Antonello: How did you get involved with computer science?

00:00:46:19   Student of mathematics at the university of Detroit Michigan
               and there was a crazy professor there who thought that the
               university should have a computer that was a very unusual
               thought in those days in those days also it wasn't possible
               just to go out and buy a computer a computer in those days
               was completely different than they are now so there was
               nothing to do than to build one it was a very large
               computer physically but by today standards very small
               computer in terms of computer power for eg a hand calculator
               that you can buy today for 35 dollars or so is much more
               powerful than the computer that we built at that time.

00:01:54:17Þ
               But clearly a small number of students were working on that i among
               them had to do everything you could not hire somebody
                to build the circuits or to do the programing or whatever
                yes we did everything and that was an extremely valuable
               educational experience and we did that. It was successful in the
               sense that we actually got the thing built and running. It was a
               lot of fun and just as newspaper people talk about getting ink in
               there
                blood so the computer kind of grabbed me and never let go
                and so i have been in it ever since.

WEIZENBAUM
BETA 38A

Antonello: Who was thinking of building computers at that time?

00:02:50:21Þ From a prof of mathematics i remember him very well his name was
               Alfred Jacobson and really at the time it was quite an insane idea
               he must of talked someone into giving him the money and
               somehow by stubbornness he made it happen. You must
               understand that in 1950 the pioneering work had been done
               there was such a thing as a univac comp for example used by the
               national bureau of standards of the USA and by the Census
               bureau in USA. And there were companies selling computers but one
               had to wait a very long time to get one and they were very
               expensive and so on and i think it was quite proper that the
               university built one themselves and i must also say that in
               those days and perhaps for the next 5 or 8 years it became
               very traditional for the universities to build there own
               computer. The university of California in L.A built one the
               univ of Michigan built one many other univ built them it
               became quite a normal thing to do. There was nothing like a comp
                business those days it was also interesting from a

historical point of view that we comp people that is people
who knew about comp and so on was a small amount of people
in those days and i cant quite say that we knew each other
but almost.

And one of the things that is very different from
today is everybody who worked on comp was very interested in
sharing there work with everybody else if one developed a
program to do something to solve a set of differential
equations in a certain way one would let everybody know that
they had this and send it around today these things of
course are business items they get bought and sold and sew
each other it was very different in those but it was a lot
of fun.

WEIZENBAUM
BETA 38A

Antonello: Are computers promoting a new idea of progress?

00:05:37:10Þ   I think today in the general public
             including in the well informed public and i think this is
             true for USA and i may say even for Europe for eg or for
             Asia for that matter. You can't talk about computers today
             and not talk about Japan. I have to remind myself.

00:06:07:20Þ   I think
             that the whole idea of the computer that the whole concept
             has become virtually identical with the concept of progress
             i think it is to weak to say that the computer and the
             development of comp that it pushes progress or fuels
             progress i think it does that but the two ideas have become
             almost synonymous. You see what's happened in these times and
             say in the last ten years is that the comp has come to prevail
             everything there are very few things that are untouched by
             comp very few human activities i hope that there will always
             be some but they are getting fewer and fewer. And one reason
             for that is that the comp has become so very small very tiny
             little micro comp exist today and they i dare say that
             almost everybody say that everybody viewing this program on
             the television set has used a computer today it may be a
             comp in their camera for eg or a comp in their TV set or
             even in an automobile and so on.

00:07:43:10Þ so the comp has become
             essentially invisible and many of the instruments that we
             use today that to us represent progress diagnostic
             instruments or automobiles or whatever have the comp in them
             and would be almost unthinkable without the comp. So in that
             sense comp development progress technical progress seemed to
             go hand in hand i want to be careful to add in my view
             anyway that this is not all together a good thing.

WEIZENBAUM
BETA 38A

Antonello: the idea of progress and the scientific revolution...

00:08:58:01Þ   I think again in our time the word progress or concept
             progress is generally seen as entirely positive. Progress is
             good and anybody who stands in the way of progress is bad
             And so on i think a closer examination it turns out not to
             be true. Not all progress is good and in fact i think
             especially with respect to the computer.

00:09:39:19Þ That what we have
             done by we I now mean the human race at this time in the last
             half of this century what we have done basically we have
             made a kind of faustian bargain with our science and
             technology. I lean on the idea of Faust who made a pact with
             the devil of power and youth he sold his soul. And the
             important thing and Faustian bargain is of course that he
             got something for it at high price but he got something for
             it. And that's how it is I think with our science and
             technology we always get something that we like very much to
             have. After we have it for a while we cant think what it
             would be like to give it up. and so on But we pay a terrible
             price for it so that's an eg perfectly obvious for everyone
             today that

00:10:37:19Þ The world is much less secure today than it was say a 100
             years ago. Today we question if children born today will get
             to be as old as i am now for eg it is not at all guaranteed.
             A 100 years ago it was of course guaranteed and the
             assumption of course that they don't die of some disease.
             But today it is not a crazy idea by very far to think of the
             whole human race being wiped out. for eg That's a price we
             pay the insecurity that's just one eg one could give 1000 of
             eg but we get something for it.

