

"The Struggle for the Future"

Dr. Wernher von Braun  
Director, Development Operations Division  
Army Ballistic Missile Agency  
Redstone Arsenal, Alabama

University of Florida  
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Robert Greenwald

My trips to Florida, for business and pleasure, have become so frequent that I almost consider your state my second home. This is not because of the length of my stay each time, for that is all too brief. But it is because of the moments of pleasure, relaxation, and sometimes even pride and exultation crammed into visits of a few hours.

Most of my flying trips to Florida end at Cape Canaveral, where our ballistic missiles and space vehicles are launched. The events of several early morning hours spent in a concrete blockhouse on that isolated sandspit are indelibly impressed in my memory. One of these nights was March 3 of this year, when Pioneer IV was started on its journey into space.

At rare but pleasant intervals I am able to slip away from Huntsville for a skin diving excursion off your coasts. And then I sometimes have the opportunity of speaking to such an audience as yours. I would like to explore with you some of the obvious implications in our present position in space exploration with relation to that of an aggressive competitor determined to conquer space for his own ends.

I shall draw some comparisons in the course of my discussion. I hope my purpose is clearly understood and that no one surmises the Soviet successes in space technology have persuaded me there is anything good in Communism. Quite the contrary, I assure you! Having survived one dictatorship, and having enjoyed the privileges of American citizenship and residence in this great country since 1945, I am determined that we must strengthen our claim to leadership of the Free World with the eventual objective of leading all men to freedom.

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I would emphasize at the outset that the Soviet challenge is by no means restricted to military technology. It goes far beyond the realms of politics and armies. The task of coping with the Red menace to our security and our future is no longer the exclusive responsibility of generals and statesmen. The struggle involves every facet of our civilization, every part of our society: religion, economics, politics, science, technology, industry and education. Free men everywhere have been caught up in this grim competition.

We who enjoy our homes, who drive the family car, who spend more time in leisure and less in work, who pay less attention to national affairs than to television shows, are faced with a decision--will we do whatever is necessary to win this struggle, or will we continue in our comfortable illusion of superiority and court the risk of a defeat which would forever eliminate freedom, and place our children and their children under the yoke of an all-powerful state? What we are about to discover and resolve is whether a nation, who rates its home run sluggers and its fullbacks above its scientists and philosophers, can meet the total competition of aggressive Communism and still preserve its way of life.

The test is not confined to the abilities of Tom Jones, American rocket engineer, and Ivan Podbrosky, Russian missile designer. This is a test of stamina, ingenuity, courage and faith between every man who operates a lathe, who lays brick, who pours steel, who mixes concrete, who sews cloth, who analyzes chemicals, who solders connections, who resolves mathematical equations, who writes editorials, who comments about news, who delivers babies, who teaches children, who grows crops, who manages industry, who engages in trade and commerce, and his Soviet counterpart. This is not a contest of diplomatic maneuvers executed by

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a small group of men in Washington and countermoves dictated by a small group in the Kremlin. The fight directly involves all of us. The result will demonstrate to the world whether we are, in fact, as we still have every reason to believe, the greatest nation on Earth and the shining hope of men everywhere.

I know the price of lost freedom. I don't want my children or yours to pay it because of our failure to recognize the seriousness of the threat as we enter an Age of Space which can be the most fruitful and the most enjoyable of all the periods of recorded history, or which can end in catastrophe so awful as to defy description.

There can be no possibility of mistake in evaluating Soviet intentions so far as outer space is concerned. The objective is to master the spatial environment, certainly for scientific purposes initially, but with the long-range goal of putting the capability of manned travel through outer space to use for the same, overriding goal of expansion of their sphere of influence which is the ultimate purpose of all Communist endeavor.

It would seem obvious that we must avoid complacency, that we must cease to take for granted American supremacy in all human endeavors, of assuming that whenever we wish to do so, we can overtake the Russians. This can be downright dangerous; at best, it is foolhardy. At the same time I disagree with alarmists who cry that we have lost our position as a first-rate power. That kind of sweeping generality can result in hysterical, ill-conceived reaction which can be wasteful and harmful. We enjoy superiority in many facets of our life over anything the Communist system has yet produced, but the trouble is that we are prone to conclude this superiority exists in all areas. It does not!

