannot be described in terms of race. Also, if two genes vary discordantly, racial classifications based on the one gene will not describe the variability in the distribution of the other.[13] Each of us probably differs from his neighbor by approximately 400 genes, yet not more than about a dozen genes can be specified as occurring in one race and not in others.[14] When dealing with polymorphic frequencies between populations, it becomes obvious that the extent of variation within any population is usually far greater than the average difference between populations, and that there is a great deal of overlap.

One problem with assigning names to races is that it facilitates the error of typological thinking—that is, the assumption that individuals in a given group are alike, or at least very similar. It is this concept that the typical man in the street has when he talks about races, and it also seems to be in the back of the minds of those who posit a relationship between race and intelligence. "Physical type, heredity, blood, culture, nation, personality, intelligence, and achievement are all stirred together to make the omelet which is the popular conception of race."[15] This attitude is illustrated when Ingle asks whether there are "any

biological bases for the failure of nations governed by Negroes and mullatoes to become self-sufficient and creative." He answers his own rhetorical question by maintaining that the "genes representing traits that are important in human affairs are not randomly and equally distributed among racial groups."[16]

Because of the problems listed above, there are many who feel that the concept of race should be abandoned. As it is commonly used, it is clearly arbitrary, undefinable, and without biological meaning, and as Dobzhansky notes, it is far from being a self-evident cliche.[17]

Since race is actually a statistical concept relating to groups and not to individuals, how then are individuals assigned to different racial groups in the United States? Obviously they are assigned primarily by social rather than genetic criteria. For evidence we need only note that children of black/white marriages are regarded as black rather than white. It is as if children are considered to have received their genotype from a population rather than from their particular parents.

The gene pool of American blacks (defined socially) has been estimated to be approximately 30% derived from white ancestry.[18] It has also been estimated that 70% of blacks have at least one white ancestor and that 30% of American whites have at least one black ancestor.[19] If we choose to call the white individual with a black grandfather a Negro, then logic would require us to call the "average" black in Baltimore or New York a Caucasian. It has been suggested that the classification which a person gives of himself should be used, but if race is considered to be a biological construct, the lay person's view of his own racial identity is both incompetent and irrelevant.

An apocryphal story is told about an American newspaperman who had an interview with the President of Haiti.

> They started to talk about Haiti and its population, and most indiscreetly the American newspaperman asked the President of Haiti what percentage of the people were white. And the President of Haiti said, "Oh, about 95 per cent." The American newspaperman looked a little puzzled and said, "Well, how do you define white?" And the President of Haiti said, "Well, how do you define colored?" And the American newspaperman said, "Well, of course anybody with Negro blood is colored." Said the President: "Well, that's exactly our definition too: anybody with white blood is white."[20]

The same situation obtains in Brazil—anyone who is not "pure black" is a Caucasian.[21]

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We do not have an accurate count of the so-called Negro population in the United States, because census takers are no longer allowed to ask the race of the interviewee. This means that the taker is asked to make a clinical judgment concerning race that a trained physical anthropologist would hesitate to make. If he is in doubt, his instructions are to assign race according to the prevailing racial composition of the neighborhood.[22] Since skin color is the major basis for classification, studies imply a direct relationship between the genetics of skin color and the genetics of intelligence.

In light of the above problems, is it correct to say that race is important in our society? Unfortunately the answer is yes. Races are real "because people believe they are, and social reality—the human world—is determined by human belief."[23]

The crucial point in this discussion of race is that most of the studies cited by Jensen and others have used a social rather than a genetic definition of race. Under such conditions, how can one demonstrate a genetic relationship between race and intelligence?

Intelligence Testing

A second major concern is the nature of intelligence and the validity of intelligence test scores. Jensen insists that there is no point in arguing the question to which "there is no answer, the question of what intelligence *really* is,"[24] but that it is possible to measure intelligence, for "intelligence, by definition, is what intelligence tests measure."[25] He limits the term intelligence to that which is represented, by Spearman's *g*, which he claims is the factor common to all tests of complex problem solving.[26] Although he considers it difficult to define intelligence in so many words, he considers that "it is probably best thought of as a capacity for abstract reasoning and problem solving."[27]

The Binet Test was originally devised to help Paris educational authorities separate out the "dull" children who would not benefit from the education offered at that time. Both Binet and Simon warned that the results were useful only when the tested children came from similar environments. This warning has been often repeated, but seemingly more often ignored. Jensen acknowledges that IQ tests have been developed for the express purpose of determining success in school, but insists that they not only measure school learning or cultural advantages making for scholastic success, but also tap fundamental psychological characteristics.[28] He maintains that although intelligence has been singled out as especially important by educational demands, it is nevertheless "a biological reality and not just a figment of social convention."[29]

Jensen's argument that most intelligence tests measure *g* is not universally accepted. Jastak maintains that most IQ scales include a balanced number of associative and conceptual tests, and that furthermore, the associative tests are more highly correlated with IQ than are the conceptual ones.[30] Deutsch strongly objects to the use of Spearman's *g* as *the* basis for intelligence, stating that

> *g* represents only *one* theory of intelligence, among many others. It is by no means a universally accepted concept among psychologists and others who work in this area. Yet from Jensen's paper, the general reader would never know that there are competing theories, several of which are more widely accepted and based on more recent information and data than Spearman's.[31]

Deutsch suggests as an alternative Piaget's theory, which is based on intellectual development interwoven with the child's experiences. Basically it is a stage theory with each new level building on the previous one. This approach reflects process, whereas Deutsch evaluates Jensen's notions of level as categorical and static. He

claims that Jensen's whole line of reasoning is inextricably linked with the concept of *g*, and questioning *g* throws doubt on his whole system.

Although Jensen claims that the dispute over whether or not intelligence is fixed is a spurious one, [32] he writes as though IQ is essentially fixed. He defines intelligence as "performance estimate," but explicitly and implicitly keeps falling into the error of treating it as a measure of "potential ability." IQ tests were constructed with the assumption that intelligence *is* fixed. Since this assumption resulted in an attempt to find test items which yield constant scores, the constancy may be due more to the tests than to the subjects tested. Although Jensen claims that it is very difficult to change IQ scores by compensatory education,

> It seems quite wrong to attach so much importance to a change—or an absence of change—in IQ scores, when the test is designed both on the assumption that what is measured is a fixed and unchanging characteristic, and with the aim of producing constant IQ scores. Such a use of intelligence tests suggests insufficient appreciation of the assumptions implicit in their construction.[33]

There certainly is some irony in the fact that people who see IQ as essentially static in nature should use it as a measure of intellectual change.

Bereiter worked in programs for disadvantaged children in which the main purpose was to directly teach academic skills.

> Nevertheless, in spite of the fact that the program was never intended to raise IQ and that two-thirds of it was devoted to reading and arithmetic instruction having little or nothing to do with the skills called for on IQ tests, significant IQ gains have been regularly obtained. Over the last four replications they have averaged about 15 points. This seems to be too much of a gain to write off to test-wiseness and things of that sort, especially since the children's IQs were in the middle nineties to begin with and thus rose to substantially above average.[34]

Rex suggests that the field of psychometrics is possibly the least sensitive of empirical human studies. Psychometricians claim that no assertions are made about essential intelligence, only about measured intelligence.[35] Although they may pretend that this measured intelligence has no reference to practical, social and political implications, the repercussions for the tested individual can be crucial, as the following example illustrates.

> The junior-high-school counselor urged Ralph to drop some of his academic subjects on the ground that he was not "college material." The boy's dissatisfactions led his parents to see the counselor, who reported to them that Ralph's test results showed him to be "average" in ability. When questioned about the accuracy of the results, he argued that the boy's grades were consistent with the IQ test scores. This seemingly ironclad logic fell apart about eighteen months later. After the use of private reading and psychological specialists, Ralph's grades rose from C's to B's and his IQ test scores from approximately 100 to 120 on comparable tests.[36]

Although it is not claimed that every student can be helped in this way, it does show the fallacy of supporting the validity of the IQ score by reference to school grades and vice-versa.

It was mentioned above that Jensen claims to have isolated two genotypically distinct basic processes which underlie learning. Since conceptual (Level II) abilities have been most important for scholastic performance under traditional methods of instruction, he postulates that the genetic factors involved in each of these types of ability have become differentially distributed in the population.[37] He also states that because of this genetically different ability, ordinary IQ tests tap only one part of the spectrum of mental abilities of disadvantaged children. Therefore the low scores they obtain on IQ tests are not unfair to them because they yield inaccurate or invalid measurements, but because the tests measure abilities which they basically lack.[38] Because of this situation

> The ideal of educational opportunity should not be interpreted as uniformity of facilities, instructional techniques, and educational aims of all children. Diversity rather than uniformity of approaches and aims would seem to be the key to making education rewarding for children of different patterns of ability.[39]

Jensen fails to mention that in many cases children are now taught in one or the other style of learning. Brazziel notes that in the American south both black and white schools use an associative (rote) learning style. Since most of the urban northern black parents were reared in the south and therefore learned in this way, they pass this learning style on to their children. However, he states that if conceptual learning is used early in their educational experience, children can be conditioned to think in that manner. He is afraid that if teachers accept Jensen's position, many children will never have a chance to be exposed to conceptual learning styles.[40]

It is very interesting to note that Jensen and Rohwer have collaborated on studies of paired-associate learning, and yet their interpretations of the results are diametrically opposed. In these studies a student is presented with 20 word pairs, such as "elephant and pillow," and in subsequent trials is supposed to recall the second word when given the first. It was found that if a child was taught to elaborate on a pair of words, such as "the elephant is looking for his pillow," the rate of performance increased sharply. When this method was used with children from varied backgrounds, there was no class distinction in performance, even though the IQs differed. Jensen attributes the results to the fact that associative learning is genetically more evenly distributed in the population. Rohwer, on the other hand, argues that this experiment stresses the importance of an active process of learning which includes not a rote principle, but a highly inventive process of imagining.[41] It was also found that simply coaching lower-class children to make up "meaningful" associations for word pairs brought them up to the middle-class rate of learning.[42]

Since Jensen has concluded that the heritability of intelligence is 0.80, he leaves very little room for the influence of environment. On the other hand, most researchers realize that there are many ways in which environment may be a factor. It is impossible to study cognitive abilities in isolation from their social and motivational determinants, and if this were explicitly recognized, it might remove much of the mystery surrounding the interpretation of IQ test scores. Even the experienced black interviewer raised in Harlem gets only monosyllabic, defensive answers when questioning Harlem boys he knows in an *individual* setting, but in discussion with their peers, the same children

reveal intricate verbal reasoning skills in talking about their experiences.[43]

A large number of statistically significant correlates with IQ have been discovered, only a few of which are: height, weight, anxiety level, race and warmth of examiner, mother's attitude toward achievement, mother's concern for language development, home cultural level, father's occupation and years of schooling, and desire to master intellectual skills.[44] In the testing of laboratory animals there are many examples of situations in which the apparent strain differences in learning, activity levels, memory, etc., were found to stem from differences in fearfulness or some other circumstance peculiar to the test situation. Certainly this would be especially crucial in testing human behaviors, where the same testing conditions may tap different functions in different subjects or groups of subjects.[45]

There are a number of studies which show that the IQ of twins is systematically lower than that of non-twins by about five points,[46] and that firstborn children have higher IQ scores than their siblings. Firstborn children are overrepresented among high IQ students, and also among a wide variety of both intellectual and career high achievers. More than half of the National Merit Scholarship finalists belonging to families with from two to five children were firstborn. If one considers only those from five child families, 52% were firstborn, and only 6% were fifthborn.[47] A common explanation is the reduced attention that parents can give when they have more than one child, but in keeping with his general approach, Jensen discounts socio-psychological explanations. He attributes the differences to biological factors, although he does concede that it "almost certainly is not a genetic phenomenon."[48]

Although sensory deprivation in the black population is often cited, Jensen is not concerned with it. He only cites the black writer Kristin Hunter to the effect that ghetto babies must be the most thoroughly loved in the world, for they are cradled, cuddled, tickled, and passed from one set of loving arms to another, and then comments that "this does not sound like sensory deprivation."[49] Yet Ward's study of a black community in the south shows that when a child starts talking it is no longer considered to be a baby, and after that time there is little verbal interaction with adults.[50]

Another possible environmental factor is the dearth of institutions in the black community that function routinely at advanced cognitive levels. For example, there are too few black colleges, professional people, newspapers, etc. As the children grow older, "their environment is progressively less rich in the frequency of use of the next developmental cognitive structure."[51] Certainly the situation in which IQs drop solely as a function of age points to the environment as a major factor.[52]

Rosenfeld has graphically demonstrated that the attitudes of educational personnel in Harlem schools affect the performance of black children, not only on standardized tests, but everyday in the classroom.[53] There seems to be little question that the self-fulfilling prophecy is at work—the belief that blacks are intellectually inferior can cause both blacks and whites to behave in such a manner as to yield confirmatory evidence. Most of the experienced faculty are assigned to superior classes, whereas the poor students are saddled

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year after year with less qualified teachers.

Statistics are available to support the contention that poorly supported schools and poor pupil performance tend to be correlated. In 1963-1964 the mean expenditure per pupil in the United States was $455. In Kentucky the average was $300, and in depressed rural areas it was even less. In the High School Achievement Test on which the national average score is 100, 69% of the school districts of eastern Kentucky had average scores below 80, and none averaged as high as 100.[54]

Most researchers recognize that it is not valid to compare IQ scores of lower and middle class children because of their different socio-cultural environments. Therefore Socioeconomic Status (SES) measures which use schooling, occupation and income of parents have been devised in an attempt to equalize environments. The implication is that when there is a matching of SES between a sample of blacks and whites, any differences in IQ scores are due to genetic differences. Although Jensen assumes that SES measures actually match environments, this is not generally accepted. It is extremely difficult to accomplish standardization, and the fact is that "comparable groups" have never been standardized even for simple physical health or for nutrition during pregnancy.[55]

Even if one takes a given cut off point for the middle class, those few blacks who are middle class will be mostly very near the cut off, whereas many whites will be quite far from it. It follows that the mean class position of middle class blacks is likely to be much lower than the mean class position of middle class whites. Thus even if the class measures were perfect, the groups would not be equated.[56] It should be obvious that black and white families with identical incomes do not have equal access to economic options. Housing discrimination is only the most outstanding example of the fact that a dollar may be worth less to a black family than to a white one. With the disparity in quality of educational institutions, equal numbers of years of education do not imply equal educations, nor do they imply equal access to future benefits such as income levels or jobs. Therefore, blacks and whites have not been successfully matched for social class.