             Let me give you an eg of
             something that appears to everybody to be essentially an
             unalloyed good its an entirely positive of technological progress
             that involves the comp. I'm thinking of the so called cat
             scanner this is comp aided tomography is what cat stands for
             This is basically a marriage between x ray technology and
             comp technology. And what happens in a cat scanner is that an
             x ray picture is taken say of a persons brain actually many
             pictures are taken of a persons brain but then instead of
             the image being displayed or stored on a photographic film
             as happens on a normal x ray machine. The image is given to a
             comp and the comp works it over so to speak and construct out
             of these many images three dimensional images of whatever it
             is that has been photographed. And with the help of the cat
             scanner comp aided tomography where physicians can see the
             living brain for eg in 3 dimension now for eg they can see
             the living heart or any other organ in 3 dimension without
             opening the body without any surgery.

00:12:39:14Þ This means that if
somebody has a brain tumor for eg that has to be operated on
the physician can locate exactly where it is and how big it
is the operation might not be necessary so this instrument
might save somebody from a very serious operation. And I
think one can say here a that unlike weapon tech it doesn't kill
anybody its all good. Theres nothing bad about it. But i would
disagree in the American context that maybe in Europe things
are very different. But in America if one looks at the health care
delivery systems so to speak that we have in America. How one
gets to a physician to begin with. and One finds for eg that
there are literally millions of people in America that never
see a physician. There are thousands of woman pregnant today
who through out there entire pregnancy never see a physician
and so on.

This has to do with our structure of medical care
system. Has to do with the structure of our society. When one
looks at this on one end and what the cat scanner does on
the other end then one sees that had we spent the money that
it took to develop the cat scanner and the energy. you know
Had we our priorities somewhat differently we would not have
a cat scanner and millions of people who do not see a doctor
today would see a doctor that's the Faustian bargain. The cat
scanner is a wonderful instrument that's what we got for it
but the price we paid for it not only because of the cat
scanner to be sure you know is the continuation of medical
deprivation and so on in the USA one can give a great many
eg especially in the USA of this kind.

WEIZENBAUM
BETA 38A

Antonello: Can you tell me something about the technological fix?

00:15:01:19Þ   What i am
talking about is summed up by the 2 words technological fix
that is what we have come to do in this age dominated by
technical instruments and especially by the comp of
course. What we have come to do is to see the problems that
face us to convert them to technical problems of some sort
and then to apply the technical tools that we have to solve all
of these problems. What happens unfortunately is that the
entire process is a distortion of reality. Let me give you an
eg Lets take the American educational system I'm talking
before the university the primary school system where
children go to school up until the time they come to
university for eg if they come to university.

I think it is
very difficult for someone who doesn't live in the USA and
for lots of people who do live here to understand in what
chaotic catastrophic state our education system is. A 3rd of
our young people between 16-30 years old are functionally
illiterate. This means that they can read street signs and

things of that sort but they can't really read a book. In the
newspapers they look at pictures and can make out words. A
3rd of our youth is functionally illiterate this is
incredible. One could go on to characterize in what terrible
state our educational system is.

00:16:58:05Þ   Well that's a problem. What
do we do about it. What we do is convert it to a technical
problem. and Learning to read for eg is a technical problem that
can be helped with the use of comp one can write a comp program
that children go to the computer and type a few things and get
rewarded
or not rewarded depending on what they type and so on and
Indeed one can show that children who have been exposed to
this comp program can read a little better than kids who
haven't been. So there you are. The problem is solved you see
That is the technological fix.

However if one were to ask, we
say johnny cant read if one were to ask why cant johnny
read. Not how do we help him to read but lets start first and
ask why cant Johnny read? Then we might find out and i am serious
about this. Then we might find out that johnnies brother was
killed by another child in school. We have hundreds and
hundreds of children in the USA every year who get shot by
other children in school. That's part of the chaos of our
school system.

We might find out that johnny is hungry when
he comes to school. We might find out that there are no books
at where here he is. There might not be a home in any proper
sense. If we then say well that's the case if he is hungry
when he comes to school then we should have programmes that
feed children at school and we used to have those programmes
What happened to them? Well then we find out that the federal
government in Washington used to give funds for this but
does not any more. Then one asks what happened to those funds.
Then we ask how much does a b2 bomber cost? A b2 bomber cost
250 million dollars. And we are building many of them.

00:19:00:16Þ   and so
on if one asks serious questions, one comes to political
questions very quickly? And hard political questions may be
very difficult for the society to accept. So its much easier
from every point of view to simply transform the problem into
a technical problem. What technology do we have to help
children read? Instead of asking why cant they read this is
one eg And that's the technological fix. We used to especially
in the USA have the protestant work ethic.