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I suspect that we have not fully awakened to the breadth and depth of the Soviet challenge. There seems to be an illusion that this is a kind of race between competing teams of rocket builders and that the "horse" we selected has pulled up lame in the stretch. Actually the Soviet effort antedated that of the United States. Consequently the competition got far down the track and into the first turn before we left the gate.

When we consider their low general technological status as evidenced during the last war, plus the tremendous physical damage inflicted upon the Soviet industry by the war itself, it becomes frighteningly clear that their rate of progress on a broad front greatly exceeds ours.

The real peril lies in the enormous momentum which they have built up. Certainly it will yield dramatic by-products along the way. They have long since embarked upon a dynamic program to achieve supremacy in science and technology. Their state-controlled educational system is turning out competent engineers and scientists in greater numbers than ours. For example, 70,000 engineers were graduated in the Soviet Union in 1958 compared to 32,000 in this country, they have achieved parity in the number of scientists actively engaged in the State-approved programs, and there are actually more doctors in Russia than in the United States, approximately 164 per 100,000 persons compared to 130 per 100,000 persons here.

It is upon this foundation that the Russian is waging his effort, not upon the gleanings of his brain-picking of some captive foreign scientists as many people in this country still believe. Clearly we must accelerate our effort at a rate calculated to overtake and surpass the early Russian advantage, and this calls for sacrifice on an unprecedented scale.

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I would suggest that we brace ourselves for other Soviet "firsts" in the new field of astronautics. We are behind and we cannot catch up in a day or two since major technological projects necessarily involve lead time. It will require several years of concentrated effort to come abreast, and even longer to pull ahead.

We can waste no time commiserating over the sorry lot of the Russian worker or peasant, comparing his lack of freedom and creature comforts to our prosperity. We should also shuck off another illusion, that the Russian people will rise up to overthrow the Kremlin and thus relieve us of all worry.

Perhaps a dream of freedom exists somewhere in the Soviet Union. Perhaps by exposing young minds to scientific training, the search for truth will eventually lead to unmasking the dictatorship. But we cannot stand around, hands in pockets, waiting for others to do what can only be accomplished by us. I am convinced that it is man's destiny to enter space and that he who controls the open spaces around the Earth is in a position to dominate its peoples. Our choice is to accept the Soviet challenge or pay the Piper.

I do not suggest that we move into space with belligerent intention. It would be consistent with the fundamentals for which the United Nations stand if we would propose to that organization the universal acceptance of the principle of freedom of outer space--analogous to the principle of freedom of the seas. But any such doctrine would be void and meaningless if we cannot back it up with a position of relative strength, whether in submarine fleets, bomber squadrons, combat-ready land forces, or missile systems capable of operating on the surface or in space.

To provide some measure of the scope of the Soviet challenge in space, and mind you, these prospects are supported by a demonstrated capability

about which there can be no question, let me outline the long-range program announced by the President of the Soviet Academy of Sciences a few months ago:

First--earth satellites of such lifetime as to be practically permanent orbiters.

Second--recoverable satellites.

Third--manned earth satellites.

Fourth--rocket flights to the Moon and other celestial bodies.

Fifth--satellites of very high apogee orbits.

Sixth--interplanetary space stations which could support a considerable number of personnel over extended periods of time.

Seventh and finally--manned flights to Venus and Mars.

Not all of these projects are scheduled tomorrow, of course. Some require further advances in rocket technology because the entry of man into space and his safe return to a pre-selected landing base on Earth calls for the solution of many perplexing problems. While none of these projects are patently hostile, many could serve immediate military purposes. For example, satellites can be the vehicles by which to conduct reconnaissance on a world-wide basis, or to guide destructive devices to targets on Earth, or to intercept orbital vehicles launched by other nations, or to control weather.

Even more important is the plain fact that if we do not match the ambitious Communist intentions to visit the Moon and other planets with an equally determined United States space flight program, pursued with a real sense of urgency, we may in the not-too-distant future be surrounded by several planets flying the hammer and sickle flag.

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It should be remembered that it is not the scientist whose investigations make these things possible, nor the engineer who builds them, who can decide how fast all this can be accomplished, nor the ends these things will serve. Those decisions depend primarily on the funds made available and the international objectives of the power possessing the capabilities. In the case of the Soviet Union the decisions are made by a few men who consider it in the best interest of their Communist dream of expansion to pursue these endeavors vigorously.

