Human Tragedy and Natural Selection

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It is argued that too logical a mind is not favored by natural selection; rather, it is biologically useful to be able to rationalize away certain unpleasant aspects of reality. In most cases this irrationality has to do either with our reproductive ideas or with our ways of viewing the future. In both cases the implications with regard to our ability to solve the current population growth/resource shrinkage crisis are decidedly negative. Looked at from a slightly different perspective, this same phenomenon can be viewed as a selection among ideas and beliefs. Sometimes this selection is quite intense. Indeed, there are certain ideas which the human mind simply cannot logically deal with, since if they should be true, then it is obvious that evolution will direct all its resources toward producing minds which will believe them to be false. An example of such an idea is discussed.

Estimates from various sources place the number of deaths by starvation throughout the world at anywhere from three and a half to 20 million every year.[1] When it is considered that Hitler's murder of the Jews is usually thought of as the worst human tragedy of modern times – perhaps of any times – but that it comprised only some six million Jewish dead and occurred over a period of several years, it is seen that we are living through such a holocaust again, but one which is even more severe and which shows no sign of abating. Indeed, it can only get worse; and the horrifyingly similar spectres of the human skeletons of Bangladesh and the human skeletons of Auschwitz will for the foreseeable future remain to haunt us, perhaps ultimately to consume us.

It is now generally acknowledged that the greatest causes of this continuing tragedy are the twin problems of overpopulation and rampant population growth. Not until 1930 did earth's population reach the two billion mark. By 1975, only 45 years later, it had climbed to four billion. If our current 1.8 per cent growth rate continues,[2] the next doubling will require only 38 years, and our numbers will reach eight billion sometime around the year 2013. By approximately this same year supplies of several important natural resources, including both oil and natural gas, are expected to be exhausted. To me it seems most unlikely that our world can support four billion more people, and therefore, unless birth rates are quickly and dramatically reduced, a momentous worldwide calamity appears inevitable.

Ever since I began working in the population movement some seven or eight years ago, one important cause of rapid population growth has struck

me as particularly curious and grotesque. This paper presents an examination of that cause, together with related ideas, plus a few peripheral thoughts and opinions. I think such an examination can lead to many insights regarding our nature as human beings – and what we may be up against.

The cause I am referring to is the oft-cited fact that in the poorest and most wretched of the world's countries, a significant factor in continuing growth is the tendency of parents to have several more children than they actually want to raise in order to make up for the ones which they expect to die. Just a generation or two ago it was expected that parents might lose several of their children to disease, and today's parents continue to have children at about the same rate as their own parents did. Yet because of modern medical progress, together with improved public health programs and sanitation systems, many more of these children live to grow up and produce children of their own. It is thought that it may take two or more generations of lowered child mortality before parents will feel confident enough in their children's survival to reduce significantly the number of births. And yet it seems almost a certainty that these countries cannot sustain a lowered mortality in the face of runaway population growth (doubling times of 20 to 30 years) for that amount of time.

Now this phenomenon strikes me as extraordinary, yet I am scarcely less amazed at how matter of factly it is accepted by others. Except possibly for the death of a spouse, it would seem to me that there can be no event in life more agonizing than the death of a child. I can understand a foolish optimism which could lead one to believe his own children will all survive despite the fact that he sees few other families so fortunate. But this is not the case here. We are speaking of a situation in which precisely because the parents expect some of their children to die, they therefore deliberately have others to replace their anticipated losses.

In such a situation I myself would most carefully refrain from having children. There are at least three reasons, any one of which alone is adequate: The wish (basically selfish) to avoid inflicting so great a pain upon myself. The wish (basically unselfish) to avoid inflicting so great a pain upon my spouse and the surviving children. And the wish (basically unselfish) to avoid inflicting death upon my child.

It would seem, then, that people who follow the behavior I have described must either be a great deal less concerned about the death of their children than I or they must have a much greater desire to have children or both.

I think it is indeed probable that their constant exposure to death beginning in their own childhood has in some sense inured them to the deaths of loved ones. But to think that they would be less than deeply grieved is to believe that there is little real love in these lands of parents for their children. And this is not likely.

I think, rather, in large measure the trouble lies in a much more deeply seated desire to have children than I am able to comprehend – a desire arising from fundamental evolutionary pressures and extending far beyond the realms of rationality or humanity. This desire has nothing to do with a 'love' of children, for it causes parents to bring children into existence even when they cannot afford adequately to feed and care for them, even when it means their children's certain suffering and possible death – even when the parents *expect* some of their children to die. Of course, once the children are born they come to be loved in the truest sense; but it is not love, but rather an evolutionarily determined, irrational, and loveless compulsion which drives a parent to give birth to offspring – those whom one day he will most love – despite whatever horrors and suffering he knows they will have to endure.

What, then, is the nature of this compulsion? Why is it that human beings are willing to reproduce even under conditions of the most appalling wretchedness and deprivation? The answer is fairly simple and straightforward and can be outlined in the space of a few hundred words.