Bodmer concludes that the only real approach to determining the effect of environment on IQ would be to adopt black children into white families and vice versa, after which a comparison would be made of the

IQs of black children adopted into white families with white children adopted into comparable white families. He doubts that even this kind of experiment could be controlled, because it still would not remove the effects of race prejudice against blacks which exists in most white communities.[57] Rex maintains that any studies in which one attempts to equalize environments should be supplemented by an experiment in which

> the peoples of Africa conquer, capture and enslave some millions of European and American whites under conditions in which a very large proportion of the white population dies and in which the white culture is systematically destroyed, and in which finally a group of emancipated whites living in "good neighborhoods" are then compared to their Negro masters.[58]

Washburn has long argued that when comparing IQs between groups of people the same criteria which are applied to comparisons between white groups should be applied to comparisons between blacks and whites. If one looks at the literature, he finds that when two groups of whites differ in their IQ scores, the explanation is immediately sought in SES differences, but when blacks and whites differ in precisely the same way, the differences are said to be genetically determined.[59]

In attempting to correlate race and IQ, Jensen relies primarily on the results obtained by past studies of IQ. He seems to have no qualms in accepting the results of some 380 investigations of black intelligence reported in Shuey, which provide the basis for the conclusion that blacks average 15 points lower than whites on IQ tests. Since Jensen states that he puts very little confidence in a single test score—especially if it is the first test of a child from a poor background and of a different race from the examiner—it is surprising that he does not question the validity of the test results in Shuey. In his own testing programs Jensen usually spends from two to four sessions of one-half hour each to ensure that the child feels at ease in the testing situation. There is regularly an increase of from 8 to 10 IQ points between the first test and the subsequent one given after the orientation sessions.[60] Jensen certainly must be aware that these conditions were not present in the studies cited by Shuey, and yet he accepts the data as being valid.

The amount of credence Jensen places in test results seems to depend on whether or not they agree with his suppositions. For example, in commenting on the studies which have demonstrated that high birth rates among lower socioeconomic status people have *not* led to a general decline in average IQ, he states that the studies are far from adequate to justify complacency, and that they cannot be generalized beyond the specific generation studied or the white population upon which the studies were made.[61] On the other hand, studies made in the 1920s are used to substantiate his arguments, and he even applies to black IQ the heritability estimates standardized on the white population.

Even if one were to accept the data as correct, it is difficult to understand the importance of the average racial differences in IQ upon which Jensen places so much emphasis. He sees the 15 point average difference between blacks and whites as crucial, yet acknowledges that the average between siblings is about 12 points, and that some 20% of siblings differ by more than 20 IQ points.[62]

Heritability

The pivotal facet of Jensen's argument is his estimate of the heritability of intelligence, which has been derived primarily from the studies of monozygotic and dizygotic twins raised apart. Estimates of broad heritability answer the question: "What fraction of the variance of a phenotypic trait in a given population is caused by (or attributable to) genetic differences?"[63] Jensen denies that the problems in measuring intelligence affect determining its heritability.

> Whether we can or cannot measure intelligence . . . let it be emphasized that it makes no difference to the question of heritability. We do not estimate the heritability of some trait that lies hidden behind our measurements. We estimate the heritability of the phenotypes and these are the measurements themselves. Regardless of what our tests measure, the heritability tells us how much of the variance in these measurements is due to genetic factors.[64]

However, tests of IQ differ from measurements of conventional phenotypic characters in two different ways. IQ tests are analogous to physical readings made with a black box—a device whose internal working is unknown. Since it is not known what an IQ test or a black box measures or how it works, it is impossible to know to what extent the measurements carried out on different subjects are comparable or to what extent they are influenced by extraneous factors. "Thus IQ scores contain uncontrollable, systematic errors of unknown magnitude."[65] IQ scores also differ from conventional phenotypic characters in that they have no strict quantitative meaning. IQ is a rank order on a standardized test, and the intervals have been chosen so that the frequency of test scores in a reference population will be approximately normal.

The heritability index used by Jensen has been widely questioned. Reservations have been expressed about both the quantitative validity of the methods and the reality of the necessary assumptions. It is recognized that the choice of a particular statistical procedure with which to handle data to a great extent also chooses the result to be obtained.[66] Since heritability measurements are somewhat arbitrary, alternative methods of computing the fraction of genetic variance for intelligence might be less striking. Jensen concludes that the heritability of intelligence is 0.80,[67] but using the same data Cavalli-Sforza suggests an estimate of between 0.40 and 0.60,[68] and Jencks has stated that the chances are about two out of three that the heritability of intelligence is between 0.35 and 0.55.[69]

Since Jensen emphasizes the studies of monozygotic twins raised apart to support his estimate of heritability, it is instructive to note the actual IQ scores rather than just the overall average. In the four existing studies of monozygotic twins raised apart, average differences range from 6 to 14 points. In one sample of 38 pairs, at least 25% had within-pair differences of 16 IQ points on one of the tests,[70] and the average difference in those 38 pairs was 14 points.[71] This is only one point under the average difference between blacks and whites, and monozygotic twins have identical genotypes!

It might seem likely that a comparison between monozygotic and dizygotic twins raised apart would lead to a measure of the relative importance of genetic and environmental factors. However, there are two problems with such a method. First, the differences between the dizygous pairs represent only a fraction of the genetic differences which can exist between two individuals, that is, they are more related than two individuals taken at random from the population at large. Second, the environmental differences between monozygous twins encompass only a fraction of the total environmental differences which can exist between two individuals, that of the family. "In short, whereas the contrast betwen monozygous and dizygous twins minimizes genetic differences, it also tends to minimize environmental differences."[72]

A major problem is that heritability estimates have been derived only from studies on European and North American white populations. Jensen is aware of this and states that such estimates are "specific to the population sampled, the point in time, how the measurements are made, and the particular test used to obtain the measurements."[73] He also recognizes that estimates represent average values in sampled populations and do not necessarily apply either to differences within various subpopulations or to differences between subpopulations.[74] Nevertheless, he uses those estimates to discuss the differences in "inherited" intelligence between blacks and whites, and states that when used in conjunction with other information about the amounts of "relevant environmental variations within groups and overlap between groups," they can be used to formulate testable hypotheses that could "reduce the heredity-environment uncertainty concerning group differences."[75]

There are at least two implications of the fact that heritability is a population statistic. Since estimates depend on the extent of genetic and environmental variation in the population at the time it is studied, they are invalid not only for other populations, but also for the same population at a different time.[76] Also, since estimates represent an average of the individuals who make up the population, there is no way in which they can be used to predict how much any given individual will be affected by a change in his environment. There may possibly be a few relatively rare optimum environments in which a given individual's performance would be extensively modified.[77] Jensen carefully notes that heritability is a population statistic, and therefore has no sensible meaning with reference to a measurement or characteristic in an individual, which makes it impossible to partition a given person's IQ into hereditary and environmental components, e.g., 80% due to heredity and 20% due to environment. However, he does claim that one can make a probabilistic inference concerning the average amount of difference between the obtained IQ of an individual and the "genotypic value" of his intelligence.[78]

A second major problem is that of genotype-environment interaction. Since differences in IQ are certainly related to some extent to genetic differences, it is safe to assume that the genotype-environment correlation is significant in subpopulations composed of children raised by their biological parents or close

Since it is not known what an IQ test measures or how it works, it is impossible to know to what extent the measurements carried out on different subjects are comparable or to what extent they are influenced by extraneous factors.

relatives. If this is true, then estimates of heritability based on data which refer to such subpopulations cannot be valid, and yet the bulk of all the available data is precisely of this kind. In one set of twins data, two-thirds of the separated pairs were placed with members of the family, [79] and in the largest and most homogeneous of the four major twin studies (that of Burt), one member of each of the 53 pairs included in the study was raised by his or her natural parents.[80] Correlations between separated monozygotic twins would be highly sensitive to distortion by genotype-environment correlation, and yet in the published studies, no serious attempts have been made to minimize the effects of genotype-environment interaction.

Genotype-environment interaction can only be controlled by randomizing environments, and heritability estimates would be completely valid only if each possible genotypic child were placed randomly in each conceivable environment. At *the least* one would have to include black children in a representative range of environments. Hirsch is concerned with the number of possible genotypes and the number of potential environments which may influence trait expression. If one takes the next to smallest case—two genotypes in three environments or three genotypes in two environments—there are 60 types of interactions. He concludes that

> it is ridiculous to attempt to characterize an environment as generally favorable or unfavorable, or any genotypes as generally superior or inferior. Some average measure of an environmental influence is applicable *only* to those genotypes affected by it in the same way. Similarly, any rank ordering of genotypes can be applied only to those environments which preserve the ranks of their phenotypes.[81]

Layzer maintains that the only potentially useful data are phenotypic correlations between foster children raised together, which could possibly provide the lower limits for the effect of environment. The available data on such children suggest a broad heritability between 0.0 and 0.5.[82]

It seems to be generally agreed that certain studies of genotype-environment interactions vitiate heritability studies. For example, it has been noted that amino acid excretion patterns of monozygotic twins was less affected by separation than was the pattern of dizygotic twins, and a suggested explanation is that monozygotic twins select similar diets and environments. If this is a general phenomenon, the limits of behavioral genetics are very broad, because one would not ordinarily consider amino acid excretion to be a behavioral trait.[83]

A third major problem is that of gene-gene interaction. Although Jensen is aware that some traits may be truly polygenic, he prefers the assumption that in-

telligence is *not* polygenic, but rather is due to a number of genes with additive effects.

> It may be more heuristic . . . to work on the hope that the trait in question, though seemingly polygenic, is potentially analyzable into a number of Mendelian characters . . . . If it is a false hope, we can find out only by trying. I know of no scientific laws or principles which a priori make it a false hope.[84]

However, the greater the number of genes which contribute to a given trait, the more likely it is that nonadditive genetic effects will play an important role. It is therefore possible that human intelligence depends on the total genotype in a way that is too complex for the application of conventional heritability analyses.

Even if it *could* be demonstrated that there is a high heritability of intelligence in both black and white populations, that would still not be convincing evidence that the differences between the groups are genetic.

> No matter how high the heritability (unless it is 1), there is no assurance that a sufficiently great environmental difference does not account for the difference in the two means, especially when one considers that the environmental factors may differ qualitatively in the two groups.[85]

Conclusion

In reacting to his detractors, Jensen argues that reasonable hypotheses concerning questions which are socially and educationally relevant should be appropriately investigated and that the findings should be published and widely discussed not only by the scientific community, but the "general public as well."[86] This raises the question of the educational relevance of his hypothesis that blacks as a group are genetically inferior in intelligence. Jensen reiterates the caveat that we must maintain the distinction between the individual and the population when discussing racial differences in mental abilities, and that all persons must be regarded in terms of their individual qualities and merits. However, the implications of his hypothesis prevent the drawing of this distinction between individuals and groups. If each child is to be taught according to his potentialities, he would have to be tested individually for the abilty to learn in one way or the other, and his position in a racial or ethnic group would be irrelevant. Yet Jensen includes no suggestions for identifying a potential conceptual learner other than by noting skin color. He states that

> The question of *race* differences in intelligence comes up not when we deal with individuals as individuals, but when certain identifiable *groups* or subcultures within the society are brought into comparison with one another as *groups or populations*. It is only when the groups are disproportionately represented in what are commonly perceived as the most desirable social and occupational roles in society that the question arises concerning average differences among groups.[87]

Since learning is essentially an individual rather than a group process, it is not clear how one's membership in a racial or ethnic group is educationally relevant.

It is not surprising that Jensen's work is seen by many as an attack on special education programs for blacks.[88] They would agree with a statement written before publication of Jensen's article that

> With indecent haste, evidence is adduced to raise suspicions about the alleged inferiority of a people *before* society has completed even the early stages of correcting the inequities and the consequences of centuries of inequality in every form. Their inferiority is established *before* they have a chance to prove otherwise.[89]

And, in fact, Jensen's arguments have been used in opposition to the funding of various poverty programs.[90]

Jensen accuses his critics of demanding almost impossible criteria of certainty before proposing and investigating genetic hypotheses as opposed to environmental ones,[91] and complains that no one has yet produced any evidence on a properly controlled sample to demonstrate that it is possible to equalize the intellectual ability in representative samples of black and white children through statistical control of environment and education.[92] Situations which tend to support the importance of environment are interpreted in genetic terms. For example, he refers to a 6th grade class in the Windsor Hills Elementary School in Los Angeles, which was 90% black and in which the mean IQ score was 115. Rather than considering this as possible evidence that environment affects performance on IQ tests, he asks "why should anyone be surprised that there are Negro children having IQs of 115 or higher, or that they should be concentrated in the affluent integrated neighborhood of Los Angeles?"[93] He then "explains" the situation in terms of the superior genetic endowment of the parents rather than as a result of a good environment.

It is relatively easy to gain the impression that Jensen feels that his hypothesis has been validated by the data. Yet this is not so, for he states:

> So all we are left with are various lines of evidence, no one of which is definitive alone, but which, viewed all together, make it a not unreasonable hypothesis that genetic factors are strongly implicated in the average Negro-white intelligence difference.[94]

Since he is convinced that the research to test his hypothesis is entirely possible, but just has not been done,[95] one wonders why he did not conduct the research rather than publish so many articles and books based on the same inadequate data. It would seem that if Jensen were really concerned with an unbiased testing of the heritable component in intelligence differences between human groups, he would have attempted to develop an operational definition for equal social conditions. He then could have devised scientific experiments in which a systematic effort would be made to ensure that his subjects fit that definition.