In this free country we can muster the necessary resources for a plan best suited to our objectives only if the people themselves want it, support it, and are ready to pay for it. This may well become our last chance for such a determination. In the first World War, as well as after Pearl Harbor, the United States had necessary time in which to marshal its resources. Even in Korea and now, in the wake of Sputnik, we had time to initiate counteraction. Next time, in this world of long-range ballistic missiles and thermonuclear warheads, we may not have time. Either we will be ready at moment's notice or historians may conclude that we were weighed and found wanting as they poke among the ruins of our great cities.

I trust that we will not conclude money alone will turn all the tricks. There are other factors in this situation which cannot be settled so easily. It would be presumptuous for me to offer any single solution, or even to list all the things which must be considered. But there are some minimum requirements which can be identified and which demand prompt action. Not the least is the educational program, a subject of such sensitive nature that an "outsider" like myself approaches it with trepidation.

If, in talking about schools, a speaker applies the broad brush of approval he may delight his audience at the cost of his integrity. If he

attempts anything like a critical appraisal, he risks displeasure or worse. Yet it should be entirely logical to expect a keen interest in education from an informed citizenry, and such a citizenry is essential to the democratic process.

In the field of scientific and technological education the Soviet Union has been eminently successful. No small part of this success is due to the fact that Russia has, by our standards, a "single channel career society." Let me elaborate a bit. The young Russian who wants to become an engineer must pass a series of examinations before admission to an engineering college or, if his aspirations run all the way to the top, to the Moscow Institute of Technology. As all education in the Soviet Union is free, a boy cannot buy his way into any of these schools although it may be presumed it would be helpful if Daddy were some kind of a Big Wheel. Passing the entrance exam is the necessary first step. But it is only the beginning.

Year after year the Russian student is subjected to new examinations designed to wash out the less competent and to arrive at the kind of educational pyramid the Soviet government needs. Year after year the student faces the possibility of washing out. If he fails to acquire a bachelor's degree in engineering, he is shunted off for life into the career of a draftsman. If he passes the bachelor's requirements but fails the master's degree, he may become a layout designer or a shop superintendent, but that must be the end of his ambition. He must acquire the master's degree, or even better, a doctorate in engineering if he expects to reach the summit and make a major personal dent in technological progress.

Every career in the Soviet system is subject to this kind of "survival-of-the-fittest" screening. The only place in this country where a comparable

screening method is applied may be the military academies supported by the armed forces. But survival in combat is one of the main objectives of military education, thus survival-of-the-fittest methods in the selection of officers and in their training is without doubt both logical and effective. When you think, however, of the mental tortures and the flashy temporary successes followed by heartbreaking setbacks which mark the life of an artist or a scientific pioneer, the value of this kind of training becomes questionable.

Military training is like running a nursery where the crooked saplings and young trees are weeded out so the good and straight ones can survive and grow stronger and bigger. The artist or the scientific genius, on the other hand, must be likened to the orchid which flourishes best in the jungles--not the nursery. I've never considered myself a genius--and my wife is always ready to attest to this fact--but I assure you I would have flunked most of those exams in a survival-of-the-fittest system during the tender years of 16 through 22.

I do not mean that the "easy way out" is particularly conducive to a young student. Look at the temptations our booming economy puts before a young fellow today. He may have some doubt about that forthcoming college exam. Also he happened to meet a pretty girl--in ~~Alabama~~ <sup>ALABAMA</sup> if not in ~~Alabama~~ <sup>FLORIDA</sup>--and they both want to get married. Back home Daddy keeps reminding him that he himself began as a newspaper boy and became a respected, well-to-do citizen without benefit of a university education.

Our young friend requires the fortitude of a giant if he does not accept that offer to manage filling station at the outskirts of town where, without much formal training, he can make more money immediately than his fine, old professor. Chances are that 10 years later our young ex-student

has acquired the dealer's franchise in his community while his roommate who passed the bachelor's exam with distinction works for one-fifth of his income for a company developing color TV sets or guided missiles!

What is the moral of all this? Well, the Soviet Union does not have anything to offer which compares with the career of a successful U. S. businessman. In Russia you either pass those examinations or you've had it, and you are channeled for life into a lower strata of Soviet society with practically no hope of recovery. This is what I mean by the Soviet Union's "single channel career society."