To begin with, we must understand that the human species has spent nearly all of its existence living in circumstances of high child mortality and premature death. Indeed, from our earliest beginnings until just a few decades ago, the average parent could expect more than half his or her children to die before reaching adulthood.

If this seems difficult to believe, a few common-sense arguments can quickly render it plausible: The world's present population is growing at an annual rate of about 1.8 per cent, representing a doubling time of 38 years. However, this is a quite recent aberration from our historical growth rate, which has averaged almost identically zero. It is a simple matter to show how close to zero our normal rate must have been, for imagine a population with a growth rate of just 0.07 per cent per year. Such a population will double in size every thousand years.

Though that might sound like quite slow growth, a few minutes worth of elementary arithmetic will suffice to show that it is in fact exceedingly rapid – over a period of 20 000 years such a population will increase 2^{20} or one million times, and in 40 000 years it will have grown to one million

million times its original size. Hence, a population of two people 40 000 years ago growing at that rate would amount to two trillion people today.

Since the present population of the earth is only 1/500 this large, and since human beings have been around for several times 40 000 years, it is not difficult to conclude that for nearly all of human history our annual growth rate must have been considerably less than 0.07 per cent, and that during the lifetime of any one person, or even of any three or four people, the increase must have been imperceptible. Indeed, over periods as short as this, there was about as great a chance of seeing the population reduced as increased.

Now if a population is to remain stationary, it means, among other things, that the number of women must remain constant from one generation to the next. Therefore, each woman who lives long enough to reach her reproductive years must on average during the remainder of her life give rise to exactly one daughter who survives long enough to herself reproduce (generally taken to be 15 years of age). And since for human beings there are approximately equal numbers of males and females, we can conclude that an average woman living in a stationary population will produce two children who will live into their adult years – one male and one female.

And yet we know both from scientific studies and from everyday knowledge that for most of human history the average woman gave birth to several more than these two children. (Most studies have placed the number somewhere between four and six). All but two must die prematurely, for if four, for example, lived long enough to reproduce, the population would double with each generation and increase one trillion times in 40 generations. For nearly all of human history, then, more than half the children the average parent produced, died before reaching adulthood. (See Note 3 for a more detailed treatment of the last two paragraphs.)

At this point let me ask the reader a subjective and personal question. Suppose you moved to a totalitarian foreign state where your racial or ethnic group was an oppressed minority. And suppose that soon after you arrived there, a law was passed pertaining to members of your group which said: 'You may have as many children as you like, but the first, third, fifth, seventh, ninth, and so on will be taken by the state and killed at some time before reaching adulthood.' Would you have children under those conditions – knowing half will die? What would you think of someone who did have children?

This is very nearly the situation which has confronted the average human being throughout history. It brings us back again to the same fundamental question: Why would anyone choose voluntarily to subject himself, his spouse, and his children to the overwhelming probability that one or more of his children will die?[4]

This time we can provide the question with a direct and simple answer: Not everyone would. No truly sensitive and rational human being could possibly fail to realize what he would be subjecting his children to, nor could he justify such a thing on any grounds. Thus, the most rational and the most sensitive individuals have from the dawn of human history assiduously been eliminating their genes from the race. Only those people who were so extraordinarily insensitive and irrational that they wanted to have children *despite the fact that more than half of them would die*, contributed their genes to the next generation. (I should mention that it is, of course, only my own opinion that human beings who deliberately reproduce under conditions of adversity severe enough to claim more than half their offspring are insensitive and irrational. Nevertheless, whatever feelings one may have on this subject, the phenomenon I am speaking of is just as real: very harsh conditions will divide the human race into two separate groups – those who think life is now so harsh it would be better not to subject their children to it, and those who think conditions have not yet reached this point. Since only the latter group will contribute to the next generation, each generation will find itself with fewer in the first category. Whether it be rationality and sensitivity or cowardice and defeatism, very strong selection against this type of thinking is occurring. The major conclusions of this paper will be largely independent of this matter of opinion.)

Of course, even from the beginning there were very few of these sensitive individuals – what chance did the human species have when it evolved from creatures whose premature death rates were even higher? Nearly all animals produce more offspring than we humans do, and all but two of them must die without reproducing. At every point along the evolutionary path leading to human beings, the majority of any average individual's progeny died prematurely. For a considerable time, selection has been favoring those with a high tolerance for the death of their offspring. It is not that we have lost our sensitivity: there was never any opportunity for sensitivity to evolve in the first place.

So far I have been talking about irrationality and insensitivity only in general terms. However, it is worthwhile to go into more detail and

consider also the particular forms these traits may take. Let us begin with insensitivity, since my comments about it are quite brief.