There was an ideology
one might say that protestant ideology and that's largely gone
now. And what's it been replaced by?   And i think you can find
the answer if you look at our presidents. Look at our present
presidents George bush for example. The word applied to him

often is pragmatic he is a pragmatist. And the name of the
religion so to speak the name of the ideology has become
problem solving. And you look at again johnny cant read. That
is a problem. Now when you have a problem you ask what is the
solution. And your very close to coming to the technological
fix. The fact is i think with respect to human problems
wether they be individual human problems say difficulties in
a marriage for eg or wether they are international problems
like the north south conflict or the east west conflict or
so on.

00:20:59:03Þ   I think the fact is that the problems are never solved
There changed they are transformed to other problems they
may not be easier to live with what we see going on in
Europe today the problems have all changed it isn't that
they have gone it isn't that they have been solved. Our
technological fix i mean Americas technological fix with
respect to the east west problem i want to say it just that
way.   Has been to have a mighty military force. That was the
technological fix.   These guys are threatening us. What do you
do when people are threatening you? Well that's a technical
problem having to do with airplanes, submarines, aircraft carriers
and
so on. What we see is a man like Gorbacheov come out of the soviet
union who does not view these problems like technical problems.
Who views them correctly like political problems. That means social
problems. And he makes social and political interventions. And
things change. In the whole time we have confronted the soviet
union
and they us with masses of armaments 50.000 atomic bombs in
those times nothing changed. So i think one might say about
the technological fix that it very often does not fix
anything.

WEIZENBAUM
BETA 38A

Antonello: What about the relationship between technology and science?

00:22:40:23Þ   Technology and science what's the
relationship...I think science as we know it today what
we call modern science began sort of with isaac newton in
England with the founding of the world society in London. It
was not an all English affair. There were many Germans for eg there
at the same time the french people and so on. I think the hallmark
the characteristic thing about this almost conscious founding
of modern science at the time. Was the promise that was made
to the king of England that he agreed to support the world
society in terms of money. The promise made to him that the
work of the scientists members of the world society what
today in America and many other countries we would call the
academy of science the national academy of science. That this
work would have practical results. That was something very
knew. you know The king was promised practical results. Now we
could ask just by the way what results the world society

actually delivered in the first say 150 years of existence.
And there is an answer to that question its very easy to find
Theres one result that they delivered and that is the
lightning rod. Nothing else. ok But just the same it started
something and in the progress so to say the milking of
science for practical results became increasingly rapid.
Until today science is almost indistinguishable from the
production of results. if you look at the research we've done
at MIT then a very large fraction of it is
sponsored by outside agencies most particularly the military
the department of defence as its called. And the proposals to
do the research are laced with promises. Heres the kind of
military instrument you'll be able to build if we solve this
problem.   So the distinction between science and technology
has been largely its an overstatement to say wiped out but
at least has been fuzzed over ok that's one thing.

00:25:51:04Þ   The other
thing that has to be said in this connection is that where
as up to the time of Enstein lets say up to the beginning
of almost the second world war the picture of the scientist
at work was largely a picture of a man and secondly a white
man and mostly important a white man waring a white coat in
his laboratory. And that was a kind of a uniform. You could tell
the difference between a scientist and a medical doctor. They
wore exactly the same coat except the doctor wore a stetescope.
So if you see the white coat and there's no stetescope that man
must be a scientist. What I'm trying to emphasize here is that
science is done by individuals like Einstein. Its interesting
you know as far as i know einstein never performed an
experiment in his whole life. It may be that einstein never
seriously saw the inside of a laboratory. But he did by
himself and he did out of his head. While other people
performed exp. I don't mean that scientists did not perform
exp. But they did it either by themselves as individuals or
in very very small teams.

00:27:30:21Þ today any body who has a doctoral
degree from university in scientific field is called a
scientist quite independent of what he or she actually does.
And most of the new breed of scientists most of them produce
nothing through out their whole scientific career.Nothing that
their name is associated with or if they do there name is
associated with 50 or 100 people with whom they have
participated with. And the instruments they use are totally
large and expensive. For eg particle accelerators huge comp. I
have to say today in the general public particularly were
use to think of comp to being relatively small they stand on
a desk perhaps and they are not terribly expensive $10.000
is already an expensive comp but the comps used by
physicist and these experiments i have in mind very often
cost 10 or 20.000.000 dollars each. Very very different than
the ones you use on your desk.

00:29:02:24Þ   So science has become we now

have a concept big science which is like big business. And i
think maybe there is a connection between the bigness of
business and the bigness of science. That in our society the
small things are being filtered out. Everything is big and in
this connection i think the fact is that science is the
activity of doing science has become largely instrumental.
Which is to say it has some specific purpose. Its not merely
to discover the laws of nature. Its to build instruments of
some sort. And the picture of the scientist that you might
still find in literature fifty or seventy five years ago is
no longer valid. In other words there has become less
distinction between the scientist and engineer.

WEIZENBAUM
BETA 39A

Antonello: when did the scientist's style of working change?