There is still another aspect to their educational problem where the Soviets enjoy a definite advantage. Think of the many things an American must take active interest in if he wants to qualify as a well-informed citizen. Unless he is informed on such things as city government, or the water supply problems of the city, the road construction program of the state and the foreign policy of the Federal Government, how can he vote intelligently? Our competitors behind the Iron Curtain have no such problems demanding individual concentration. All the news they have to keep up with are the cyclic fluctuations of the party line. It may even be healthier not to develop too strong a personal opinion on matters not related to the immediate profession. The net result is that the average Soviet citizen can devote more of his waking hours to his professional work regardless of whether he is a student or a factory executive.

While this may have its semi-comic aspect, it is also a serious challenge. More than ever before our schools, colleges and universities have become the bulwark of our cherished freedoms. We cannot afford to have scientists and engineers who, in their fields, are inferior to their Soviet counterparts. But in order to be sound citizens of a free nation,

our knowledge and interests must embrace a vastly larger area and extend well beyond relatively narrow professional occupations. This simply means we must learn and work harder than the men behind the Iron Curtain-- let us ask ourselves if we are really doing that. Let us search our minds and souls to determine if we have faced up to the challenge of the Space Age.

Now I would not have you think nothing has been done by this country since the Russians made their opening bid with the Sputnik. A great deal has happened in the last 17 months. Two new agencies have been established to carry forward our space programs--the Advanced Research Projects Agency of the Department of Defense, which is concerned with space programs of military significance, and the National Aeronautics and Space Administration. The objectives of the United States have been stated by President Eisenhower in clear and unmistakable language. When he spoke of the opportunities which a developing technology can provide to extend human knowledge of the Earth, the solar system and the Universe, Mr. Eisenhower said: "These opportunities reinforce my conviction that we and other nations have a great responsibility to promote the peaceful use of space and to utilize the new knowledge obtainable from space science and technology for the benefit of mankind."

All three of the armed services contributed to the International Geophysical Year program, the most spectacular evidences of which were the earth satellites and deep space probes. Out of these projects we have derived a wealth of data about the spatial environment. An outstanding discovery was credited to Dr. James Van Allen of the State University of Iowa whose instrumentation carried in three Army EXPLORER satellites and our PIONEER space probes measured and defined the two doughnut-shaped

bands of intense radiation activity which exist in space and which pose a hazard to manned space vehicles. We believe it will be possible either to choose a flight path avoiding these bands, now that Dr. Van Allen has described their limits, or to provide the necessary shielding to protect a human being in a space vehicle from dangerous exposure to this kind of radiation.

The PIONEER IV experiment, launched March 3d, with our JUNO II rocket, convinced every member of the Army missile development organization that man can eventually travel safely in deep space. These are the reasons supporting that optimism:

First--the experiment demonstrated methods of tracking, guiding, and maintaining communications with vehicles over extreme ranges far beyond the Moon. Communication was maintained with the probe from the instant it lifted off the pad at Cape Canaveral for three days, except for short periods when it went below the horizon of U. S. tracking stations. The signals ceased due to exhaustion of batteries supplying transmitters in the probe after some 82 hours of continuous transmission. By that time PIONEER IV had traveled 406,620 miles from Earth and was moving towards its solar orbit at a velocity of 3,899 miles per hour. Radio transmission had been conducted over a greater distance than with any other man-made object in space. The signals were strong and clear until they ceased.

Second--with relatively simple protection applied to the outer surface of the probe it was possible to control temperatures inside the vehicle within tolerable ranges. Readings up to 105 degrees Fahrenheit recorded by Earth tracking stations from data telemetered by the probe do not indicate any imponderable in creating environment capable of sustaining life.

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Third--while it will be some time before all data are reduced, the cosmic radiation counters installed in PIONEER IV further defined the outer limits of the Van Allen Radiation Belt. This kind of information will enable us to evaluate empirically the engineering design of cabins or capsules in which men can safely traverse the hazard.

In about 5 minutes after leaving the pad at the top of a vehicle 76 feet long, weighing many tons, PIONEER IV was injected into orbit at the incredible velocity of 24,800 miles per hour, more than enough to break free of Earth's gravitational field and sufficient to hurl it past the Moon in approximately 36 hours.