Evolution will select for those who can be utterly insensitive to the welfare of their children before they are born, but who, strangely, become incredibly solicitous of their offspring's wellbeing after they are born. Nevertheless, they will disregard both their existing children's welfare and that of their future offspring when the question involved is whether or not to have still more children. Evolution will mold insensitivity so that the choice will always be to have another child no matter what the consequences.[5] Those whose genes, for whatever reason, impel them to produce the most descendants will leave the most similarly inclined offspring to the next generation.

With regard both to insensitivity and to irrationality, evolution is faced with a conflict: There are certain kinds of insensitivity and – as we shall soon see – even certain kinds of irrationality which give one a distinct evolutionary advantage. And yet, as is obvious, in other cases sensitivity and rationality are at a premium. In essence, the problem encountered by evolution is what to do about an intelligent, perceptive species which loves its children and doesn't want to see them suffer, when the circumstances of this species' existence are so harsh that virtually all its offspring suffer considerably and more than half of them die. How does evolution force such a species to go on reproducing in spite of these facts?

Let us recast the question as follows: In a varied population, what sort of traits could a member of an intelligent, perceptive, own-child-loving species possess which would enable him deliberately to produce children despite the conditions of extreme hardship his own over-reproduction[6] guarantees those children will have to live under?

There are a number of these traits, but, essentially, they break down into five different types, which we will consider one by one. I will begin with the two least interesting so as to get them out of the way with first.

The most obvious trait to be selected for is an inordinate desire to have children. If one desires children strongly enough, he or she will have them no matter what the costs either to the children or to oneself.

The second sort of irrationality which may lead one to produce children even when there are sound arguments against doing so is a strong, perhaps even uncontrollable, sexual desire which cannot be adequately quenched by those sorts of sexual acts which do not give rise to offspring – e.g. oral-genital intercourse, homosexuality, masturbation. Thus, someone possessed of this trait may have every hope and intention of never having

children, yet find himself saddled with several nonetheless.

These first two traits are rather obvious and direct: Evolution will select for those who have a deep desire for (A) children and/or (B) sex – something which is not children but which often leads to children as a by-product. The effects of both these traits – probably because they are so direct – are to a large extent limited to their own special provinces. A compelling desire to have children will likely color one's views and perceptions of children. An insatiable sexual appetite of the sort discussed above may affect one's impression of his fellow men and women – perhaps one will be more apt to view those of the opposite sex as sex-objects. But for both these traits, their strongest effects are fairly direct, obvious, and circumscribed.

This is not the case with the three remaining traits. They operate less directly and affect not only our views toward reproduction but many other fundamental ideas as well. They are thus more insidious, and the biases they introduce less easily detected and guarded against.

The third trait, then, is a sort of generalized, optimistic shortsightedness and self-centeredness. Its purpose is to minimize an individual's perception of the amount of suffering his children will likely have to experience, or to minimize any actions based on this perception. Individuals possessing this trait will have a marked tendency to discount the importance of the future in comparison with the present. They will 'worry about that when it happens'. They will have a childish inability to forego immediate desires even though they may be attended by altogether disproportionate future penalties. They will minimize bad events and maximize good ones, always viewing their surroundings through rose-colored glasses. Finally, they will tend to discount what they see happening to others when they apply this vicarious experience to themselves – they will tend to think of themselves as somehow 'special' and will expect the blows of life to rain less heavily down upon them than upon their neighbors.

The fourth trait is belief in an afterlife. It functions markedly to alter the balance of happiness and suffering one would otherwise perceive, so that happiness can predominate. If one suffers and dies in this world, at least he can be compensated in the next.

The impact of this trait is quite profound. Directly, it influences many of our religious ideas, but its indirect effects are probably even more significant. For it is very likely that a mind which can believe in eternal life and eternal happiness despite the fact that it experiences only perpetual death and perpetual misery will find itself laboring under many other delusions as well.

The last trait is related to several of the preceding ones, especially the fourth, and is in many ways the most important of the five. It is belief in a purpose to life. Whatever suffering must be borne, it is not in vain. There is a higher end which can justify whatever hardships we may have to endure.

It is striking how symbiotically this trait interacts with the fourth to give rise to our various religious convictions. Before a purpose can be believed in, it is almost necessary – certainly very helpful – for the finality of death to be denied. At the same time, belief in an afterlife would seem to lead naturally to a conception of some sort of superior plane of existence, and quite probably to superior beings as well – from which vantage-point a belief in a higher purpose requires only a very small leap of faith.

But the importance of this trait extends well beyond the religious arena – indeed, its importance lies specifically in the fact that its influence is so widespread. It affects in a fundamental fashion the way we view our-selves, the way we plan for and conceive of the future, the way we interpret history (to say nothing of its influence on the way history hap-pened), the way we view differing cultural or political systems as struggles of right versus wrong, the way we imagine, in war and numerous other undertakings, that God is on our side. Indeed, there are few areas of importance in which this belief does not play some role.