00:00:57:18Þ   let me say something about when there is
              change began to take place there has to be of course that
              there is no particular moment or no particular event that
              signals the change but perhaps the way to begin is the
              following. When the USA got into the 1st world war in 1917
              there was a chemistry prof at harvard who wrote to the
              secretary of war in Washington. And he was a famous chemist
              and identified himself and said that he would be willing to
              work for the war effort during this time of emergency. And a
              few weeks later he got a letter back from the secretary of
              war saying i have talked to the army and they told me they
              already have a chemist. That's an impossible story for today
              of course when a very large fraction of American scientific
              talent works for the military. In some cases very directly
              and in some cases not so directly.

              So i think that the
              organization of science for the purpose of developing various
              systems inluding cryptografic system encoding and
              decoding and all that sought of thing. And most especially
              the atomic bomb and one should perhaps mention radar as
              another eg that is The mobilization of science in the second
              world war more so in the USA than in Germany i would say. and
              also certainly than in England. That i think does really
              represent the beginning of this. At the end of the war the
              usa demobilized extremely quickly. I was in the army at the
              time and as soon as japan surrendered everybody wanted to go
              home. And the demobilization was extremely rapid.

00:03:47:02Þ   And a number
              of scientists especially or perhaps i should say scientific
              administrators. That's an almost
              knew profession that grew up. These are people that were very
              good scientists who got into scientific administration and
              were very good at that.   I'm thinking for eg of vannevar bush
              at MIT.   Got together and said basically a way out must be
              found to keep the organization of science and tech that was

developed for the purposes of developing things for the war
to keep that intact.   To keep the scientific community funded
for eg. Not to let it split it up because if it were to split
apart it would go back to the time before the war when
scientists work pretty much individually and so on. And there
were actually meetings held and the government was persuaded
to maintain the governmental particularly the military
support for science that had grown up in the second world
war.

00:05:11:09Þ   And of course an instrument had to be found for that. And
the first instrument that was used was the USA navy. Trying
to think of the name now the office of naval research, ONR,
this is what it was called. and shortly after the war This was
1947, 1948 for eg you find in the archives thousands and
thousands of research contracts
all sponsored by the office of naval research. And
you'd think that we would be building a brand new navy. But
in fact it had very little to do with the navy. This office
that already existed was simply used to continue the
institutionalization of American science. And that changed
later on. Today the principle office that does work like this
is called darpa defence advanced research project.
organization. But the the whole idea of the government and
particularly the military massively sponsoring research is a
direct child of the second world war.

WEIZENBAUM
BETA 39A

Antonello: What about the social impact of this partnership, of Big
Science?

00:07:04:18Þ In order to make this happen, The permanent institutionalizing of
particularly military science has been whether anybody wanted
it or not. Basically a fairly large scale of militarization
of our society. Its interesting to observe that in 1941 all
Europeans will remember that it was a terrible time. The
world was in flames Europe was in flames Asia was in flames
in 1941 before we got into the war. But the congress of the
usa was about to pass a law requiring military service for
young men. And that law passed the congress of the usa at
that time by one vote. America was a pacifist society up to
that time.   You have to understand that at that time a great
many immigrants that came to America we are of course an
immigrant country came to avoid military service from
wherever they came from.

00:08:29:20Þ   And so the obvious military character
of usa today is a relatively new thing. Its this half of this
century. I think that the invasion so to speak of every
aspect of science in a country where science is held to be
very important where there is a lot of science activity the
invasion of that by the military has a lot to do with the
militarization of the society.   So here we are in January 1990

we see that the east west conflict has lost a great deal of
its militancy. We believe that real peace may be possible
between the soviet union and the usa and in Europe and in
eastern Europe. And America is scared to death why? Well if
peace actually breaks out, what actually happens to our military
oriented industry. It turns out that a very large part of our
industry is military determined.

00:10:04:18Þ So the affects of turning
          the support of science and technology over to the military
          in 1946 47 i think is very profound. When we look at today the
          huge dept the usa owes for the first time. It was just a few
          years
          ago that America was the largest credit in the world now it
          is the largest debtor. If we look at the unbalance in our
          budget in our federal budget.   All of that has everything to
          do with he enormous armaments program that w have undertaken
          say in the last 20 25 years. which you know again is the
          consequence of militarization of science otherwise it
          would have not been possible.   So i think the effects are very
          serious. I think i should say one more thing. What i am about
          to say about the Usa is also true about the soviet union.

00:11:13:24Þ   That so much of our industry is devoted to and directed by
          the military. Where costs of things don't play much of a
          role. The important thing is that things work. If you build
          things for the airforce it has to work. How much it costs
          does not matter so much because you are not competing with
          anybody. And our industry has got so use to ignoring
          manufacturing costs that it turns out in many industries
          we're no longer capable of building things competitively.
          Building things that other people build with an eye to
          economy. That's a very serious social consequence the end of
          which we have not seen i am sure.

WEIZENBAUM
BETA 39A

Antonello: Let's talk about universities and the military research money
flowing into them...