One attempt to explain Jensen's approach is that he has "girded himself for a holy war against 'environmentalists,' "[96] and that his position is most understandable when seen as a reaction against the "iniquities" of his professional colleagues who take an essentially environmentalist viewpoint,[97] and whom he accuses of having branded him as a "moral pariah" for his approach.[98]

Jensen sees little validity in the many criticisms of his work. He refers to the "storm of ideologically, often politically, motivated protests, misinterpretations, and vilifications" which his article prompted,[99] and characterizes the majority of the letters and articles in the summer 1969 issue of the *Harvard Educational Review* as "only masquerading as serious critiques of my

article."[100] Eysenck, who is Jensen's British counterpart, claims that "truly competent judges" have not found any serious error in Jensen's statements,[101] and in 1972 Jensen saw no reason to substantively revise any of the main points of his 1969 article.[102]

Jensen is unhappy with critics who are concerned with the moral, political and social policy dimensions of a general acceptance of his hypothesis. He insists that such issues should be kept clearly distinct from the scientifically answerable aspects of the question,[103] giving the impression that he sees the situation only as representing a normal scientific exchange between the representatives of two alternative scientific theories. But as Fried points out:

> This is not a question of digging the "Mohole" or not, or whether *Homo habilis* is or is not an Australopithecus. It is more like dividing on the question of whether or not to exterminate six million Jews: one side says no and presents its arguments, and the other side says yes and presents its arguments, and this too becomes a debatable scientific question.[104]

Even if it could be demonstrated that there is a high heritability of intelligence in both black and white populations, that would still not be convincing evidence that the differences between the groups are genetic.

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Viewed processually, the appearance and reception of Jesus as the Christ is a paradigm of a recurrent phenomenon in which the salvific potentialities of the creative process itself are actualized here and now in an individual's costly adherence to the divine logic of the process by which he was created and by which he was designed for responsive and responsible participation in physical, biological and cultural evolution. . . .

No, the fact is that now, at this point in time, the end of the present age, he has appeared once for all to abolish sin by the sacrifice of himself. And just as surely as it is appointed for all men to die once, and after that pass to their judgment, so is it certain that Christ was offered once to bear the sins of many and after that, to those who look to him, he will appear a second time, not this time to deal with sin, but to bring to full salvation those who eagerly await him.

(*Above*) George Arkell Riggan, "Epilogue to the Symposium on Science and Human Purpose" *Zygon* 8, 469 (1974)

(*Below*) Hebrews 9:26-28 (Phillips)

The Brain and Behavior

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Presumptuous but Necessary

A discussion of the relationship between the brain and behavior at this point in the development of science may be both presumptuous and necessary. Presumptuous, because the disagreement among psychologists themselves regarding theory, method and the specific subject matter of psychology is so vast that little consensus could be found by Koch (1959, 1962) in his six volume review of psychology. Karczmar and Eccles' volume *Brain and Human Behavior* (1971) does not indicate that the neurosciences are significantly better off than psychology when they come to interpreting their research findings. Yet, however presumptuous the task appears, it seems necessary to attempt to bring some order and conceptual understanding to the exponential increase in the research evidenced by an increase in the size and number of journals in both psychology and neurosciences.

This paper presents (1) a description of two significant areas of research in psychology, (2) an analysis of some methodological implications of these areas for brain research, and (3) a discussion of some of the traditional solutions to the brain-behavior problem.

Attitude Change

Attitude change is one of the most recently developed and most actively investigated areas of research in psychology. An examination of the literature indicates that this area has generated more research and theorizing than any other area in the last ten to fifteen years with the possible exception of behavior therapy (Abelson, Aronson, McGuire, Newcomb, Rosenberg, and Tannenbaum, 1966).

Although some reviewers of the development of attitude theory and research do not agree on whether the trend is moving from conceptualizing attitudes unidimensionally to multidimensionally (Fishbein, 1967), or from multidimensionally to unidimensionally (Insko, 1968), there does seem to be general agreement that three factors are involved: affect, cognition, and motivation-behavior (Secord and Backman, 1964). In the unidimensional view the affective tendency to evaluate objects positively or negatively is the attitude. Cognitions (beliefs) and behavior are some complex function of the attitude proper. In the multidimensional view all three factors are components of the attitude. Only future research will determine which is the correct view. However, in either view affective, cognitive and conative components are functionally and intimately linked. The linkage of these three components can also be observed in the discussion of personality. Rogers (1959) and Gendlin (1962) specifically assert that cognition and feeling cannot be separated. Gendlin (1964) also maintains that behavior can carry forward or symbolize feelings. Furthermore, Rogers (1959) argues that a fully functioning individual is "congruent in his experience (of the feeling), his awareness (of it), and his expression (of it)," i.e., in his affect, cognitions and his behavior. In addition, Maddi (1972) asserts there is a whole category of personality theory and research which can be classified as a consistency model of personality. Consequently it is asserted that the three components of attitudes also can be the contents of personality. This does not deny that there may be different types of attitudes in Kelman's (1966, 1967) sense or Katz's (1960; Katz and Stotland, 1959) sense. Nor does it deny that there may be varying sub-organizations within or between the components in Newcomb's (1959) or Rosenberg's (1960a, 1960b) sense. Nor does it deny that some other content(s) or hierarchical organization may also exist, e.g., the self. The assertion is simply that the three components of attitudes are the contents of personality and are organized and changed according to the nature of the personality process.

The central role given to the concept of congruence, consistency or balance (the terms are equivalent) in personality theories (Maddi, 1972) seems to parallel its central role in almost every attitude change theory (Festinger, 1957; Heider, 1958; Newcomb, 1959; Osgood and Tannenbaum, 1955; Rokeach and Rothman, 1965; Rosenberg 1960a, 1960b). Festinger asserts that dissonance between two cognitions (or a cognition and a behavior) leads to change. Heider describes imbalanced affect situations among two persons and an object as productive of change. Newcomb, on the other hand, speaks of the strain towards symmetry in a system of orientations is disequilibrium. In Osgood and Tannenbaum's mathematical theory, evaluations move

toward congruity and simplicity. Rokeach and Rothman tried to improve on Osgood and Tannenbaum's theory and describe belief congruence in terms of gestalt-like configurations. Rosenberg describes attitude change in terms of inconsistency of affect and cognitions. Clearly these theories are different, partly because they are attempting to explain different aspects of attitude change. Nevertheless, the overriding similarity is congruence or balance as an explanatory concept. The principle of reinforcement is used as an auxiliary explanatory concept by some of the above theorists. Others (Hovland, Janis and Kelley, 1953; Sarnoff, 1962) use it as a central concept. Assuming that incongruence and reinforcement do in fact produce attitude change it is not difficult to explain why this should be so. If personality is an ongoing process of organized components (attitudes) which is interacting with the environment, imbalance in the organization or stimuli from the environment (reinforcement) could lead to reorganization (attitude change) of the expected environmental contingencies. A more extensive review of the theories which use congruence to explain attitude change cannot be made at this point. However, if the three components of attitude: affect, cognition, and conation, are also the contents of personality, then it is to be expected that congruence or balance should play a central role in explaining attitude change as well as a great deal of psychological functionings. This expectation can be supported in Insko's (1968) as well as Abelson's (1968) survey of attitude change theory and research. More recently Feather (1971) has conceptualized his extensive research on behavioral and cognitive expectancies in a consistency model.

Imitation

The second area of research to be examined is Bandura's (1965, 1971), and Bandura and Walter's (1965) extensive investigation of imitation. The basic research setting is a room full of toys or games in which an adult (experimenter-confederate) is observed directly or indirectly by a child who is also involved in play to some extent. If, for example, the adult stages an angry outburst and starts beating one of the larger dolls in a specifically predetermined manner, then what the child does at a later time depends on what happens to the adult after his angry outburst. The expression of the adult-confederate's anger is carried out in specific behavioral, verbal and emotional actions which are capable of direct imitation. The effects on a child of observing this anger or aggression depends on what happened to the adult-confederate. If the major experimenter opens the door to the playroom at a critically staged moment, finds the adult-confederate beating the doll, and reprimands him sharply for his actions, then the child does not imitate the adult. If on the other hand, the adult-confederate's aggressive actions go "undetected and unpunished," soon the child begins to beat the doll in a total detailed imitation including all the verbal, behavioral and emotional specifics. In addition to the total imitation the child often adds novel aggressive behavior or verbalization of his own. Observation of "undetected and unpunished" aggression disinhibits the effects of previously observed "punishment" of an adult-confederate.

However, perhaps of equal interest for the consideration of this paper is the fact not only that imitation of total detected complex aggression acts occur, but that they are imitated *in toto* after one observation. Bandura (1965) and Bandura and Walters (1965) have shown this type of imitation takes place for many kinds of acts. Thus the significance of their research has broad implication in that it is not limited to just one type of action or behavior.

Brain centers from considerably different areas and different systems coordinate the behaviors they regulate in a consistent pattern.

The reason for considering the two types of research described above together may not be obvious. However, their similarity becomes more apparent when the different aspects of imitation are examined. In all types of imitation investigated there are specific (and often varied) motor responses, verbal statements and emotional expressions. These three components appear to be the same components that are involved in the attitude change research, though in the latter they are most often not acted out, but described in paper-and-pencil questionnaires. Also the consistency or congruence of the components of the imitated behavior is manifestly evident, most probably because they were combined and expressed simultaneously in adult-confederate-model. While it is outside the scope of this paper, it might be interesting to speculate on the infrequency of inconsistent verbal and motor behavior accompanying strong emotion in normal individuals.

Implications for Brain Research

The similarity between functional components involved in these two bodies of psychological literature has been stated. Now it is necessary to examine their methodological implication for brain research. It should be noted that the three components being considered, i.e., affect or emotion, speech with its attendant meanings, and motor activity with the impulses behind it, are largely regulated by different areas of the brain. Emotion is largely regulated by the limbic system which is a subcortical system. Meaningful verbalization, with all its complexities excluding the motor movements of the mouth, is mediated through a number of temporal and lower parietal lobe centers, and motor responses are regulated through an area along the central fissure in the frontal lobe. While their exact location is not important for this discussion, their diversity is. Yet, the observable behavior which stems from these diverse points in the brain becomes integrated, i.e., brain centers from considerably different areas and different systems coordinate the behaviors they regulate in a consistent or congruent pattern. This congruent pattern is the first implication for neuroresearch.

As indicated above, Bandura and Walters (1965) have shown congruent patterns can be acquired in one observation. They call it vicarious learning. What is important here, however, is not learning but the congruent pattern itself. For the attitude change research

the pattern is already in the individual and only assessed by the researcher. The consistency or congruency comes into play when the experimenter produces inconsistency either through verbal persuasion or emotional manipulation. When attitude change occurs with the individual, a new consistency or congruency among the verbal, affective and behavioral-motivational components results. Change appears to take place because the experimental conditions prevent return to the original congruency. This need or tendency to congruency is the second implication though it may well be only a more general statement of the former.

Congruency or consistency may appear to be only a new term for old neuroscience concepts such as integration, organization or system. However, the components of the congruent psychological patterns or processes are different. It is this difference which appears to be of immense methodological importance if meaningful research work on the brain-behavior problem is to move forward towards a solution. Neuroscience as well as physiological psychology has long attempted to coordinate specific motor, memory or sensory experiences with specific brain mechanism or neural structure.

However, it is the larger or more complex organization, described in the imitation and attitude change research under the term consistency or congruency, which appears never to have been related to a neural substratum and which may provide the appropriate structures, processes, or mechanisms for coordinating psychological functions and brain functions. Which size units are the most appropriate to investigate and which are the most fundamental to either or both areas of research? This question raises an empirical and methodological issue which may have epistemological and theoretical implications. The issue is not new. The molar-molecular or the wholistic-atomistic issue has appeared frequently in the history of biological, psychological and social sciences. (Matson, 1964; Chaplin and Krawiec, 1968). Perhaps the issue of which unit to employ is related to a more basic issue. Scientists in the social or life sciences who prefer the automatic or molecular level concepts tend to view their field after the model of physics or chemistry, while those who prefer molar or wholistic level concepts tend not to model their discipline after physics (Allport, 1947; Jessor, 1958).

To use an operationally defined neural concept or event to explain a mental or behavioral event is an equivocation of its meaning.

The occurrences of differences in the model, processes and units to be employed between the sciences which deal with nonliving inorganic matter and those which deal with living organic matter is not surprising since by definition living matter is organized and reactive. However, the human sciences, i.e., those which deal with what has traditionally been called mind or behavior, are manifestly different in experimental methodology from the physical sciences. Some examples will be given from psychology at the conclusion of this section of the paper. Experimenters in perception and learning regularly ask the subjects to report on the characteristics of the stimulus or their responses, or more significantly, whether the apparatus is correctly adjusted (fitted) to the part of the body being employed in the research. This subject effect seems to have no counterpart in research in the physical sciences (Orne, 1962). Furthermore, it is difficult, if not impossible, to get social psychology research published if controls for "seeing through" the deception or manipulation involved are not adequate. Frequently, subjects who do "see through" the manipulation are excluded from the data tabulation.

Subject reactivity in some form (e.g., response bias and demand characteristics) is probably the biggest single methodological problem in social psychology and personality testing (Orne, 1962; Block, 1972; Weber and Cook, 1972). This methodological problem reflects something fundamentally different in the subject matter itself. This difference appears to me to call for a different model and different size unit in the human sciences, which in turn calls for a relating of these units to those which are appropriate at the brain level. Although the above discussion may not have brought the solution to the mind-brain problem, hopefully it has clarified some of the methodological issues.