These five clear-cut and distinct traits will all function similarly: in a population which has been subjected to such severe hardship that certain of its members have concluded it would be better for their children never to be born, those individuals strongly possessing one or more of these traits will be among those who do reproduce and pass their characteristics on.

Let us consider an example. Over a period of several hundred years many millions of men, women, and children were kidnapped from their homes, forever separated from their families and loved ones, and, under atrociously inhuman conditions, were shipped across the ocean from Africa to the Americas to be made into slaves. Their treatment before and during the voyage was so harsh that at least 20 per cent died before reaching America.[7] Once there, their treatment was not much better and was sometimes worse. Vicious whippings which left lifelong scars were commonplace. At any time a husband or wife, child or parent, brother or sister might be sold to a slave trader or to another slaveholder hundreds of miles away never to be heard from again. Conditions of work for field hands were so onerous that many died young of overwork or ill treatment. According to the *New Orleans Argus* of September, 1830, in an article on

sugar cane culture, 'The loss by death in bringing slaves from a northern climate, which our planters are under the necessity of doing, is not less than twenty-five per cent'.[8] All in all, perhaps twice six million died as a result of slavery.[9]

Now the question is this: Why on earth would a woman voluntarily submit to bringing a child into the world, knowing beforehand with complete certainty that every child she bore would be made into a slave? And again the answer is: Not all of them would. It is well known that there were many suicides among slaves, especially before and during their voyage to America. Indeed, at times they were so numerous as to represent a serious economic problem for the owners, despite the fact that stringent measures were always taken to prevent them. Obviously these individuals brought forth no more children to be made into slaves. I know of no studies examining the question of how many of the survivors refused to bear children, but I would expect the number to be several times larger than the number of suicides.

Hence, the genes of these individuals, the most sensitive, intelligent, and determined, were eliminated. If slavery had continued for a few dozen more generations, it might have appreciably altered the genetic makeup of the slaves. As it was, the average newly-freed Negro in 1865 probably had no more than three generations of ancestors who were slaves, since for most of slavery's history a substantial fraction of the slaves had been born free in Africa. The institution, therefore, could have had no lasting genetic impact, not only because the selection was extended over so few generations, but also because for human beings selection in that specific direction has already proceeded so far. Comparatively few people of each generation would have refused to become parents.

The situation with regard to human misery, overpopulation, and the various traits I've mentioned can be thought of as constituting a self-reinforcing system. Overpopulation is currently causing extreme misery in many areas of the world. But however bad the situation ultimately becomes, it can never reach the point that the human race decides life is no longer worth living and therefore dies out. If conditions become so bad that a sizable fraction of the race refuses to reproduce, this will halt population growth and thus bring an end to the worsening conditions. This equilibrium is only temporary, however, for as each generation continues to remove from reproduction most of those individuals most sensitive to life's hardships, the population will find itself continuously becoming more largely made up of those willing to reproduce despite these harsh

conditions. Therefore, the population will slowly begin to rise again. As a consequence of rising population, the level of misery will begin to rise. And as a consequence of the increasing misery, some people who would have been willing to reproduce under the former conditions will no longer do so, causing the future population to become still more accepting of misery. Thus, selection will always move in the direction of making the population willing to reproduce under worse and worse conditions, while overpopulation, together with the increasingly warped personalities of the individuals involved, will always tend to make conditions worse – and the selection, therefore, more rigorous. If ever conditions become so harsh that only idiots and madmen continue to have children, then the whole human race will shortly consist of idiots and madmen.[10]

I feel, of course, that the harshness which has always prevailed among most human populations has already carried us a considerable distance along this downhill path. That is why I see almost no hope of averting a major population-resource disaster in the years ahead. The biases evolution has selected for – giving scant heed to the future, thinking we are 'special' and that God is looking over us and that His 'purpose' could not allow such a catastrophe, glorifying childbearing, etc. – will prevent us from dealing logically and forcefully with the tragedy ahead. Indeed, not only do I think we shall lose the battle, I think we shall not even make any serious attempt to save ourselves. The contest will not even be close.

I have not attempted to be complete in this listing of the various psychological traits evolution and harsh conditions will provide the human mind with. There are a number of other minor ones I deliberately skipped over (for instance, those whose reproductive compulsions can be as completely fulfilled through adopting children as through having their own will be gradually displaced by those who require actual genetic descendants), and perhaps some major ones I accidentally overlooked, though I tried my best to find them all.

More importantly, however, this paper deals with only one *class* of evolutionarily determined psychological trait – those traits which act to cause one to reproduce despite marked conditions of hardship for the offspring. There are other traits evolution will select for through different means. For example, there is a most important class which is made up of those characteristics which enhance an individual's chances of survival (and thus, usually, of leaving descendants). It consists of such traits as will to live, fear of death, and – first and foremost – selfishness in one's dealings with others.[11] Indeed, selfishness is surely a more important

component of the human mind than any of the five traits I chose to discuss.