In essence each of the payloads hurled into space by U. S. rocket systems have been small-sized, scientific laboratories equipped with highly efficient sensing and measuring devices. More ambitious space projects are under way. Let me mention, in passing, one of the less obvious but interesting aspects of our achievements. Just one of the earth satellites, EXPLORER I, has traveled nearly 150,000,000 miles since it was injected into orbit January 31st, 1958 from the Florida coast. If you consider the cost of the device in terms of the distance it has traveled, and the millions of miles of additional distance it will travel before it eventually dies, you may concede that such a satellite is more economical than your family car. My guess is that EXPLORER I will do better than 500 miles to the gallon--the cost per mile will be reduced to something like one-tenth of a cent.

There are many intriguing possibilities in this space business. For example, a set of three properly spaced communication satellites equipped with modern electronic recording equipment could easily handle the entire mail volume of the world. Postal service, acquiring radio

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messages from Wichita, as one example, and relaying them via line-of-sight links to New York, Rio de Janeiro, London or Bombay. World-wide television and broadcasting service can be achieved with the same satellites. They would be positioned above Earth at correct altitude so that they remained in a relatively stationary position. One satellite will be used for weather observation and forecasting will become at last an exact science with its help. The savings in lives and property damage by advance hurricane warning alone would far exceed the cost of the service.

So much for some of the accomplishments which are behind us and some of the glittering possibilities beckoning in the future. At the outset I emphasized the need of strengthening our claim to leadership. I believe we must begin by preparing our youth adequately to cope with the problems and the contests which lie ahead. We must disabuse ourselves of the idea that school is a place in which boys and girls learn how to live together and nothing else. They must understand mathematics and the physical sciences and they need more, better-prepared teachers, who can only be attracted to the profession by better salaries, improved professional status, and the kind of physical facilities which encourage inspirational leadership to interest young minds in facts.

I do not believe the Federal Government should attempt to dictate such a program but it should establish generally recognized standards and it should assist in a pump-priming role in the public schools, colleges and universities. Education is the concern of every citizen. The people should insist upon a re-direction of emphasis and willingly accept their just measure of responsibility. To those who ask "What can I do?" my answer is "take active interest in what is being taught, by whom it is taught, and how it is taught."

There has been unnecessary concern about possible Federal interference. The Federal Government as well as the states has supported public education to greater or lesser degree for many years. All we are talking about is funneling support into more productive channels. If the Federal Government can support highway projects, why not schools? If we can support crops, why not the most important crop of all--the brains of our children?

Finally, we must generate the will to supremacy. Because this is intangible, because it must come from the hearts and minds of our people, it cannot be legislated, budgeted, or evoked by decree. We want no Federal propaganda machine exercising dominion over the free press. We want no dictator telling us what to believe and what to do. But we must set about learning the facts and, when we have understood them thoroughly, buckle down to the challenging tasks which confront us.

We should stop telling the world what we are against. We should tell the world what we are for. We must not fight Communist ideology with negative statements but with the lofty ideals of the founders of this great Republic. The antidote to Communism is not anti-Communism, but the belief in God and the dignity of the individual. Let us not deceive ourselves; the Communist ideology has powerful appeal to the have-nots, the uninformed, the desperate. But ideas are fought not with material means but with superior ideas translated to the benefit of man. Where should these ideas be found in this world if they cannot be found in this glorious Land of the Free? The flag of leadership of the Free World has been thrust into the hands of Americans; let us live up to what is expected of us.

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The rocket developer with his eyes upon the outer galaxies is certainly not motivated by material reward. Yet he is constantly asked, "Why do we do these things?" "Will they ever pay off?" Can you imagine anyone asking that of an Einstein or a Pasteur? There will be payoffs, of course, as we move into space, but the most important, the reward of greatest lasting value, is our increased understanding of the spatial environment and of its influence upon our earthly existence.

You cannot put a price tag on such a discovery as the Van Allen Radiation Belt, made possible through the launching of relatively small orbiters. We have opened the door into the limitless reaches of the Universe by these modest beginnings, and we can see just far enough ahead to know that man is at the threshold of a momentous era. Here is opportunity, challenge, adventure so tremendous as to exceed anything which has gone before. Here is the tomorrow which youth wants to embrace and for which we must provide whatever guidance and preparation we can. I am confident that as more of our educational institutions conduct programs like that which is carried on in this campus, we shall begin to prepare for the new age.

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