Traditional Solutions to Mind-Brain Problem

Beloff (1962) maintains that the traditional positions on the mind-brain problem reduce to four logical possibilities: (1) mind is reducible to brain, (2) brain is reducible to mind, (3) there are two distinct separate levels which may or may not interact, and (4) the two are not really separate, but related to a third more fundamental phenomenon. Beloff's assignment of the traditional views to these four logical possibilities is not of importance here and the four logical positions serve only as a backdrop with which to interact. While different schools of psychology have preferred one or another of the four solutions (Marx and Hillix, 1963), physiological psychologists (Morgan, 1965) and many neuroscientists seem to favor explicitly or implicitly reducing mental events to brain events (Karczmar and Eccles, 1971). While there are problems with each position on the mind-body problem, there seem to be particular methodological problems with accepting the reduction of mind to brain. In spite of the sophisticated discussion of advanced research in neuroscience and its implications for the brain behavior problem (e.g., Taylor; McMullin's and Toumin's attempt to avoid reductionism and dualism by accepting "Congruency" systems), Karczmar and Eccles (1971, p. 14,15) seem to embrace an implicit reductionism, apparently unaware of the methodological inadequacies of such a position.

The occurrence of neurological "expectancy" waves or "decision" waves prior to a decision appears to be accepted as an explanation for a decision even if it does not appear to be explanatory, or at least "feel" explanatory in an interior sense. The "even if" part of the argument does not create the difficulty. It is the acceptance of a neural correlate as an explanatory concept for a conscious event (even if it antedates it) that creates a basic scientific methodological problem that cannot be surmounted. If a scientific concept is to have scientific meaning, it must be empirically and opera-

The reduction of mental events to brain events is excluded in science. Neural events or brain events can be only correlates of mind or behavioral events in a scientific theory.

tionally defined, i.e., defined by the measurements used to assess it, or be a hypothetical construct grounded on both its anterior and posterior side in operationally defined constructs. For example, the physical concept of force is defined as the product of two operationally defined entities, mass and acceleration.

There is nothing in the operational definition (measurement) of the firing of neuron(s) which would or could relate a wave of negative electrical potential to a conscious decision. Such a wave might "explain" other waves or the absence or presence of electrical activity in related nerves, but it cannot by its own definition explain a conscious or mental event. To use an operationally defined neural concept or event to explain a mental or behavioral event is an equivocation of its meaning, and creates instead a speculative concept (which is devoid of scientific meaning) but which masquerades as scientific because its scientific "name" remains. That is, scientific concepts obtain their meaning from their operational definition and by being embedded in a network of similarly defined scientific concepts. When a concept is used to explain events outside its own operationally defined network, it loses its meaning and thus its capacity to explain.

Consequently, the reduction of mental events to brain events is excluded in science, i.e., reductionism is not a scientifically acceptable solution to the mind-brain problem. This conclusion does not imply that dualism or some other solution is correct. Time and space do not permit the discussion of other alternative solutions to the brain-behavior problem. The elimination of reductionism occurs on scientific grounds, not metaphysical or philosophical ones, i.e., science by its own nature—the use of operational constructs—is responsible for this exclusion. Thus, neural events or brain events can be only correlates of mind or behavioral events in a scientific theory.

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Skinner's data are real, frighteningly real, and should serve to point up the disturbing fact that man is rapidly falling beneath, not moving beyond, his freedom and intrinsic worth by turning away from God.

Lawrence J. Crabb

"Beyond or Beneath Freedom and Dignity," in *The Scientist and Ethical Decision,* C. Hatfield, Ed., InterVarsity Press, p. 154 (1973)

Literature on Glossolalia

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Comparatively, there is little material available on glossolalia although the amount of literature has increased drastically since April 3, 1960, the date usually regarded as marking the "new-pentetration" of tongue-speech into the mainline denominations. Prior to 1950 there were only a handful of studies available, and some of these were not accessible to English readers.[28,35,46] Generally, the literature reflects a lack of clarity on several fronts, especially regarding definition. Moreover, much of the writing is characterized by a highly prejudicial viewpoint with respect to the usefulness of the phenomenon. Thus the description of what is happening is frequently lost in the attempt to either justify the experience or consign its adherents to the sphere of the demonic.

The reader who is not at all familiar with the tongues phenomenon would do well to look at some general introduction to the subject for orientation and reference. The volume by Anthony Hoekema[20] or that by Larry Christenson[6] would be found inclusive though non-technical. In addition, there are numerous popularly written articles that are nonetheless accurate,[64,65,66,71] although many of the so-called "secular" magazines present the phenomenon in a rather negative light.[89,90,91,92] A volume appearing too late to be included in the references below is *Speaking in Tongues: Let's Talk About It*, edited by Watson E. Mills (Word, 1973). The book contains ten essays by leading authorities in the subject. The foreword is by Martin Marty.

The literature on glossolalia falls into one of several categories. Since the purpose of this essay is basically bibliographic, an attempt will be made to indicate something of the nature and usefulness of the various materials included in the bibliography proper.

Primary Materials

The reference to tongues in Acts and I Corinthians exhaust the direct instances of the phenomenon in the biblical record. The reference in Mark 16:17 is interesting but there is no reason to include this spurious text among the primary ones, a conclusion reached by virtually all scholars including Pentecostals.[69]

The Old Testament background is important and can be approached in terms of prophetic ecstaticism.[17,27] Extra-biblical references bearing on glossolalia have been examined by Stuart Currie,[54] and Ira Martin[30,62] has assembled some of the tests that could be regarded as glossolalic in nature. The church fathers provide several references to the phenomenon.[106-114] These are discussed thoroughly in Kenneth Bruce Welliver.[98]

There are numerous sources for obtaining transliterated samples of tongue speech.[7,16,40] These examples are worthy of careful study and evaluation.

Reference Materials

Probably the earliest published bibliography in English on glossolalia appeared over two decades ago.[70] In 1970 Ira Martin produced a bibliography that contained 678 entries.[31] The latter is virtually definitive except for some obscure periodical articles and privately printed materials. While some attention is given to foreign works, the list is basically English. A more recent list by this writer includes contemporary writings as well.[50] These can be supplemented with the extensive bibliographies found in recent books on tongues.[22,23,25,33,40]

Only recently, David W. Faupel compiled a bibliography of the American Pentecostal movement.[48] It does not refer to any works on tongues not already alluded to in the lists cited above, although it does treat other areas of Pentecostalism in much greater detail than existing bibliographies.

There are numerous dictionary[79,84,86] and encyclopedia articles[78,80,81,88] that can be consulted with profit. Of particular interest are the articles by Elias Andrews[73,74,75] in the *Interpreter's Dictionary of the Bible*. Additional reference materials can be found in Kittel,[77] Bauer,[76] and other lexicons[72,85,87] and lexical aids.[82,83]

Historical Studies

For years the standard treatment of the history of glossolalia has been that of George Barton Cutten.[7] It is an objective and inclusive account of the occurrences of tongues throughout the history of the church. The work is frequently cited in more recent attempts to trace the movement. Certainly, Cutten's work is more "historical" than "psychological" although he did anticipate this latter dimension that is presently receiving considerable attention.

The Pentecostals themselves offer the reader many histories; however, glossolalia is often given only cursory attention since it is but one facet in the broader context of Pentecostal studies.

Among the many works of Donald Gee, a good example of his history writing abilities may be seen in *The Pentecostal Movement.*[13] Another Pentecostal effort is that of Frank Ewart,[9] and still more recently the historian Vinson Synan has treated Pentecostalism in America.[44] These writers do basically what Cutten did though they are not quite so detached as he.

Stanley H. Frodsham has written an excellent work that treats not only the history of glossolalia and its present-day occurrences in America, but also in Chile, West Africa, China and Egypt.[11]

Pentecostalism in its larger context is the subject of a recently translated German volume by Walter Hollenweger.[21] This massive tome is the most definitive statement of modern Pentecostalism. It contains a wealth of information about events, leaders and beliefs. The historical section is obviously selective and is not so comprehensive as Nils Bloch-Hoell[4] or John T. Nichol.[36] All of these volumes pay considerable attention to glossolalia though this is always done within the broader framework.

Sociocultural Studies

Enthusiastic, ecstatic possession and other similiar phenomena have long intrigued anthropologists. There have been a number of cross-cultural studies of ethnographic data on glossolalia. Carlyle L. May[63] did a survey of glossolalia and related phenomena in non-Christian religions. He found the roots of the phenomenon to be in the ancient religions of Asia Minor. He further concluded that glossolalia and kindred phenomena are confined to those areas where spirit possession is found.

Erika Bourguignon has done studies on the larger question of religion in native societies.[47] She notes a variety of forms of glossolalia among the primitives. In some cases the practice was part of a fabric that included trances and the like; other times tongue speech occurred as isolated behavior. Her student, Felicitas D. Goodman, recently published a monograph[16] that follows a similar tack. Her cross-cultural study essentially views glossolalia as aberrant behavior. The glossolalist modifies his speech into a certain pattern because he is in a mental state that approximates a trance. Glossolalia then becomes an artifact of a hyper-aroused mental state.

R.A. Knox studied the occurrences of glossolalia in the eighteenth and nineteenth centuries.[24] Looking at traditional Christian groups he discovered that tongue speech is aimed at reestablishing an experimental basis for religious faith—a dimension that had been replaced by intellectualism. He concluded that glossolalia was a proof of the presence of God in the believer's life, a view that has been advanced to explain the references to tongues in Acts.[33]

In some studies prior to 1960, the attempt was made to relate glossolalia to Pentecostal and Holiness groups. These groups were usually characterized by their marginal socioeconomic position in society as well as by a lower degree of intellectual sophistication. The various forms of ecstatic behavior, including tongues, served both as an outlet for repressed conflicts and as a means of demonstrating that regardless of one's plight within society there is a certain degree of righteousness available.[26, 53]

But with the inroads of glossolalia into virtually every Protestant denomination, a newer position is to regard the phenomenon as a *rite de passage*[93] since the participants are neither marginal socially nor intellectually. They do, however, need to demonstrate significant behavorial change.

Tongues and Other Traditions

The spread of glossolalia into the various denominations of Protestantism can be traced in the various publications of the Full Gospel Business Men's Fellowship International. These include *Voice*[101] and *View*[105] and numerous others.[99,100,102,103] *Trinity,*[104] the now defunct publication of the Blessed Trinity Society, is an excellent source for testimonia.

It is difficult to evaluate the spread of neo-Pentecostalism into Catholicism because it is so recent a development and there has not been sufficient time for a critical study to appear. There have been a number of helpful books,[10,14,37] however, including two significant works by Dorothy and Kevin Ranaghan.[38,39] These authors estimate that 30,000 people may be involved in the spiritual renewal within Catholic ranks. Several articles by Kilian McDonnell[59,60,61] are valuable since he affords the reader an inside view of the emerging Catholic-Pentecostal tradition.

As glossolalia began to crop up in the various mainline denominations the need arose for some official pronouncement on the subject from the various groups whose lives were touched by it. The episcopal diocese of California issued the late Bishop Pike a "preliminary report"[94] in 1963. His "pastoral letter"[67] grew out of the findings of the twenty page report submitted by a panel of nine persons.

Other official reports include those issued by study commissions of the Lutheran[95] and Presbyterian[96] churches.

Psychological Studies

Since William James, students of religion have sought to explain most so-called religious phenomena in terms of various psychological models. The practice of speaking in tongues did not escape close scrutiny by those disciplined in psychology of religion. Cutten did not hesitate to postulate that glossolalia could be "explained by recognized psychological laws."[7] Once established, the "psychological" dimension of glossolalia afforded those most opposed to the phenomenon another way to disparage it. Some initial studies enabled the critics to dismiss the one who speaks in tongues as being pathological[29] or engaging in some kind of automatic speech.[28] Eddison Mosimann[35] likened glossolalia to an

hypnoptic state, while Martin labeled it a psychic catharsis akin to ecstaticism.[62] These earlier estimates[55, 56,57] gradually gave way to more exacting studies and to the chagrin of many, the glossolalist was pronounced no more "abnormal" than the ordinary non-tongue speaking Christian.

Formal studies such as that recently completed by John P. Kildahl[25] have substantiated the fact that there is very little difference between the mental health of active churchgoers who speak in tongues and those who do not. This conclusion has been supported by numerous other studies.[16,40] Goodman regards the glossolalic behavior as a state of dissociation while Wayne Oates[51] speaks of "psychological communication." Both refuse to regard the behavior as pathological. Generally, at the moment, there is a reluctance to regard the "state" into which a glossolalist goes when he speaks, however defined, as a pathological one.

Biblical Studies

The vast amount of scholarly research that has been done with reference to Acts is slow to find its way into the discussions about glossolalia. The problem of the sources used in the composition of Acts, for example, as well as the role of the redactor, has received little attention except in one or two recent works.[33,52] Traditionally, interpreters have regarded the "other tongues" in Acts 2:4 as either a reference to foreign languages,[3,18,43] to a miracle of hearing,[7,41] or to unintelligible speech.[15] There is, of course, considerable variation within the groups, but few attempts to interpret tongues within the broader context of Lukan theology.

The apparent ambivalence over glossolalia in Paul has allowed him to be the champion of both those who support[58] and those who oppose[1] tongues. Consequently, there is little agreement among scholars regarding the interpretation of tongues in I Corinthians. Some find the background of the phenomenon in Hellenism, noting there numerous examples of ecstaticism.[19,34] Others looks to a Palestinian background.[3] This *religionsgeschicte* approach is fascinating but in such discussions the meaning of glossolalia often goes wanting.