There is also, probably, a sixth trait I did not discuss but which I shall briefly mention. It belongs partially to my class but also to others. Its causes and effects are difficult to assess, and for that reason I leave its analysis to someone with more time or insight. I am speaking of the ability to believe irrational (and also rational) ideas just because one's neighbors do, the ability to accept slavery or Nazism as 'right' just because one's neighbors happen to be slaveholders or Nazis, the ability to go along with the crowd.[12] This trait is so nearly universal in human beings that it must have evolutionary utility. Several possible selective advantages it would confer can readily be seen, but there appear to be significant disadvantages as well. More thought is needed here.

Finally, before bringing this paper to a close, I would like to spend a few paragraphs discussing a closely related idea which is, in a sense, nothing more than viewing the same problem from a different perspective. It can easily be proven – indeed the fact is obvious as soon as I have named my one example – that there is a special class of ideas with which our human minds cannot logically deal. Our inability arises from the inevitable effects of evolution, so that it is possible to say that this 'blind spot' exists not only for human beings but also for any intelligent beings who may have evolved through natural selection elsewhere in the universe. In other words, it is possible to name certain ideas which, without our ever looking into their truth or falsity, we know *a priori* will be believed false (or their negations true) by virtually all members of our race. This belief in their falsehood bears no relation to whether they are in reality true or false, so that even the true ideas of this class must be believed false.

The example I shall give is an idea which falls into this class, but which I firmly believe to be true nonetheless. It was through noticing that I could expect almost no one else to agree with my opinion on the matter that I first perceived the existence of this type of idea. My opinion is this: There is no God; there is no afterlife; there is no purpose to existence. Nevertheless, for human beings and for all other sentient creatures there are pleasure and pain, happiness and sadness, joy and suffering. But because of the very nature of natural selection, it will always be the case that misery and suffering predominate – indeed, they will greatly predominate. And therefore: life itself is evil, and to bring more life into this world is unthinkable.

I suspect that this idea – that life is evil because it involves a preponder-

ance of suffering over happiness to no worthwhile end – will currently seem rather farfetched to almost every reader. But please note that your segment of the human race is currently enjoying an altogether unprecedented prosperity which population growth and non-renewable resource consumption will soon bring to a halt. If well over half the human race perishes in a massive worldwide catastrophe before the year 2000 – an outcome which I consider to be extremely likely – though even then comparatively few may accept this world-view, at least they will no longer regard it as absurd.

Now it is not my purpose here to argue for the correctness of this viewpoint. Nevertheless, to a certain extent I have already done so, since a number of basic reasons for the existence of so much pain have appeared earlier in this article. But there are still other important reasons for my opinion which I will not attempt to discuss, for it would require an entire book to deal with them adequately.

My purpose, rather, is to point out the existence of this class of ideas and to demonstrate a fact which should by now already be apparent – that no more than a tiny minority of the human race can ever accept one of these ideas. For any race which suddenly became convinced of such an idea's validity (perhaps as a result of some massive catastrophe) would die off immediately, and any individuals who down through history have happened to possess such a belief have eliminated their genes and the genes of their disciples from the gene pool. Such ideas are self-extinguishing.

In other words, if my idea should indeed be the truth (imagine some other universe in which it is true), then we know in that event that one of the most important tasks of evolution would be to produce individuals who are blind to this fact – who are not able to perceive the worthlessness of existence no matter how much horror they exist in the midst of or suffer under themselves. And, I would submit, minds so facilely able to ignore or justify suffering are apt to be an important factor in the cause and continuation of such suffering.

There are certain ideas which the human mind simply cannot logically deal with, since if they should be true, then it is obvious that evolution will direct all its resources toward producing minds which will believe them to be false. The example I gave is the most important member of this class since it determines our opinion of the ultimate nature of reality – we *must* believe reality to be good. But there are other ideas of the same type, and they make up a most interesting category. It would be useful for someone to devote a whole paper to this subject.[13]

I'll end by quoting in full an excellent, short report which Richard Threlkeld gave on the 'CBS Evening News with Walter Cronkite' on October 1, 1975. The story was also carried in several articles in the *New York Times,* from which it can be gathered that at least a few members of the family in question have chosen not to have children because of the risk of passing on their genetic disease. Their disease is most unusual, since nearly all seriously defective genes are recessive, but this one is dominant.

CBS Evening News with Walter Cronkite (Excerpt) 10/1/75. CBS Television Network

Cronkite: The Joseph family is a big one. There are aunts and uncles and sisters and brothers and cousins, and they live in California, Nevada, Oregon, and Washington. Some have never met, but they all share a common and tragic bond. Richard Threlkeld reports.

Richard Threlkeld: It's 1845, and a Portuguese sailor, Anton Joseph, jumped ship to begin a new life in the muddy streets of old San Francisco. Joseph mined for gold, did some farming, and started a family, and, by doing so, left his descendants a medical legacy of disease and death for the last five generations.