00:15:13:06Þ we are sitting
          here today in an office for the laboratory of comp science
          of the MIT. A very important laboratory perhaps
          internationally important and certainly an integral part
          today of MIT. We can ask what happens to students here who
          come to MIT are interested in comp hope to be able to work
          in this laboratory in particularly to do there doctoral
          research in this lab and there are many other labs like this
          at MIT. What will turn out is that the student will soon be
          involved with research that's sponsored by the dept of
          defence the American military. Paid for by the dept of defence
          in most cases work that actually is part of a contract for a
          very specific weapon system. And it will almost certainly be

true that when the student graduates from MIT and is now a
very desirable product so to speak. Students graduates are
very much wanted by American business and industry. That he
or she will be recruited by a company like general dynamics
or general electric for eg many others aircraft companies
whatever or a comp company who's work is mainly military
work. So i think if you look at the career of a student.
Consider the students who lets say enter mit in 1960. That's
30 years ago and you follow there progress in the last
thirty years. You will find an overwhelming majority spent
there entire professional life working on military systems.
That's serious.

That also seems to me induces an attitude
quite unconsciously when someone whose livelihood has depended on
for 25 years or so and the availability of military work and
"progress and weapon systems "and so on. When a person like
that heres about cancelation of contracts because the
military need is much less than it was yesterday or so on. A
person like that is going to look for reasons consciously or
unconsciously to keep the work going.

00:18:22:13Þ   So i think the effect
is very profound you also have to think now of the family of
that person.   When the children begin to ask what do you do
daddy. And he tries to explain to them what he does. And the
children ask what's that used for. His answer will have a
reaction. If its evasive the children will detect the evasion.
And if he is not evasive he will tell them that he works on
weapon systems.   Well then the whole attitude is propagated.
and so on .I think that's the way we have to look at it.

39aWEIZENBAUM
BETA 39A

Antonello: Is this what you mean by the militarization of the country?

00:19:25:15Þ   no no not only that i think what i have said
here about the militerization of our society and i think it is
largely true certainly in many countries in Europe. There are
many other parts to it. Theres the fact that we see uniforms
where ever we go. Theres a soldier going down the street
there. The fact that many of the students many of the people
who have studied at mit are now working in military work
have to have security clearances.   It turns out that a very
large proportion of American work force must have security
clearances. That means that there is a whole administration
behind the scenes just to work on that. Lots of people must
be investigated on some of the products produced by the
factories are dangerous there must be security apparatus to
make sure these things don't get into the wrong hands.
although they sometimes do.

00:20:59:03Þ   So we have become to form a

military oriented society. If the president of the USA or anybody else does not want to talk about something to the press for eg. All he has to say is that it is a national security matter. That could not have happened fifty years ago or 60 years ago. Because the concept of national security interest was not yet a natural concept to the American people. This has a lot to do with language. If we try and pay attention to how our language changes as our tools change then we can see our language reflects these changes. For eg

00:21:57:05Þ   Today we talk about real time. A term thAt would have not been understood a hundred years ago. People would have said what's real time. They would of said is not all time real. and similarly Introduction of words like national security interest and so on which are taken to be perfectly natural. Testifies to this effect. So the militarization of society is not only the fact that military people work on contracts. That we have a huge standing army and over 200 bases all over the world. That would have been unthinkable before the second world war. America was almost a pacifist country and it is all natural today. Its interesting when you think a young man today or a young woman 30 years old. A person like that has never lived in a world without TV without comp without nuclear weapons. Those 3 things are perfectly natural. They have always been there like trees. And so is national security interest and that's the effect.

Antonello: Will it be possible to demilitarize the US?

00:24:45:18Þ   demilitarization especially of our society all together but especially of our industry of course means conversion of industry from the production of military goods to the production of civilian goods. And that's a very hard thing to do. In large part because our industry has learned over many many years now several generations of workers to produce without respect of cost.   It was not long ago in California and there is a commuter train that goes to SF to palo alto 25 miles or so. And i took that train one day. I saw to my amazement that the passenger cars were made in japan. I remember at one point the boeing aircraft company that makes wonderful airplanes and many of the military had tried to manufacture these cars. And obviously failed. It isn't because they cant make cars that will work. But there entire manufacturing management is geared to making things work in dependant of cost. That also means to a certain extent, independent of complexity.

00:26:29:06Þ   So that means one big difference of American automobiles and Japanese autos is that internal American auto are much more complex than japs autos. The japs not only pay attention to simplifying manufacturing and to simplify maintenance. So if you have to fix something you don't have to take a thousand pieces apart in order to oil that particular spot. I think that is one factor. But another thing has to be said in the context of economics

00:27:07:04Þ   Lets look at
          military production from entirely an economic point of view.
          Then the fact that you are building lets say a tank or an
          aircraft career or military airplane. You are building it as
          anybody will tell you in order to not to have to use it. You
          want to be very well armed in order for the enemy who ever
          he is wont attack you. So your building things you never want
          to use. Which means, from an economic point of view, that you
          could have a factory that builds things like tanks and then
          once a month takes the entire production and dumps it in the
          sea.

          From an economic point of view, what i mean to say is
          that military goods tanks airplanes etc produce no wealth in
          themselves. A sewing machine produces a dress that can be
          then sold.   But military airplanes and tanks produce nothing.