The problem of the exact relationship between the tongues in Acts and I Corinthians is an area that needs careful attention. The majority of scholars concede that Paul was not attacking tongues per se, but rather he was attempting to give some estimate of their relative value. His attitude appears to have been reserved but not altogether negative.[68]

Theological Studies

There have been several works that are critical of glossolalia from a theological perspective.[5,32] Anthony Hoekema points to basic inconsistencies that develop if the validity of glossolalia as a spiritual experience is maintained alongside other doctrines of orthodoxy.[20] The basic point where most studies of this variety end is the biblical principle put forth by Paul: "Does glossolalia help build up the community?" (I Cor. 14:5). Again, this only attests to the need for a definitive evaluation of the biblical evidence.

Positive theological evaluations arise mainly from within the Pentecostal tradition. These studies include works by Larry Christenson,[6] a Lutheran pastor, and W.H. Turner.[45] Although writing from outside of Pentecostal ranks, John Kildahl[25] and Watson Mills[33] give some theological overview. A symposium edited by Wade Horton[22] consists of seven articles by prominent Pentecostals. It affords the reader a good summary of glossolalia from varying perspectives within Pentecostalism.

Testimonia

Within the Pentecostal publications the list of testimonia would be legion. The reader is referred to the various periodicals[99-105] where any number of case histories are reported.

A popular book by John Sherrill[42] written in journalistic style recounts the reporter's study of the phenomenon together with his own involvement in it. More detailed and carefully drawn case studies are reported in Goodman,[16] Kildahl,[25] Samarin,[40] and Vivier.[97]

Marcus Bach's work is readable and traces the quest for the "inner ecstasy" through the use of hallucinogenic drugs and various meditative practices to glossolalia.[2]

Unpublished Materials

Lincoln M. Vivier's doctoral dissertation[97] remains one of the most significant unpublished items for the study of glossolalia. It treats the biblical evidence and the occurences of tongue-speech within Christian history. Also, it includes the results of a survey he conducted in which he concludes that glossolalists are somewhat below average in their psychological adjustment.

There are numerous other reports, papers and theses on the subject. Lists may be found in Martin.[31]

The literally thousands of privately printed tracts and pamphlets prevent any bibliography on glossolalia from being definitive. Perhaps the best collection of these may be found at the Oral Roberts University, though it is by no means complete.

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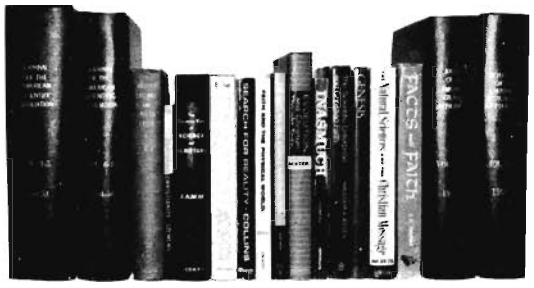
Our attitude to life is always a reflection of our attitude to God. Saying "Yes" to God is saying "Yes" to life, to all its problems and difficulties–"Yes" instead of "No," an attitude of adventure instead of one of going on strike. In such an adventure we commit our entire being. It is not an escape. It is not obscurantism. We do not have to give up our reason, our intelligence, our knowledge, our faculty to judge, nor our emotions, our likes, our desires, our instincts, our conscious and unconscious aspirations, but rather to place them all in God's hands, so that he may direct, stimulate, fertilize, develop, and use them.

Paul Tournier
The Adventure of Living, Harper & Row (1965) p. 196.

BOOK  REVIEWS

THE NEW GENETICS AND THE FUTURE OF MAN by Michael Hamilton, Editor, Wm. B. Eerdmans, Grand Rapids, Michigan 1972. 242 pp. Paperback. $3.95.

If abortion is one of the issues in which the concerns and disciplines of science and the Christian faith are particularly focussed, genetic engineering is certainly another. It is not quite so immediately present as abortion, but its potentialities for the future are, if possible, even more frightening or promising depending on one's outlook. This book, edited by the Canon of Washington Cathedral, was produced through the cooperation of the National Presbyterian Center, the Board of Christian Social Concerns of the United Methodist Church, and the Episcopal Cathedral of the Diocese of Washington. It is divided into three principal sections, each with four subsections: (1) New Beginnings in Life, (2) Genetic Therapy, and (3) Pollution and Health. Each section is initiated by a paper by a scientist, and the remaining three papers represent reactions and responses by other scientists, lawyers, theologians, and philosophers. The first two divisions of the book are obviously closely related, whereas the third seems like rather a different topic to be included in the same covers. Because it does seem rather "far out" in many cases, the subject of genetic engineering is not as familiar to the informed Christian as it should be. It is fortunately one of the purposes of this book to further communication between laymen and scientists. Every Christian with any kind of social responsibility should have this book on his must reading list.

The lead article under "New Beginnings of Life" is by Leon R. Kass, a biologist and Executive Secretary of the Committee on the Life Sciences and Social Policy of the National Research Council-National Academy of Sciences. Dr. Kass takes a somewhat dim view of the various possibilities involved in man's control over new ways to begin life. "Faddishness has replaced tuberculosis as the scourge of the intellectual classes." He considers the state of the art and ethical questions involved in *in vitro* fertilization, the fertilization in the test tube of human egg by human sperm, and the subsequent laboratory culture of the young embryo; the state of the art and ethical questions involved in cloning or asexual reproduction, the derivation of new individuals from a single parent with whom they are genetically identical; and questions of power, dehumanization and wisdom. He strikes a telling blow at modern reactions in a footnote,

> The current sentimentality which endorses all acts done lovingly because they are lovingly done leads to some strange judgments. A teacher friend recently asked one student who was having difficulty appreciating the crimes of Oedipus, what she would think if she discovered that her sister was having an affair with their father. The girl replied that, although she was personally disgusted by the prospect for herself, she thought that there was probably nothing wrong with it "provided that they (sister and father) had a good relationship." It is unlikely that individuals or a whole society which is unable to find reasons (other than genetic ones) for rejecting incest will be able to sort out any of the questions raised in this paper.

Kass is particularly disturbed by the inherent tendency toward dehumanization involved in cloning.

> For man is the watershed which divides the world into those things that belong to nature and those that are made by men. To lay one's hands on human generation is to take a major step toward making man himself simply another of the man-made things. . . . To the extent that we view as knowable only those aspects of nature which are reducible to material for manipulation, to that extent we surrender our human and humanizing ability to perceive and sense the mysteries of nature.

Kass makes no claim to being either "a theologian or a student of religion," but his arguments are consciously informed by the "great religious traditions which have informed our civilization." His is a prophetic voice that deserves to be heard.

> Let us simply look at what we have done in our conquest of nonhuman nature. We find there no grounds for optimism as we now consider offers to turn our technology loose on human nature. In absence of standards to guide and restrain the use of this awesome power, we can only dehumanize man as we have despoiled our planet.'

Respondent Frank P. Grad, Professor of Law at Columbia Law School, attempts to mitigate the legal and ethical consequences implied by Dr. Kass. Respondent Joseph Fletcher, labelled a theologian, disagrees sharply with Kass on many scores ("It is plain enough that he (Kass) is not very trustful of human nature.") and proceeds to attempt to apply his brand of "situational ethics" to the problem with some bizarre effects.

> I would vote, for example, for cloning top-grade soldiers and scientists or for supplying them by genetic intervention if needed to offset an elitist or tyrannical power plot by other cloners.

He steps aside from the details of genetic engineering, because he has "too little technical grasp of the subject," but he is able to call for a "consensus built around a humanistic ethic that is not metarational or based on

faith assumptions, but derives its cogency from shared values and reportable experience." Respondent Daniel Callahan, a philosopher, takes a mediating position more like that of Kass. In this division of the book, biologist Kass has far more of value to tell us than theologian Fletcher.

Genetic therapy, the attempt to treat hereditary diseases by influencing the genes directly, is the subject of the opening chapter of the second division of the book, by W. French Anderson, head of the Section on Human Biochemistry, Molecular Disease Branch, National Heart and Lung Institute, National Institutes of Health. He indicates the positive applications of genetic therapy to genetic diseases (diabetes, phenylketonuria, sickle-cell anemia, hemophilia, cystic fibrosis), viral diseases (measles, German measles, mumps, chicken pox, smallpox, poliomyelitis, influenza, mononucleosis and the common cold), the area of cancer, and the area of aging. He also indicates the negative possibilities of misuse of genetic therapy, and the alternatives that might also be pursued

Respondent Arno G. Motulsky, a clinical geneticist at the University of Washington Medical School where he heads the Division of Medical Genetics, basically agrees with Anderson, but feels that the reality of gene therapy is a long distance away in the future. Respondent Alexander M. Capron, lawyer, cautions that the law can both aid science and halt scientific endeavor. Respondent Paul Ramsey, theologian from Princeton, gives voice again to his often repeated concerns about the impact of genetic therapy—or genetic engineering, as he believes it must be called—in an article that parallels that of Dr. Kass with respect to new beginnings of life. He is primarily concerned that men do not take upon themselves the choice of how to "help" one who has no voice in the matter.

> We ought not to choose for another the hazards he must bear, while choosing at the same time to give him life in which to bear them and suffer our chosen experimentations.
>
> Treatment is construed to include killing the patient for his own sake in order that he may not have a life deemed by others not to be worth living.
>
> The efforts called "treatment" extend to the elimination of *the patient*. Strange treatments, that; . . .

Dr. Ramsey calls our attention to the unknown dangers and pitfalls of genetic experimentation with the goal of genetic engineering, and questions whether the possible disasters are worth the possible benefits.

> This area holds such *dangers* of untold human suffering, dehumanization, exploitation, radical alteration of the conditions of human existence, genetic SST's and Lake Eries, that we are obligated to search out ways by which regulatory public policy can be devised.
>
> Before us then opens up the dizzy, abysmal prospect that man can be present where the foundations of the world were laid. Piece by piece of information may destroy our sense that, for all the genetic corruption, God made the world and the human creature and they are good. We may finally lose our faith that, under God, life should always be affirmed with joy and hope beyond despair—and lose also our concern that even genetically defective lives be saved and cared for.

In the lead article of the third division on "Pollution and Health", Samuel S. Epstein, professor of pharmacology at Case Western Reserve School of Medicine, gives an excellent summary of the types of pollutants and the three major classes of public health hazards: carcinogens (producing cancer), mutagens (producing genetic mutations), and teratogens (produing congenital malformations). He warns of the public danger of untested chemicals added to our food and our environment and insists on the importance of open access to all relevant data.

Respondent Julius E. Johnson, Director of Research and Development of the Dow Chemical Company, does not disagree with Dr. Epstein, but argues for a calm and careful approach to attacking the pollution problem. Respondent Leonard Bickwit, Jr., a U.S. Senate counsel, tackles the question of the legal controls involved in pollution control and correction. Respondent Charles W. Powers, theologian from Yale Divinity School, considers the problems of responsibility for both the individual and the institution.

> In such a situation it is easy to slip into a frame of mind that suggests that everyone (person, group, or institution) is responsible for everything; the unhappy result is that no one takes responsibility for anything.

He considers the responsibility of the church in these areas in its role as corporate investor, consumer, property owner and employer. His discussion emphasizes, at least for this reviewer, the ambiguities of viewing the church as an investor in big corporations.

Our history indicates that man has gone far to pollute and degrade the natural world into which he has been placed. Environmental degradation has proceeded without limitation almost to the point where wholesale human death would be the next natural consequence of unchanged policies and practices. The great threat is that man is now turning his attention to the last category of nature not appreciably subject before this to group pollution and degradation: man himself. If genetic engineering produces in the human

Books Needed

We have been in contact with a Christian scholar working on a "religious-philosophical book" in Hungary, who is in need of books published only in the Western World and unavailable to him in Hungary. On his behalf we are requesting that you make available used (or new) copies of the following books. If you would like to give one of these to our Hungarian brother, please write The Editor, *Journal ASA*, 753 Mayfield Ave., Stanford, California 94305. We will confirm that the book is still needed, and after you have sent the book to us, will see that it is sent on safely to Hungary.

Any book by Frances Schaeffer
God in Exile, by Cornelio Fabro, Newman Press, Westminster, Md. (1968)
The God-Problems and the Philosophers by Thomas Molnar
Irrational Man by William Barrett
Philosophy in the 20th Century by W. Barrett and H. Aiken
The Great Lion of God by Taylor Caldwell
Difficulties and Alleged Errors and Contradictions in the Bible by R. A. Torrey

race the kind of effects that man has produced in strip mining, water pollution, material waste, and denuding of forest lands, we will yet face the ultimate in pollution. The voices of Kass, Ramsey and Epstein are voices that Christians will do well to heed as we wait, striving to live today for Christ in our own world, even though we look for another.

Reviewed by Richard H. Bube, Department of Materials Science and Engineeering, Stanford University, Stanford, California 94305.

A Second Review of *The New Genetics and the Future of Man*

The most interesting paper is the first, on "New Beginnings in Life" by Leon R. Kass, dealing with cloning and fertilizing eggs outside the body, and either reimplanting them in their mother or some other woman, which seems feasible now, or *in vitro* culture, which may become so. All biology students, and especially those entering medicine, ought to be exposed to the ideas presented here.

Kass asks some hard questions, and they require some hard answers:

> What do you do with unwanted fertilized embryos? Is this murder? If it is, why isn't an IUD a device to murder?
>
> Shouldn't we beware of losing our sense of the mystery of life?
>
> What if implantation produces a defective child?
>
> Would you like to live your life with someone else's genotype?
>
> Who makes the choices?
>
> What would all these developments do to the family?

In the middle section on Genetic Therapy, two presidents, Lawyer Alexander M. Capron and Paul Ramsey, a lawyer and a theologian raise questions, in reaction to a straightforward account of the possibilities of genetic therapy. The lead article here, by W. French Anderson, states that gene therapy using viruses has already been tried, using viruses on two sisters suffering from a defect in arginine metabolism. Since no reference is cited, apparently this is the first published report.

Capron's hard questions are such as:

> Is genetic therapy really a good thing?
>
> Wouldn't it be cheaper to require mandatory screening of all couples, and simply not allow some of them to have children?
>
> Is there any such thing as a patient capable of giving rational consent to experimentation on himself?
>
> Can we afford to lose the variety the gene pool now affords us? If we wipe out sickle cell anemia, what happens if malaria returns in force?