The doctors call it, 'Joseph's disease', and it's so rare, confined just to Joseph's one-hundred-fifty or so descendants, it's not even in the textbooks, but it's almost certain that before they reach middle age, at least half these children, the tip of his family tree, will die of it – the 'family bug', they used to call it.

Rosemary Silva: Well, it was a family secret for a very long time, oh, up until the last four or five years. And family members just didn't want to talk about the disease because they really didn't know what it was all about. I think they were ashamed that we would have such a disease in our family.

Threlkeld: Last year, Rosemary Silva, a descendant, took the family secret to the National Genetics Foundation and got help from medical specialists, who assembled the family and diagnosed the family bug as striato nigral disease. It is hereditary. It is presently incurable. It can drag on for as long as twenty years and it is always fatal.

Dr. William Nyhan, who tested each family member, describes the symptoms.

Dr. William Nyhan [medical geneticist]: An individual in the early stages of this disease doesn't know he has it, and yet he acts as though he's drunk. He might be driving an automobile and the police stop him for some minor traffic infraction and he gets out and he can't walk straight. traffic infraction and he gets out and he can't walk straight.

Threlkeld: The doctors think but are not sure it's caused by a defective gene that leads to the death of brain cells. Eventually, the victim cannot swallow or breathe or urinate. He catches pneumonia and dies. Joseph's disease strikes one out of every two members of this family. Mrs. Doris Nusbaum is one of the unlucky ones. She now spends most of her life in this chair.

Doris Nusbaum: Why, I live each day as if it will be my last. I don't look forward to the future or past, in the past. And I – There's no need to worry about it. And, I don't know, I just take it. I guess I – I didn't ask to be born but I am, so I'm doing the best I can.

Threlkeld: Rick Donohue watched his mother die of it. His older brother and his uncle are dying of it, too. And last weekend, the doctors told Rick Donohue he's showing the first symptoms.

Rick Donohue: But it was pretty heavy when he told me that, you know, I got it. It was like, you know – like my big brother says, like dropping a bomb on a twenty-year-old kid, you know?

Threlkeld: If Anton Joseph had known when he landed in San Francisco how many of his children and their children he'd be sending to an early grave, he might never have married. But that is history. And today, his descendants can only hope, for their children if not for themselves.

Donohue: I – I'm not going to let it stop me from having children, and I'm going to tell my wife everything, you know, because I think it has to be important for her to know what'll happen, you know. Also, I think I'll take her down and have her see my uncle, you know, the way I'll probably end up.

Threlkeld: Richard Threlkeld, CBS News, Sacramento.

Cronkite: And that's the way it is, Wednesday, October 1st, 1975. This is Walter Cronkite, CBS News. Good night.

NOTES

1 A sample of the estimates in order of increasing numbers:
   Senator Joseph D. Tydings, *Born to Starve*, William Morrow & Company, Inc., New York 1970, p. 5. 'According to conservative estimates, 3.5 million people will die of hunger in 1970; countless other millions undoubtedly will succumb to diseases after malnutrition has lowered their resistance.'

William and Paul Paddock, *Famine – 1975*! Little, Brown & Company, Boston 1967, p. 11. 'Today twelve thousand people died of hunger in the world. Tomorrow another twelve thousand will die.' (12 000 per day equals 4 380 000 per year.)

Dean Fraser,*The People Problem*, Indiana University Press, Bloomington 1971, p.43. 'A recent article in *BioScience* gave a figure of 12 000 a day dying of starvation world-wide. I have seen much higher figures, if from somewhat less reliable sources.'

Timothy Dickinson, 'Death Trapped in a Tree', *Harper's Magazine*, June 1974, p. 15. 'Although the victim nations cannot furnish reliable statistics, it is fair to estimate that somewhere between 30 million and 100 million people are now slowly starving to death, and at least 5 million of them will die this year.'

The Editors, 'Fighting World Famine', *New Republic*, August 7, 1965, p. 7. 'In India, five million children die each year of malnutrition.'

Special Report, 'Running out of Food?' *Newsweek*, Nov. 11, 1974, p. 56. 'By the most conservative estimates, at least 460 million people are threatened with starvation today. Ten million will probably die this year – most of them children under 5 years old.'

Paul R. and Anne H. Ehrlich, *Population, Resources, Environment*, W. H. Freeman, San Francisco 1970, p. 87. 'Of the 60 million deaths that occur each year, between 10 and 20 million are estimated by French agronomists René Dumont and Bernard Rosier to be the result of starvation or malnutrition.' The Ehrlichs use this estimate but admit it may be too high.

René Dumont and Bernard Rosier, *The Hungry Future*, Frederick A. Praeger, New York 1969. See above.

Harold M. Schmeck, Jr., 'Malnutrition Is Up Sharply Among World's Children', *New York Times*, Oct. 6, 1974, p. 1. 'It has been estimated that roughly 15 million children a year die before the age of 5 of the combined effects of infection and malnutrition.'