00:28:27:03Þ   So that from an economic point of view the entire military
          budget of a country like the USA is exactly the same thing
          as a welfare budget. It's simply paying people to behave
          uneconomically. To produce nothing. Now if you take the actual
          welfare budget of the USA and you add it to the
          military budget you see that we have a situation here in
          which a relatively small fraction of the population those
          engaged in the manufacture and sale of civilian goods
          support the whole rest of the country. That has enormous
          consequences.   We're a very rich country but not that rich.
          That we can afford that for many many years and we have been
          doing it for four decades. Anyway those are the economics of
          the situation.

          There's one exception and that is if you build
          weapons, other military things. And you sell them to another
          country. Then you get money back. But if you look at that in
          turn. You see that we supply Africans with weapons in Asia and so
          on These are weapons that you see on TV that are sometime
          carried by 14 year old children. The countries that we sell
          weapons to are usually very poor. And what we are doing is
          exporting poverty. But anyway that is a small exception.

00:30:02:18Þ   Now
          if we were to stop to build military things as i say we
          would have to convert to civilian things that would be very
          hard for us because we would have to learn new ways to us of
          manufacturing. Ways that we new very well 50 years ago but
          generations of workers have gone by. Things that we used to
          be very good at in the USA. And in the mean while people
          would complain for the absence of these welfare payments
          that's really what they are. It is a very difficult social
          and political problem.

WEIZENBAUM
BETA 40A

Antonello: Do scientists have social responsibility?

00:00:52:08Þ   Let me ask the question what motivates
           scientist to work on systems that they might personally
           not like. For eg weapon systems that have no other purpose
           except to kill people more efficiently. That sort of thing.
           Why do people work on that sort of stuff. And i am sure
           there are several reasons. And they are probably easy to find.
           I want to give two reasons that i think people don't think of
           very quickly. One of them is Oppenheimers explanation of why
           the atomic bomb scientists continue to work on the atomic
           bomb when the original purpose that is to get ahead of the
           Germans was already fulfilled when the Germans surrendered.
           And oppenheimer explained that it was very sweet science.
           What he means by that and every scientist will understand
           that this was an enormously huge puzzle. Like a huge London
           times cross word puzzle with rewards all along the line. You
           found a particularly thing that fit and so on. It was just an
           enormous amount of fun. And that was my experience in the
           computer field. It was always great fun in the sense of
           puzzle solving especially to work on it.

00:02:36:01Þ   I want to give you a
           quotation that you may not or may want to use on the air it
           was an American comedian WC FIELDS. Who unfortunately died a
           few years ago. He was a great favorite of mine. And he once
           said "there are some things that are better than sex and
           there are some things that are worse than sex but there is
           nothing quite like it."   And i think that working in science
           the same thing can be said. There are some things better there
           are some things worse but there's nothing quite like it.
           You see just the fun you can get out of it that's one thing.

00:03:28:12Þ   The other thing which i also think played a great role is the
           atomic bomb and played a great role in the general militarization
            of the USA and especially the academic science no i want to
           take that back no not especially academic science lets just
           leave it at that militarization of science in the USA and
           this is the feeling that scientist and engineers working on
           these things get that they are somehow closely connected with
           power. Working in a laboratory like say the laboratory
           of computer science at MIT where we now are.   And that means
           going to Washington every once in a while and that means
           meeting generals and admirals. It means that military people
           come here to see what we are doing. They are relatively high
           ranking people and all that sort of thing. One goes to
           offices that has deep carpets and maybe where theres a USA
           marine standing outside the door keeping guard. It means
           having security clearances and not being able to tell your
           friends what it is your doing.   It is a feeling of being near
           power. And i think that has a lot to do with it. And i also
           think that effects a conversion problem.

00:04:57:04Þ   How to convert
           military things and especially military industry to civilian

industry. One of the things that will be lost will be this
feeling of being near power. I think that by the way i have
heard Russians talk about this. And saying very nearly the
same thing with the respect to there conversion of power. And
there problem is even harder than ours. Because if a factory
in the soviet union that manufacturers lets say missiles is
converted to manufacturing refrigerators. for eg The big
managers on top loose there privileges. And we don't have
that concept. If one of our big managers in general dynamics has a
cottage on a lake in Wisconsin. for eg That isn't given to
him by the government and cant be taken away from him by the
government. He's bought that. Where his soviet counter part
gets that cottage on some lake as part of the privileges of
his job.   And so that has a serious effect. I think a great
deal of resistance that exists in the soviet union, resistance
to gorbachoev and his programmes. Comes from this sort of
thing.   The people are afraid that they will loose lots of
privileges. And particularly this feeling of being near power.
i think is very important.

WEIZENBAUM
BETA 40A

Antonello: let's talk about the contradictions within this system?