Ramsey's questions are:

> What is actually being treated in a "therapeutic" abortion—the fetus, the parent's desires or society's pocketbook?
>
> Isn't the "treatment" of arginemia mentioned by Anderson just prolongation of a subnormal life for experimental purposes?
>
> Do we want to live in a world where behavior genetics is a master science?
>
> Aren't many so-called medical decisions really *social*? Proceeding with heart transplants was not only a medical decision, but a fund allocation decision.

Two valuable points are made in the section on pollution and health. One is that the best solution to pollution is to allow citizens to sue when their environment is damaged. Experience in Michigan does not seem to indicate that this will open the floodgates holding back the crackpots. The second is that investors, especially if they are churches, ought to work for social responsibility.

This reviewer also has some questions:

> Why don't we make adoption easier?
>
> Is there any real hope of evaluating the moral effects of any new technology before it is used? Would theologians tolerate a committee of citizens passing on fields of investigation?
>
> Is there any hope for a society whose best thinkers, (such as the contributors to this volume) in dealing with profound questions such as these, seem to have no absolute values, nor any reason to think anyone else should?

The New Genetics and the Future of Man goes a long way from Watson and Crick and Mendel. It asks some important questions. I like to think the ASA can help shed some light on the answers.

Reviewed by Martin LaBar, Central Wesleyan College, Central, South Carolina 29630

RELIGION AND THE RISE OF MODERN SCIENCE by R. Hooykaas, Grand Rapids: Wm. B. Eerdmans Publishing Co., 1972, xiv + 162 pp., $2.65.

Studies of the relationship between science and Christianity have been dominated by a pair of opposing stereotypes. In the latter half of the 19th century, John W. Draper and Andrew D. White published anti-Christian polemics in which they contended that Christianity has everywhere and always opposed the progress of science, inhibiting at every turn the discovery and dissemination of scientific knowledge. A modern statement of the same proposition can be found in Lewis Feuer's *The Scientific Intellectual* (1963). But if Draper, White, and Feuer are guilty of a naive and jaundiced view of the impact of religion upon science, the reaction to their work has produced an equally simple-minded alternative. A school of historians, taking its cue from Alfred North Whitehead's *Science and the Modern World* (1925) and Robert K. Merton's *Science, Technology and Society in Seventeenth Century England* (1938), has recently come to hold that far from obstructing science, Christianity (or Puritanism) was the very cause of the birth of modern science. The book under review, by the Dutch Historian R. Hooykaas, is solidly within this latter tradition.

Hooykaas possesses the scholarly credentials (Professor of the History of Science at the University of Utrecht and author of a large number of scholarly publications) to suggest that he might rise above the excesses and the naiveties of past polemics; but, alas, we have not been so blessed. At the heart of Hooykaas' scheme is a positivistic conception of modern science; that is, the scientist does not seek causal connections, but attempts merely to establish mathematical correlations among statements of positive fact (*viz.* observation statements). However, Hooykaas is not merely a positivist, but also an occasionalist. Science, he main-

tains, does not merely give up the quest for causal connections; properly pursued, it recognizes that there *are* no causal connections. Because ours is a universe wholly dependent on the Divine will, the only cause is the Divine cause. When two balls collide, the motion of the first does not cause the motion of the second; rather, the collision is the occasion for God's decree that the second ball begin to move. Now this conception of nature, Hooykaas holds, is not only the right one; it is also the biblical one, and it first received widespread acceptance in the 17th century and helped to usher in the "scientific revolution."

This account is of course embellished with a fair amount of detail. The Greeks deified nature (i.e., they attributed to it independent powers and capacities), whereas scientists in the 17th century, under biblical influence, realized that nature is distinct from God and wholly dependent upon him. Consequently, they no longer worshipped nature, but viewed it as an object to be understood and controlled for God's glory and man's benefit. Moreover, with the recognition of nature's contingency, the rationalism that characterized Greek and medieval science gave way to a thoroughgoing empiricism; because God could have created the universe any way he pleased, the only way to learn how he did create it is to observe and manipulate. Manual labor (and hence technology) had been denigrated by the Greeks, but under biblical influence the founders of modern science made manual experimentalism the very foundation of their endeavor. Finally, turning specifically to the vexing question of Puritanism and science, Hooykaas argues that there was an "intrinsic compatibility" between Puritanism and the new philosophy, which created a climate of opinion favorable to the pursuit and advancement of science.

This scheme is open to serious dispute; indeed, in my view, it is pervaded with misconceptions and oversimplifications. In the first place, a positivistic conception of modern science (not to speak of 17th-century science) is wholly inadequate; historians of science and philosophers of science alike have cast doubt on the very conception of "positive" scientific knowledge, and it is abundantly clear that the search for causal connections was at the heart of the 17th-century (if not the modern) scientific enterprise. Secondly, Hooykaas builds his argument around what I would call the methodological fallacy, namely the belief that a new conception of science and of the proper methodology for pursuing it leads (and led) swiftly to a dramatic alteration of the contents of science; research in the history of science suggests, on the contrary, that the relationship between scientific methodology and scientific content is far from direct and that historically the two endeavors have frequently proceeded in total independence. Thirdly, the attempt to discover radical dichotomies between ancient and 17th-century world views requires a drastic oversimplification of historical reality and ignores many of the results of the past half-century of historical scholarship. Fourthly, Hooykaas writes as though there were no viable scholarly viewpoint on the subject besides his own; to give only one example, the vast body of critical literature on the relationship of Puritanism and science is not discussed, nor even cited.

Finally, even if we were to grant everything Hooykaas claims about the conception of nature and the methodological principles of 17th-century scientific virtuosi, it remains that he fails entirely to demonstrate that these arose because of Christian inspiration or under Christian auspices. Hooykaas has offered broad generalizations without ever undertaking an investigation of individual cases. (If he provides an occasional quotation from a 17th-century source, he also commits the serious fallacy of equating the standard rhetoric with underlying motivations and theoretical commitments.) It is by no means sufficient to point out, for example, that John Kepler was both a pious Christian and the originator of important scientific ideas (both undeniable); before we can take Hooykaas seriously, it must be demonstrated that Kepler's scientific contributions were the *result of* his Christian commitments or his biblical world view.

The basic reason for Hooykaas' failure, I believe, is that he has attempted to answer in general terms a question that must first be dealt with in specific. When Hooykaas inquires whether Christianity (or Puritanism) provided a climate favorable to science, he insists on a "yes" or "no" answer, which can be applied to an entire age and an entire continent; Christianity either inhibited or advanced science, and Hooykaas wants to know which. But such an approach can never succeed. The relationship between science and religion (or any other pair of cultural phenomena) is exceedingly complex, and we must learn to ask questions consistent with this complexity. We must begin by accumulating

Religious Dependence of Doctorates

Data from a wide variety of sources reflect geographical, baccalaureate, and social class variations in the production of scientific and scholarly doctorates in the United States. To a significant extent, these variations are associated with the kind of religious-ethnic group from which such persons come. Roman Catholics are extremely low producers of scientists and scholars, but fundamentalistic and traditional Protestant faiths (southern white Protestants, Lutherans) are also low producers. Liberal Protestant sects, such as Unitarians and Quakers, and secularized Jewish groups are highly productive, and less liberal faiths are moderately productive.

Variations in productivity are reflective of differences in beliefs and values. Highly productive groups share a certain set of values, unproductive groups hold the antithesis of these, and those groups intermediate in productivity possess a mixed blend. Tentatively, the common beliefs and value systems of high producers seem to include naturalism; intrinsic valuation of learning and the individual quest for truth; emphasis on human dignity, goodness, and competence; a life pathway of serious dedication, of service to humanity, of continual striving; humanistic equalitarianism; a pragmatic search for better ways of doing things unfettered by traditional restraints; and a focus on the relatively immediate, foreseeable future which can be affected by personal effort.

Kenneth R. Hardy, "Social Origins of American Scientists and Scholars," *Science* 185, 497-506 (1974); copyright by the American Association for the Advancement of Science.

a substantial foundation of individual instances; we must know, insofar as possible, how the work of Copernicus and Galileo and Kepler and Descartes and Boyle and Newton and a hundred other scientists reflected and was shaped by their culture, family, education, professional peers, personal circumstances, religious commitments, and so forth. Only then can we begin to construct a model of the complex and subtle ways in which religion directed the thoughts and efforts of the founders of modern science.

Why has Hooykaas failed to proceed in such a manner? The answer is obvious. A carefully reasoned historical analysis was never his real purpose. What he has prepared for us, under the guise of history, is an *apologia* for Christianity—which is certain to be immensely influential and widely quoted in circles where the truth and viability of the Christian faith are viewed as dependent upon its having been the fountainhead of modern science.

Reviewed by David C. Lindberg, Department of History of Science, University of Wisconsin, Madison.

Reprinted from the Christian Scholar's Review, 3, No. 2, 189-191 (1973)

THE COSMOLOGICAL ARGUMENT: A REASSESSMENT by Bruce R. Reichenbach, Charles C. Thomas—Publisher, Springfield, Illinois. 1972. 150 pp.

Basic to the question of the nature of faith in God are the proofs of God's existence. While nineteenth century philosophy seemed to operate under the belief that Kant and Hume had successfully disposed of the theistic arguments, modern philosophy has exhumed and reexamined the arguments of Aquinas, and his subsequent supporters and detracters. Bruce Reichenbach in *The Cosmological Argument: A Reassessment* presents the argument in contemporary terms with modern positive developments, transforming the "inherently weak, . . . outmoded relic of the thirteenth century" into a viable option and perhaps a required conclusion for present day theistic philosophy. The author examines the issues in depth, not merely restating or sketching previous treatments, but developing a specific argument, with a thorough inquiry into the many underlying and sometimes unseen details and problems. At each point of the development, opposing views are presented and then examined for flaws or tested against the logic of the author's presentation of the argument. By deftly demonstrating the inherent confusion and misuse of terms, or by finely reinforcing the buttress of his own logic, Reichenbach disarms attacks by such luminaries as Hume, Kant and Russell. Throughout the book, the author frequently restates and describes previous important points which not only refresh the reader with a new slant, but also prevent needless leafing back to find the preceding reference. Such restatement and reference, in combination with selected examples and clarity of style, are especially helpful to the reader who is not familiar with the intricacies of philosophical argument. Although a bit formal, the work is readable even for the uninitiated, yet it demonstrates excellent scholarship with complete referencing and footnotes.

In the first chapter, Reichenbach presents in turn each step in his formulation of the argument, expanding, clarifying and defining terms where appropriate. The argument may be summarized as:

(S_1) A contingent being exists.
  a. This contingent being is caused either (1) by itself, or (2) by another
  b. If it were caused by itself, it would have to precede itself in existence, which is impossible.

(S_2) Therefore this contingent being (2) is caused by another, i.e., depends on something else for its existence.

(S_3) That which causes (provides sufficient reason for) the existence of any contingent being must be either (3) another contingent being, or (4) a non-contingent (necessary) being.
  c. If 3, this contingent being must itself be caused by another, and so on to infinity.

(S_4) Therefore, that which causes (provides sufficient reason for) the existence of any contingent being must be either (5) an infinite series of contingent beings, or (4) a necessary being.

(S_5) An infinite series of contingent beings (5) is incapable of yielding sufficient reason for the existence of any being.

(S_6) Therefore (4) a necessary being exists.

"Contingent" is defined as "to be such that it could have been other than it is," applicable to propositions, events and beings. A contingent being is one which at any time may either exist or not exist; its nonexistence is as possible as its existence and it is neither really nor logically necessary that it must now exist. Contingency has no bearing upon the question of certainty, however, for we can still know with surety concerning a being's present existence. The author emphasizes that the first premise is grounded in the world of fact by showing that contingent beings (e.g., the author, you and I) exist in this real world, thereby establishing the argument as *a posteriori*, not *a priori*, as in the ontological argument. After disallowing any *tertium quid* between contingent and non-contingent beings in S_3, Reichenbach goes on to discuss the nature of the infinite series in S_5. In one of the most crucial points of his analysis, he rightly contends that "the cause can not be temporally prior to the effect *at the moment of actual causation.*" In an infinite series of cause and effect, each cause is itself an effect, requiring a cause, *ad infinitum*. Since cause and effect, at the instant of being subject and object, must be simultaneous, an infinite series must be ordered apart from any consideration of time. This is not to say that the cause may not exist prior to the effect, as long as they exist together in time at the point of causation.

In asking what adequately explains the existence of contingent beings, one must define what constitutes explanation. Might not different explanations, such as a finite series of relevant conditions instead of an ultimate and necessary condition, be acceptable depending upon one's methodology? Reichenbach argues that explanation goes beyond the epistemological and is grounded in an ontological question about the nature of explanation, which ultimately boils down to causation. In three chapters he discusses the nature, necessity and principles of causation, a concept most important to the validity of the argument in any formulation.

Any consideration of causation must deal with Hume's widely accepted analysis of the subject based

largely upon the awareness of constant conjunction, which leads to a psychological propensity. Hume contended that rather than perceiving or sensing causation *per se,* man develops the impression of causation upon reflection and sensing the presence of certain relations: (1) spatial contiguity, (2) temporal priority, and most importantly (3) constant conjunction. Reichenbach dispenses with the second relation in a most pleasant but effective way. Instead of temporal priority, by simple logic and example he restates his contention that causation obligates simultaneity. Concerning the objection that simultaneity eliminates the possibility of causal chains occupying time, he points out that causal activity of intransitively (occurring in time) ordered causes may proceed for a length of time, thus the chain may occupy time. In disproving the necessity of constant conjunction, the author is more questionably convincing. He presents instances where (1) the events need occur (and thus be conjoined) only once in order to suggest causation, and (2) numerous events are constantly conjoined but have no cause-effect relationship. More recently attempts to reinforce Hume's contention of the necessity of constant conjunction have rested in the development of a causal or covering law. Reichenbach analyzes the idea of causation as offered by R. B. Braithwaite, in which constant conjunction must occur and from which a deductive conclusive generalization of causation can be made concerning a relationship based upon higher (inductive) hypotheses or laws. But the higher laws to which appeal is made, reveal upon close examination to be causal, and thus the argument becomes circular.