Alan Berg, *The Nutrition Factor: Its Role in National Development*, The Brookings Institution, Washington, D.C. 1973, p. 27. 'Before children born today in developing countries reach their fifth birthdays, approximately 75 million youngsters will die of malnourishment and associated illnesses.' On page 4 we have a statement which does not deal directly with malnutrition but which indicates to me that his figure of 15 million per year may well be in the right ball park: 'If India's child death rate were the same as Taiwan's, 5.6 million fewer Indian children would die every year.'

A large part of the variation in these estimates may be accounted for by the fact that some of these authors (e.g. the Ehrlichs) include all deaths which would not have occurred if the individuals had been properly nourished, while others (e.g. Senator Tydings) are more selective and include only those deaths for which malnutrition was far advanced. (There are almost no deaths due *wholly* to malnutrition; infection deals the final blow.)

2 Estimates for the world's growth rate range from as low as 1.63 per cent (Agency for International Development) to as high as 2.2 per cent (Environmental Fund). I am using the Population Reference Bureau's mid-1977 growth rate estimate.

3 This point – that for most of human history more than half of all children died before the age of fifteen – although important, is somewhat peripheral to the main purpose of this paper. For those interested, however, I feel a somewhat more detailed explanation is due than that given earlier. Hence, this rather long footnote:

A stationary population must have the same number of women who live long enough to reach reproductive age in one generation as in the next. The same is true of all other categories of individuals as well: an equal number of children must die at age six and a half whatever generation one is talking about. However, we are particularly concerned here with the first group – those women who live long enough to reach reproductive age – because everyone born into that population must be born to an individual in this category. Only these women are having children.

Therefore, each woman who lives long enough to reach reproductive age must during her

lifetime on the average give rise to exactly one girl child who lives long enough to reach her reproductive years. If the average is two girls born, then one must die before this time.

Estimates of children per average woman are often misleading, since they usually refer to 'total maternity ratio', the number of children born to the average woman who lives through her reproductive period. And yet, for early humans, less than half the women who survived to enter their reproductive period were still alive at the end of it. The actual average number of children (for women who survive to enter their reproductive period) is given by the following equation:

$$C = \sum_{x=15}^{45} f_x \, l_x \, / l_{15}$$

(1)

Here, f_x represents the age-specific fertility, i.e. f_{18} is the number of children born to the average female between her eighteenth and nineteenth birthdays (x need vary only between 15 and 45 because f_x is practically zero for any x outside this range), and l_x represents the probability of survival to age x for females. Therefore, if l_{15} is ½ and l_{45} is ¼, it means half of all newborn female babies are still alive at age 15 and one-fourth at age 45. In this example, l_{45}/l_{15} equals ½, and, consequently, the average 15 year old will give birth to only half of f_{45} children thirty years later, because those women who do not survive will all give birth to zero children during their forty-fifth year.

In their book *History of Human Life Span and Mortality* (Akadémiai Kiadó, Budapest 1970), Gy. Acsádi and J. Nemeskéri develop life tables for various ancient populations. Their table of Maghreb-type mortality – an abbreviated form of which appears below – is based mainly on estimated age at death of various skeletons uncovered on the Maghreb peninsula of North Africa. Maghreb-type mortality is thought to represent fairly well the conditions existing during the late Paleolithic and the Mesolithic eras – from about 25 000 years ago until about 10 000 years ago. We can see directly from this table that only 46 of every 100 children lived to age 15, and that among the 77 who survived their first year, 40 per cent died before their fifteenth birthday. When the survivorship function for this table is applied to the probable fertility rates for ancient humans, or for existing populations with high fertility (see Acsádi and Nemeskéri, p. 177, for examples of fertility rates), we find values of children per woman about 25 per cent less than the corresponding total maternity ratio, generally falling between four and six children per average woman.

Maghreb-type Mortality (both sexes)

AGE	0	1	2	3	4	5	6	7	8	9	10	15
l_x	1.00	.769	.661	.587	.560	.543	.528	.514	.502	.495	.489	.463

AGE	20	25	30	35	40	45	50	55	60	65	70	75
l_x	.433	.390	.340	.290	.240	.195	.154	.119	.088	.058	.029	.008

Children per woman can also be computed directly from l_{15}, the fraction of women surviving to age 15, as follows: The net reproduction rate, R_0, is the number of female babies born to the average newborn female baby during the remainder of her life. R_0 must equal one for a stationary population. R_0 is given by $n \sum_{x=15}^{45} f_x l_x$, where n is the ratio of female infants to total infants. Substituting R_0/n for $\sum f_x l_x$ in equation (1) therefore gives us $C = (R_0/n)(1/l_{15})$. But R_0 is very nearly one and n is close to one half. Therefore:

$$C \cong 2/l_{15}$$

(2)

This implies 4.32 children per woman of a Maghreb-type population, and is appreciably smaller than the 6.08 obtained through equation (1) using Acsádi's and Nemeskéri's estimate of the probable fertility rates of ancient humans (total maternity ratio equals eight). Part of the difference is accounted for by the fact that we used values of lx for both sexes when we should have used values for females only. Since under adverse conditions, even among disadvantaged populations today, female mortality is distinctly higher than male mortality (Acsàdi and Nemeskéri, Ch. 5), if we had had data for women alone, the number of children obtained through equation (1) would be less and equation (2) more. This cannot account for all the difference, however.