00:07:32:15Þ   the dilemma that
            the scientist faces or that the scientist is thought to face.
            That on the one hand there is the wonder of doing sweet
            science. And it is something that starts to become a habit
            that one can hardly do without. On the other hand science is
            supported by things done by the scientist that the
            individual might not like or his or her children might not
            like. This dilemma might not sound as sharp as it sounds at
            first hand. Because there is science that is not war related.
            And it is possible to do without this proximity to power and
            to great events.   So it has to do with personality of the
            scientist to a certain extent.   And there are these wonderful
            rewards that i have mentioned.   But the're not necessary for
            living. Its like having to dress fashionably. Many people
            would feel that there lives have lost something if they could
            not dress in the latest fashion but it certainly isn't
            necessary.

00:08:56:02Þ   And yes there is a question.   If in fact military
            support of science were to stop would the large number of
            people working in military things would they be able to
            continue to work in science that's a very large question. But
            i personaly have the faith that there is lots of
            of work.   It is an entirely different orientation on the part
            of society. It isn't that only the military have interesting
            problems.   You have to consider what is science anyway.
            Science is the search for scientific regularities for
            the laws of nature something of that sort.

Science is asking nature questions. And you have to be very skilled
how you formulate the questions if you expect to learn
something ok that's what science is. Now it turns out of
course that there are infinitly many questions that we could
ask of nature. But we all have finite lives. So we have to
choose what questions we ask. We have to throw away all
possible questions that we could ask just to have the few
questions that we want to ask. ok that's what we have to do.

00:10:26:15Þ   Now I don't think that's in the nature of the universe that
questions about explosives for eg are the most important
questions one can ask of nature. That the military
questions are the most interesting and most important. No,its
the orientation of our society that creates a situation in
which those questions come to mind first. Those are the
questions that are supported by the government. But theres an
infinitude of other questions that we could be asking.
There's plenty to do. Theres no reason in the world
that any scientist should be out of work any where in the
world quite without any military.

But in order to realize
that there has to be a profound structural change.
A philosophical change it seems to me. In our society it isn't
just that peace has to break out. In the sense that we are no
longer afraid of war say with the soviet union. It is much
more than that and i think you know that it is perhaps the
most interesting time in which to live in the past several
hundred years. Because we can see in this decade of the 80s just in
that decade. We can see profound changes going on in the world.

00:11:58:05Þ There is a real danger that peace will break out so to speak
to put in the way real opportunity. It is really quite
possible. And the question is can we do the conversion not
yet in the factories but in our heads. Can we do the social
conversion. That's the critical question. And i must say that
i am not very optimistic. I'm hopeful but not very optimistic.

00:12:41:01Þ there are lots of people in the USA and in the
soviet union and i dare say many other places in the world
who would much prefer to have the cold war as we call it
continue much prefer it. There's today in the USA great
poverty. Its very deep and very wide spread. 30 years ago 25
years ago something like that there was also great poverty.
But not as nearly as deep and great as today. 99And our
president then lyndon johnson declared war on poverty. And it
wasn't very long before the saying came around that theres
lots of money to be made in poverty. Which is to say there is
a huge bureaucracy fighting the war against poverty. And
these people this bureaucracy developed an interest in the
maintenance of poverty because that's where there jobs were.
And i think theres lots of money to be made on the cold war.
And a lot of people are going to resist shutting it down.

WEIZENBAUM

BETA 40A

Antonello: Did the concept of time change with the electronic revolution?

00:14:39:16Þ What effect has the electronic/computer revolution had on our
            perception of time? And i think that the answer is that it
            has a profound effect so to speak on the reality of time.
            Its not clear to me that everybody's perception of the flow of
            time has changed to the extent of which reality has changed
            First of all one of the most important marriages that is
            taken place in the last 25 years. Most important to our
            existence all together is the marriage between comp
            technology and communication technology. That's a critical
            thing. What has happened is that only in the last 10 or 15
            years perhaps, has it been able for us to transfer huge
            amounts of information i mean really huge amounts of
            information virtually instantly not quite but virtually
            instantly. If you consider for eg

            Say you are a broker at the
            stock exchange in new York and you want to know what the
            state of the market is in Tokyo. And say it is 25 years ago.
            Not very long ago. Well you will probably have in your office
            if you are interested in that sort of thing, you will
            probably have a person in your office who's on the telephone
            to Tokyo maybe 12 hours a day. Simply has the telephone
            connection which will break down often. And in order to
            determine the state of the Tokyo market there is somebody at
            the other end who's talking into the telephone. And the rate
            of transfer information is about the rate that we are
            experiencing now. Which is very very slow.

            It would take weeks
            of that kind of talking to transmit the state of the Tokyo
            stock market from one place to another,in those days. Today
            the state of the Tokyo exchange the zurich exchange London
            Paris frankfurt johanesbourg all of those exchanges is
            transmitted and recorded simultaneously in what we call real
            time. There use to be no such thing as real time which means
            simultaneous with ongoing events. In all these places Tokyo
            johanesbourg and so on its recorded in all these places and
            sent to all these places. So what's happened from this point
            of view if you look at the map or the globe and you see
            where all these exchanges are, the're very far apart from one
            another. But from a communications point of view they have so
            to speak imploded. As the opposite of exploded. They have all
            been thrown together and they are one essentially.