Hume was attacking the concept of causation as production, and asserted that analysis of causation in terms of production is no analysis at all. While admitting the synonymous relation of production and causation, Reichenbach concludes that causation is a basic which cannot be defined merely in terms of Hume's relations, for causation as production must include some concept of causal efficacy, that is, the power to make some effect occur. Hume contended that causal efficacy was not an impression of sensation; however, the author draws upon the work of Albert Michotte, which shows that indeed the absence of specific sensory data does not exclude the perception of causal efficacy. The phenomenal world contains more than the world of strict sense data; stimuli alone cannot account for grouping, figure ground, closure, proximity and gestalt-forming, to cite the author's examples. He suggests that since causation is validly viewed in terms of production, then certain conditions become essential for an event to occur and in their absence it will not occur.

Reichenbach goes beyond defining causation to show the necessity of causal relations, for the cosmological argument contends that contingent beings *must* be caused. In proving such necessity, the author again confronts the argument of Hume and he again successfully invalidates it. Hume asserted that we can distinguish and therefore can conceive of an effect and its cause as separate, and since the conceivable is really possible, then it is possible for cause and effect to exist separately in reality. The author cleverly argues that Hume has confused his conditions for distinguishable and separable. Distinguishability requires impressions of sensation which he terms "epistemological conditions." Reichenbach, having refuted the disproof, proceeds to prove the necessity of causation. His rigorous proof argues: "[1] All contingent beings have their existence accidental to their essence. . . . [2] That which has its existence accidental to its essence derives its existence from something. . . . All contingent beings derive their existence from something, that is, all contingent beings are caused." In case you agree with the objections which he subsequently raises to this argument, and disagree with his defense, he gets around having to prove his point by posing causation as a basic principle of the universe. It is known by human reason to be intuitively true and it is a principle by which human reason operates; denial of the causal principle completely splits thought away from reality.

The author next deals with causation indirectly in addressing the question of whether propositions can be informative and necessary at the same time as the causal principle is. The discussion in this area deals largely in the formal philosophical characterization of propositions. While often technical in nature, and noting a number of modern philosophers of opposing positions, Reichenbach manages the remarkable feat of keeping up moderate interest and also establishing his point. Although he shows the possibility of a synthetic *a priori,* that is, an informative (non-analytic) statement verifiable without reference to experience, this is not good enough to establish causation in the real world. Finally, he demonstrates that causation is really, as opposed to logically, necessary—it has its basis in the very nature of the world. The author's conclusions concerning causation appear valid, but only insofar as he is able to ground them in the real world. His struggle with this question is complex and at times exasperating, but also most worthwhile.

In an exciting and vigorous fashion, Reichenbach takes on Bertrand Russell's objection that since causa-

tion is derived from examination of particulars there is no reason to assume that there is a cause for totality. Even after demonstrating the inapplicability of the objection to his particular formulation, he goes on to destroy systematically any remaining pockets of opposition. To the objection that a characteristic of the parts does not apply to the whole, he shows that extension to totality is valid depending upon the characteristic; particularly, contingency is a property which can be extended from individuals to the totality of contingent beings. In answer to the objection that causation occurs only within the context of the totality of contingent beings, and therefore cannot apply outside of the totality, the author cleverly but perhaps questionably creates a totality of all beings, including non-contingent beings.

In what seems to be merely a discussion of semantics, but which is truly an important contribution to the argument, Reichenbach studies the nature of necessity and "necessary" in the final statement (S_6). While the assumption of logical necessity makes the final statement impossible, he shows that the final proposition is conditionally necessary, depending upon the premises preceding. "Necessary" appears in a second sense as a qualifier of beings, meaning to have existence as part of its nature, such that if it does exist, it always did and will exist, and if it does not exist, it never did nor will. The author also shows that the traditional proof of Kant that the cosmological argument depends upon the ontological argument is not valid. He clearly shows Kant's confusion of identification of the necessary being with the proof of its existence. Identification of a "most real being" deals with the conceptual and is invalid; however, it does not invalidate the proof of existence of a necessary being which is based upon experience in the real world.

Having concluded the proof *per se*, Reichenbach finally approaches the task of relating the proved necessary being to the concept of a personal creative God. Realizing that verification is no longer possible, he shows that "necessary being" is not an empty term, but rather characteristics may deduced: it must be non-finite; since it is the reason for its own existence it must be self-sufficient and self-sustaining; and it must be eternal. These attributes are all inherent in the concept of the personal creator God. Furthermore, there are no conflicting attributes. The circumstantial evidence is very strong; however, the author is wise enough to recognize that man is not guided by reason alone, but on the contrary, he is often led by emotion. Of what value then is the presentation, besides being mental exercise? In a fitting close, the author answers:

> Granted that it is highly unlikely that the above argument will convert the atheist to theism or convince the agnostic to adopt religious belief in God; yet perhaps it will answer or cast light on some of the pressing questions of reason which surround the debate about the reasonableness of a belief in God. With the question of reason aside, the ground has been prepared for the planting of reasoned belief.

Reviewed by Carl Lynch III, Department of Physiology, University of Rochester Medical School, Rochester, New York.

THE DUST OF DEATH by Os Guinness, Inter-Varsity Press, Downers Grove, Illinois (1973). Paperback. 419 pp. $4.95.

Os Guinness discusses in *The Dust of Death* many of the recent movements in man's search for life. The "counter culture," in rebellion against the Establishment, has attempted to accomplish that in which society has failed. Guinness shows, however, that the counter culture has also failed. He presents a "Third Way," that of Christianity, as the only solution for society's dilemma.

The counter culture's critique against the oppression, lack of morals on personal as well as social and political levels, superficiality and demand for conformity of the Establishment is valid, says Guinness. Technology is controlling man by reducing his individuality and personal value and making him no more than a machine. As "technocracy" becomes more and more complex, it is in danger of running out of control. "Rome was no less totalitarian for having a pluralistic wealth of societies, cults, clubs, mystery religions and esoteric cliques. It just meant that citizens were better adapted to totalitarian control and did not give vent to their grievances" (p. 140). B. F. Skinner proposes in *Walden Two* that man can be controlled by giving him what he wants, and by indoctrinating him to believe that what he is getting is what he really wants. Guinness' criticism of this type of control by society is that it creates a "one-dimensional man"—a man who, once he is satisfied with his material comfort and recreation, has forgotten that he is more than just a machine —that there is a spiritual reality as well as a physical.

Society oscillates between forms of humanism (optimistic), and existentialism (pessimistic). Both share the same basic weakness—a false picture of man as alone and left to work out his own fate. Humanism romanticizes man's ability to better himself and to find a meaning for life in preserving "mankind." Existentialism, however, realizes the total lack of meaning in life and the resulting need to live only to experience as much of life as possible. The two always fail because of their failure to realize the true reason for man's problems—his alienation from God which implies also an alienation from himself, from other men and from nature.

The counter culture's revolution against such a failing society is valid in its criticism, says Guinness. The alternative it offers, however, although it denies the humanistic principles of society, cannot help incorporating them again into its ideology, since it begins with the same one-dimensional view of man. Thus all such revolutions are doomed to failure and absorption into society. An interesting observation Guinness makes is the irony of man's view of himself. As the psalmist says of the idol worshipers and their idols, "their makers grow to be like them, and so do all who trust them" (Ps. 115:8). The pagan's views of ultimate reality were such that he projected them into the natural world by creating idols, which were made such a part of him so as to become his reality, until eventually they "stifled his human aspiration, until he, like his idols, was deaf, dumb and immobile" (p. 147). So modern man's view of himself, since it is based on no ultimate standard outside of himself, eventually lessens his

worth and his ability to be who God created him to be.

On the metaphysical level a similar process is occurring. Man is unsatisfied with himself and searches for a deeper spiritual truth. With the denial of a God, man looks inside himself through meditation or Eastern mysticism, or outside to drugs or the occult. Whatever a man chooses as his means for searching for truth, eventually becomes "truth" or "God" in itself. This lowers man's potentiality to be fully human, and the ever-downward path is begun.

The denial of a universal, unchanging standard of Truth destroys man's opportunity to be man. Modern Christian thought is traveling this road in denying the historic validity of the Bible. Without an absolute and universal truth faith becomes merely an exercise in metaphysics, totally unrelated to reality. Guinness points out that the Christian God is ultimate Truth. God himself replies to Moses, "I am who I am." God is the Absolute in relation to whom all else is defined and established, in sharp contrast to Eastern thought. An Indian guru who is believed to be an incarnation claims "I am whoever you think I am" (p. 347). Christianity must be wholly accepted as true or rejected as false. It cannot be divided into what men want to hear and what they wish to reject.

It is this absoluteness that makes Christianity the only alternative for man—Guinness' "Third Way." Guinness' claim for the truth of Christianity is based on its relation to reality. Although Christianity does not claim knowledge of the *whole* Truth (God is infinite and beyond our finite mind's comprehension), the truth he does give us may be verified by examining it for an accurate picture of reality.

Christianity avoids the dilemmas of the East and the pre-Christian West. The Western gods failed because they were finite and thus no more than men; the Eastern gods are infinite but impersonal, thus unable to relate to or communicate with men. God as revealed in the Bible is both infinite and personal—he can relate to man on human terms in Jesus Christ, but also provides the outside power and strength and wisdom man needs to be who God created him to be.

The Christian view of man provides what is lacking in humanism and existentialism. Existentialism sees no meaning in life, and humanism has a purpose that man cannot, on his own, fulfill—a giving of oneself to the betterment of mankind. Christianity provides a meaning in life in that God who created us will restore us to our rightful position in the world. As we are restored to God, we are able to be restored in our relationships with our fellow man. We are thus enabled to carry out the ideals of humanism.

Psychedelic drugs and the occult stand as counterfeits of a true experience with God. All experiences, though real, are not necessarily true. After a "trip" the emptiness and futility of life is even more apparent than before. Christianity provides a foundation of meaning for life, to which true "religious experience" adds richness, but is not the base. Christianity challenges man to make a clear and final choice between Truth as revealed by God and the many counterfeits of truth created by men.

Reviewed by Kim Chamberlain, undergraduate student, Stanford University, Stanford, California 94305.

Books Received and Available for Review

(Please contact the Book Review Editor if you would like to review one of these books.)

Agress, Rabbi Hyman, *Why Me?*, Creation House, 1974.

Carvell, F. and M. Tadlock, *It's Not Too Late*, Glencoe Press, 1971.

Guinness, O., *The East, No Exit*, IVP 1974.

———, *Encircling Eyes: The Current Resurgence of the Occult*, IVP, 1974.

———, *Violence: A Study of Contemporary Attitudes*, IVP, 1974.

Howard, D. M. (ed), *Jesus Christ: Lord of the Universe, Hope of the World*, IVP, 1974.

Lewis, G. R., *Judge for Yourself: A Workbook on Contemporary Challenges to Christian Faith*, IVP, 1974.

Schilling, H. K., *The New Consciousness in Science and Religion*, Pilgrim Press, 1973.

Stewart V. Mary, *Sexual Freedom*, IVP, 1974.

Stott, J. R. W., *The Authority of the Bible*, IVP, 1974.

Vaux, K., *Biomedical Ethics: Morality for the New Medicine*, Harper & Row, 1974.

The Idea of A Christian Philosophy, Wedge Publ. Foundation, 1973.

TOWARDS DEEP SUBJECTIVITY by Roger Poole. New York: Harper and Row (Torchbook), 1972. 152 pages.

The subjective is our haunted house; it excitingly attracts while it frightens. We are confined in it forever, but we forever strive to keep it from contaminating our actions. Our scientific credo calls us to repent of our subjectivism. It draws the scientist into one of psychology's conjured classifications, the approach-avoidance conflict. Subjectivity is the seeming essence of life, yet it cannot be objectified. The psychologist says he is unable to pin it down empirically, but can infer it and define it operationally. The man-of-the-lived-world says he can feel it, but cannot put it into words. He and the psychologist share the same dilemma. Like a dieter drawn and repelled at the same time to the richest of foods, we are constantly approaching and avoiding the alluring, frightening, and haunting subjectivism that is our human experience.

Roger Poole invites us to walk briskly and bravely into this awesome arena. He encourages us to dive deeply, suggesting such a plunge will lead to authentic objectivity; an objectivity not anti-human and anti-life; an objectivity that is not impoverished, but "takes objectivity *seriously enough* to examine subjectivity subjectively" (p. 68, emphasis his).

Objectivity as demanded in the dominant scientific paradigms, Poole argues, prefers the model to the living reality, the abstraction to the lived events. Such an attitude, he contends, leads to an impoverished concept of meaning because it retreats from subjective space. Meaning and interpretation belong together in an inseparable bond (p. 6).

Poole most certainly rests on the phenomenological philosophy of Edmund Husserl (1859-1938) and makes this explicit in a three-page historical footnote (p. 79ff). It must be left to the philosophers of esoteric thought to determine if Poole has read Husserl prop-

erly, but from this groundwork the author hurtles the philosophy of science and epistemology into the realms of politics and ethics.

"All objective knowledge is the servant of the use we intend to make of it," Poole asserts (p. 99). From this develops an argument that MIT linguist Noam Chomsky, who startled many with his anti-Vietnam war writings, has become the successor to Husserl and Kierkegaard: Chomsky knows "he has a duty to knowledge which exceeds the demands of the academic and professional world" (p. 104). In other words, Chomsky moves towards deep subjectivity.