I am inclined to think that the values given for Maghreb-type mortality may be a little too optimistic. (Actually, Acsádi and Nemeskéri give a 'zone' of mortality, and Maghreb-type represents the boundary of lowest probable mortality for the zone. Something close to Maghreb-type was probably correct during the Mesolithic, but earlier a somewhat higher mortality prevailed.) Data from modern times show similar, and sometimes even higher, mortality. For example, concerning present-day India (from Alan Berg, op. cit., p. 33): 'Even in the Punjab, which includes India's best-nourished people (they consume nearly 50 per cent more food per capita than people in states like Bihar and West Bengal), wives in their mid-forties had given birth to an average of 7.5 live-born children, of whom 34–44 per cent died. Nearly half the women over forty years of age had lost at least three live-born children; only one in seven had lost none.' From page 34 of the same book: 'In seventeenth century England . . . twenty-two (of the thirty-two) children of British royalty died before reaching the age of twenty-one.' And from *The Prevalence of People* by Marston Bates (Charles Scribner's Sons, New York 1955, p. 184): 'In England a prime mover in public health was Edwin Chadwick. His *Report on the Sanitary Condition of the Labouring Population of Great Britain*, published by the Poor Law Commissioners in 1842, led directly to the establishment of official public health agencies in that country. Chadwick was one of the pioneers in the use of statistics as a tool of investigation and persuasion. He found that the average age at death, in Manchester, of members of working-class families was 17 years; of families in trades, 20 years; and of the gentry, 38 years. In Liverpool, the average age at death for the same three classes was 15, 22 and 35. He reported that "More than half of the children of the working classes die, and only one-fifth of the children of the gentry die, before the fifth year of age".'

4 For women who survive to the end of their childbearing years, the total number of children born is between five and eight. If a woman has six children and if the odds are fifty-fifty that a child will die, then the chances are only one in 64 that none of the six will die. (There is also one chance in 64 that all of them will die.) And the odds are almost nine in ten (57/64 or .89) that two *or more* of them will die.

5 This statement must be qualified: Obviously a point will ultimately be reached where the welfare of the existing children would be so diminished by additional births that fewer total offspring would survive if more were born. It is equally obvious, however, that this point will not be reached before several times two children have been born, and also that it will not be reached until the welfare of the existing children is already at a very low level.

6 All four traits – intelligence, perception, loving one's children, *and over-reproduction* – will enhance an individual's chances of leaving more than two offspring (i.e. a more than average quantity). Hence, they will increase in the gene pool – which is to say, they will be selected for.

7 According to the *Encyclopaedia Britannica* (1976 ed.) in its article on slavery.

8 As quoted in *American Slavery as It Is: Testimony of a Thousand Witnesses* by Theodore Dwight Weld (Arno Press and the *New York Times*, New York 1969, p. 162). This is a reprint of the 1839 work, a classic in its field.

9 I have not made a very thorough search into this subject, but I can cite three figures.

Daniel P. Mannix and Malcolm Cowley in their book *Black Cargoes* (Viking Press, New York 1962) estimate 30 to 40 million deaths. In episode three of its recent series 'The Fight Against Slavery' (broadcast May 11, 1977 in New York), PBS television gave a figure of 15 million. Finally, in the interest of honesty I should mention a third figure which is somewhat smaller, even though I cannot be very specific as to the source. In a special on Africa, the name and date of which I have forgotten, though it was approximately ten years ago, CBS television put the number at 10 million.

10 There is an interesting book by Colin Turnbull called *The Mountain People*, which, if you have read it, you will see the appropriateness of recalling here.

11 Except for one's children and, to a lesser extent, other close relatives.

12 A rather important and very similar trait which, however, belongs primarily to the same class as selfishness and which, therefore, I also shall not discuss, is the ability to believe whatever ideas for the moment and in the present situation are advantageous for one to believe. If instead of 'advantageous' we say 'genetically advantageous' and define as genetically advantageous those ideas which may persuade one to rear many children, we do have a trait which belongs in our category. However, I think it is one of the minor traits and only mention it in passing. All these traits are similar in that they have to do with the ability to have a self-contradictory mind.

13 It is worth noting that these unpleasant ideas will be more desperately and dogmatically disbelieved in if they are true than if they are false. Also, human beings and all other intelligent beings will find their minds in general more irrational if the ideas are true than if they are false, since in the latter case, evolution could direct its energies toward producing minds which perceive reality's essential nature correctly instead of backwards.