A practitioner of deep subjectivity who is repeatedly praised by Poole is anti-psychiatrist R. D. Laing. With his associates, Laing comes closest to utilizing the deep subjective method Poole proposes as an alternative to behaviorally defined objectivity.

Those familiar with Thomas Kuhn's work may find a passionate new paradigm for scientific research in Poole. The socio-political photographic analyses of "ethical space" that open his investigation may disturb readers, but may prove as well a germane example of the type of perception Poole is advocating. Rereading this opening chapter when one has completed the book is recommended.

Christians, whose rootedness in spiritual reality must raise queries with materialistic objectivism, may find in Poole a provoking alternative toward understanding reality. As those who have constantly asked for deeper penetration into the mysterious interplay between Creator and creation, however, they may find Poole a perturbing effort to further a humanistic panacea in the realm of knowledge.

Reviewed by Allan R. Andrews, Behavioral Science Department, North Shore Community College, Beverly, Maryland 01915.

THE EARTH IS THE LORDS? by Joyce Blackburn, Waco Texas: Word Books (1972) 160 pp. $4.95.

The Earth is the Lords? is a personal book written by a nonscientist about her concern for the local environment, one of Georgia's Sea Islands, and what she and others did to save it. Altbough I cannot recommend it as any sort of environment or ecology text or as a treatise on the theology of the environment, it is a well-written personal history of lay legal action, motivated by Christian commitment, fueled by writings spanning a range from de Chardin to *Biology: a search for order in complexity* and including the late Walt Kelly and Dr. Seuss. Probably this is the sort of thing more of us will have to do if environmental quality is to be preserved.

The book, like the environmental crisis itself, raises some disturbing questions. How often are citizens with the stature of Eugenia Price involved in an environmental dispute—in this case against developers and phosphate miners in the salt marsh? How often are experts like Eugene Odum available to testify? How often has a poet written the equivalent of Lanier's "The Marshes of Glynn" about a threatened area? How often can a local legislator be found to shepherd a bill like the Georgia Coastal Marshlands Protection Act of 1970 into being? How often can citizens be aroused to telegram, write and call their State legislators as they did in this case, and at the appropriate time? How often do "ordinary" Christian citizens become convinced that they are stewards of the local environment, as Blackburn did? How often do ordinary Christians express a commitment *to anything*, for that matter? Are Blackburn and Price less damaging to the salt marsh than those whom the developers would have brought in, just because their hearts are in the right place (presumably)? And, most important, "where will it all end"?

Reviewed by Martin LaBar, Division of Science, Central Wesleyan College, Central, SC 29630.

THE DELICATE CREATION: TOWARDS A THEOLOGY OF THE ENVIRONMENT by Christopher Derrick, Devin-Adair, Old Greenwich, Conn. (1972) $5.95.

The environmental crisis, according to Derrick, is spiritual. Thus, his main remedy is also spiritual. We need to repent of a heresy. "We" is modern man. The heresy is titled Manichaeanism, with parallels drawn to ancient Manichaeanism and Gnosticism.

Modern Manichaeanism is dualist. Matter, including man's body, is evil. Spirit is good. God is good, but otherworldly, and the day-to-day running of the affairs of the cosmos is left to Evolution, a modern Demiurge. Since matter is evil, our salvation lies in more and better education and science.

Lest the previous paragraph sound like a false view of modern thought, consider such phenomena as the drug culture (a spiritual search) and the brutalizing, cheapening, and perversion of sex (the body is evil). Consider artists such as Pollock and musicians like Cage, who are either putting us on or expressing their views of the universe as having meaning only apart from real material shapes and sounds. Consider also statements of the form: "Evolution has provided (insert name of organism) with (insert name of adaption)." *The Delicate Creation* is not an antievolutionary book, except that it points out that regardless of how scientists feel about it, the typical modern man somehow believes in a powerful being called Evolution, although he would deny it if questioned.

At the root of the problem is the idea that matter is evil and it is our duty to restructure it. This has led to the worship of the unholy trinity: Science; Technology, which is science's child; and the Standard of Living; which study matter, study how to restructure matter, and measure how much matter has been restructured, respectively. In other word, the crisis results not from exalting material things, a gross sin, but from the opposite attitude, according to Derrick.

The brief summary above does not convey the full impact of the book, which is concise and well-written, taking a high view of Scripture, man and nature. Derrick takes careful aim at polluters, the SST, the transportation system, and capitalism, and also at environmentalists, communism, Lynn White, Jr. and Teilhard de Chardin. C. S. Lewis was his tutor, and his influence is apparent.

Derrick tends to be anti-science, although he seems to think "pure" science is all right and the advances of medical science, at least, must be retained. It is

questionable if we can have pure science without some of the evils of technology applied for the benefit of the few and the harm of many, or if we can have medicine apart from advances in other areas.

Derrick is firmly against the notion that birth control is a solution to the environmental crisis. His reasoning in this book based on the notion that birth control is a Manichaean attack on the flesh, is not wholly convincing. The full argument is supposed to be in print by now in a book called *Talking about Population.*

Overall, Derrick is interesting, timely, and thought-provoking. I recommend *The Delicate Creation* highly.

THE HOLINESS PENTECOSTAL MOVEMENT IN THE UNITED STATES by Vinson Synan, William B. Eerdmans Publishing Company, Grand Rapids, Michigan (1972). 248 pp. $5.95.

Vinson Synan is professor of history at Emmanuel College in Georgia and an ordained minister in the Pentecostal Holiness Church. This work is based upon his Ph.D. dissertation at the University of Georgia, although it does not betray the devastating style of so many published theses. This volume will be appreciated by both classic and neo-Pentecostals alike since it is an objective and creative treatment of the fast growing segment within Christendom. Pentecostals will welcome a detailed examination of their origins, while the neo-Pentecostals and other charismatic groups within the traditional denominations will sense the relationship of their emerging tradition to classic Pentecostalism. Also, Dr. Synan has carefully documented the rise of neo-Pentecostalism within the ranks of virtually every major denomination and among the Roman Catholics as well. Much of that information is for the first time presented in this book.

Noting that the holiness movement was first a reaction against the increasing liberal trend in Methodism at the beginning of this century, Synan shows how Pentecostalism itself reflects a theological division that took place within the ranks of these schismatics. The two groups differed on the question of what constituted "proof" for a believer having received the baptism by the Holy Spirit. Those who would be called Pentecostals settled on glossolalia.

Thus in theological tone, if not charismatic practice, modern day Pentecostalism is very close to the "historic message" of Methodism. In fact, Synan sees similarity between the early Methodist camp meetings and present-day Pentecostal meetings.

Dr. Synan indicates that the dangers for the Pentecostal Church include the failure to recognize the need for structure and community discernment—a fact that will not go unnoticed by many who have criticized the emerging movement at that very point. This well-balanced volume is a helpful and well written source for understanding the evolution and present dimensions of the Pentecostal movement.

Reviewed by Watson E. Mills, Department of Philosophy and Religion, Averett College, Danville, Virginia.

WANTED—*Advisors* for the Theological Students Fellowship

The aim and goal of the TSF, a new branch of the Inter Varsity Christian Fellowship, is to assist those who are studying religion or theology in the universities and seminaries to be faithful to Jesus Christ in their thinking and living. We want to help them come to grips with the important critical and theological issues, so that they may be better able to present a solid witness to the Gospel. When we consider the influence these students will have for good or ill, it becomes clear how vital and strategic the work of the TSF is.

One of the ways we hope to achieve our goal is by distributing the TSF Bulletin and supplementary materials to our members. But this will not enable us to reach any more than a tiny percentage of our potential audience. Therefore, what we need, is a number of advisors to the TSF, mature Christians who would be willing to extend our effectiveness into the schools in their vicinity.

A TSF advisor could be a pastor, a campus Christian worker, a theologically aware layman, a mature student, a man or a woman, old or young. This person would accept responsibility for cultivating the evangelical witness among students of theology and religion. The work would not be time-consuming, but would yield rich fruit. Think, for example, of the effects of helping only one minister or theologian-to-be to hold onto his commitment to Christ and go on to a faithful ministry of preaching and teaching! The results of even a small investment of time and effort could be incalculable.

What would a TSF advisor do? There are various possibilities. (1) He could simply make TSF brochures available to students in the nearby college or seminary. (2) He could help evangelicals in these schools to put on a TSF seminar on a Saturday at which a quality talk on some aspect of biblical Christianity would be given and some choice evangelical literature be displayed. (3) As he gets to know sympathetic students studying theology, he could encourage them to meet together for prayer and study in a TSF chapter at their institution. (4) He could also minister to them by advising them of solid new books that are coming out in theology and even help them to secure them.

TSF will be what the theologically aware Christians of this country want to make of it. We have no full-time staff. All of us are volunteers. I appeal to you to lend us your assistance.

Clark H. Pinnock
Theological Students Fellowship
Division of Inter-Varsity Christian Fellowship
233 *Langdon, Madison, Wisconsin* 53703

PREHISTORY AND EARTH MODELS by Melvin A. Cook, London: Max Parrish and Co. Ltd. (1966) 353 pp.

This book is a collection of papers written by Dr. Cook over a period of years (1956-63). The book can conveniently be divided into four sections—problems with chronology, continental drift: its causes and effects, the occurrence and origin of coal and oil, and evolution.

The first section is an attempt by the author (both qualitatively and quantitatively) to show that

all of the methods of dating materials have certain assumptions which can cause errors. He spends three chapters on istopic methods (C^{14}, U-Th-Pb, Rb^{87}-Sr^{87}, K^{40}-A^{40}) and one chapter on other methods (salt in oceans, sedimentations, heat balance, etc.). The author concludes that there is no accurate method for measuring chronology.

The second section composing six chapters deals with various models of continental drift. Several of these chapters deal specifically with an ice cap model which, according to the author, is the best.

The third section is a series of four chapters dealing mainly with the origin and occurrence of gas, oil and coal. It also includes a short chapter on paleomagnetism.

The last section (three chapters) deals with some unsolved problems concerning the development of life, the fossil record and evolution.

In the reviewer's opinion, the book is worth reading by the scientific community but it is not recommended for the lay public. The arguments presented by Dr. Cook are logical but usually very mathematical and occasionally very hard to follow. One major shortcoming of the book today is its date of publication (1966). A newer version would improve it.

Reviewed by Dr. Floyd Wilcox, Associate Professor of Science, Central Wesleyan College, Central, South Carolina 29630.

MEMO FOR 1976: SOME POLITICAL OPTIONS, by Wesley Pippert. Downers Grove, Illinois: Inter-Varsity Press, 1974.

In *Memo for* 1976, Wesley Pippert has illustrated that the relationship between one's profession of Christ and his profession of occupation is not meant to be casual—rather so intense that the onlooker can rarely witness the occupation without seeing the Christ. His primary concern in this work is of course political.

Having been intimately involved in two presidential campaigns, one as a partisan functionary (Nixon, 1968) and the other as a reporter (McGovern, 1972), the author draws heavily on personal experience and comparison. He argues that McGovern was "probably the first candidate of bona fide evangelical origins ever to run for the presidency . . . a person who endorsed biblical values and a political philosophy that cared about people . . . his 1972 campaign in its final analysis was a cry for return to scriptural values." (p. 14)

In chapter one, Pippert states that the Christian has an obligation to understand what true religion is and what its impact can and ought to be on political matters. Gone, says Pippert, is the national concern about the religious faith of the candidate for public office. Some call this separation of religion and politics voter sophistication. Pippert calls it tragedy. The president is not merely the chief executive, etc., he is also the moral leader of the country. "How the president lives out his faith has profound implications for the way he makes decisions and, more importantly, for the way he stands before the people as a symbol." (p. 22) Whether voter or officer holder, the Christian has had life-changing experiences that the non-Christian has not had. He makes his decision on a foundation of prayer, seeking God's will for himself as well as for his people. For a Christian to be a mere onlooker is hazardous.

In chapter two Pippert discusses an option open to those Christians unwilling to be mere onlookers, yet uneasy with an activist such as a King or a McIntire. He argues that since, in all likelihood the government is ungodly, like Joseph, Mordecai and Daniel, the Christian can influence that government through infiltration at key levels. Such an approach demands excellence, determination and spiritual vitality. The author illustrates by citing the careers of Sen. Mark Hatfield, Rep. John B. Anderson and former Lt. Gov. of Ill., Paul Simon. He follows with specifics on how and where to begin.

The Old Testament prophets indicted the nations and their leaders for exploiting the poor, making a mockery of justice, betraying the office in which they had been placed, and living blatantly and hedonistically. In chapter three the author reclaims the words of the prophets and finds a starkly contemporary commentary about our world today. Despair and distrust have spread across the nation. Some have turned away from the active political process. Others have tried revolution. Pippert illustrates the gamut of Christian involvement with references to the Jesus People, the Berrigans, Tijerina, Bonhoeffer and Stein. Each group or individual has his role. We must decide what ours ought to be.

In chapter four, Pippert provides a biblical basis for political action. Primary reference is to Romans 13:3 and 4 where Paul identifies government as God's agent without stipulating that the government has to be either godly or ungodly. Regardless of the place or nature of the government or ruler, God can perform his will. In 1523 Luther said that if everyone in the world believed in the Christian faith and lived it, there would be no need for government. Pippert follows that "few persons meet this standard. Thus, God ordained government to show both his wrath and his grace in a sinful world." (p. 90)

Although the author concludes with a chapter on how to decide one's individual role, his real conclusion is at the end of chapter four from which I quote:

> The Christian politician, however, has a commission that no other politician has, and he has resources at his disposal that others do not. When Jesus began his public ministry, he stood in the synagogue and read from the prophet Isaiah. . . . 'The spirit of the Lord is upon me, because he has anointed me to preach good news to the poor. He has anointed me to proclaim release to the captives and recovering of sight to the blind, to set at liberty those who are oppressed, to proclaim the acceptable year of the Lord.' (p. 96)

Reviewed by Roger J. Rozendal, Assistant Professor of Speech, Houghton College, Houghton, New York.

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