00:18:10:08Þ   This has
            enormous effects on international money matters on trade and
            so on unfortunately the stock exchanges of the world
            especially new York have exactly become gambling casinos. And

they don't have very much to do anymore principally with
transferring capitol to industry. But when such a disease takes
hold like
for eg the conversion of wall street to a gambling casino.
The infection spreads instantly to all the others. Because
today it is just as easy to trade on the Tokyo exchange as
it is to trade on wall street. And that all is a consequence
of the marriage of computers and communication.

00:19:03:23Þ And so things today happen much more quickly many orders of
magnitude than they happen as a short time ago 25 50 years
ago. And we see the importance of the time factor. We see in
the new York stock exchange that the buying and selling of
stocks by means of computer programmes has had the effect of
so radically collapsing time generating effects such as when
stocks begin to fall the value begins to fall that the
computers start selling more and more stocks so the value
falls still more. All this happens in a time span in which the
human being can't interfere. Its all to fast. And the solution
of the governors of the new York stock exchange have put in.
Is that when this kind of free fall when that happens. That they
declare pause. They say 15 minutes no trading. And if it
continues after 15 minutes then they say ok 30 minutes no
trading. Its an attempt to slow down time. Its a very clumbsy
attempt to delay.

00:20:20:21Þ   You know because what has dissappeared in
this world largely this is an eg that largely this is an eg
there are many other eg what has dissappeared is the play in
things. If you take say a gear work heres one gear driving an
other. If in fact the fit between these gears is made that
theres no play at all nothing loose then the gears wont work.
You've got to have a little play. And what we have done with
the help of computers and communication is to take out that
play. Everything is scheduled maximally not optimally to do
as fast as possible to squeeze the amount of productivity
out of the tools and so on. This has had a profound effect. I
want to say that if we see this idea or this perception to
international events. Then i think that it becomes very clear
what the effect is there.

00:21:37:19Þ   For eg if we look at what happens
in eastern Europe in the last 6 months. In the last 6 months we saw
4 or 5 revolutions of profound character. It would of been
sufficient for a whole century too see 5 revolutions. And i
was just over there in east Germany and also in west Germany.
And what the managers let me call them that in the
government in the military and industry what they all
complain about is that theres no time. That is that things
are happening so rapidly that decisions that ought to be
made in the light of careful conversations careful
preparatory work that would take weeks or months ordinarily
these decisions that have to be made by 3 this afternoon. And
i think theres a connection between the two. I think like so
many other things in our world. Theres something that started

and grew very slowly and all of a sudden is growing much
more rapidly. And i think this terrible pressure for decision
making has to do with the immediacy of communication that we
have.   It may be that there are lots of people even in
important places who have not yet changed there concept of
time. That's possible that people have not thought of it. But
our experience of time is very different today than it was a
short time ago 25 or 50 years ago.

WEIZENBAUM
BETA 40A

Antonello: The computer makes possible vast quantities of information. But
this flow of information is being controlled?

00:25:40:13Þ   I remember
           somebody said at the time more or less of the invention of
           the printing press or really when it became possible to
           print newspapers sometime after the invention of the
           printing press. Somebody said a newspaper makes it possible
           to lie to a great majority of people at the same time. Of
           course now the modern journalism including the television
           and radio media amplify that very considerably. Today its
           possible to lie all over America for eg and to all of the
           world very efficiently and in a short time.

           That's true i
           remember in east Germany after the revolution so to speak
           When erik honeger the communist boss for 40 years. He wasn't
           but he led the government until the change. At that time or
           just after that the east German TV went on the air. And the
           same reporters who were reading the news before were now
           reading the news. And they started off by saying we have lied
           to you for 40 years and now we are going to start to tell
           the truth.

00:27:00:05Þ   And i think when we look at the American media the
           TV for eg. There are astonishing things one might observe. For
           eg with the help of these controls that we have for our TV
           sets where we just press a button to switch stations. If in
           Boston for eg one watches the news at 6.30 in the evening
           the national news one can switch back and fourth and one
           thing is almost guaranteed that is on the 3 major networks
           the three commentators will be talking about the same event
           at the same time. There are editorial boards that decide what
           to broadcast this evening. And i am sure they don't
           communicate to one another around the 3 networks. Never the
           less the interest represented by this media are so uniform.
           No one has to tell them what to do they know.

00:27:56:08Þ   And if we look at
           the coverage of the things like for eg of what's going on in
           panama. There are a lot of important things that are not said.
           It isn't that it isn't entirely that the're active lies that

people say what isn't true. That happens too. But the
selection of what to say more importantly of what not to say
is a kind of distortion of reality. That of course becomes
enormously amplified by the centralization of the news media.

There are these 3 people sitting in new York and there
broadcasting to the entire nation. And the newscaster in
Boston concerns himself almost exclusively with murders
that have taken place here with fires and killed children
stories. Not to mention baseball and all that. That's one
thing that has to be said.

00:29:13:19Þ   The other thing is we live in an
ocean of information. And it's so very large that all of it
becomes irrelevant. Because it is impossible to pick out the
relevant things. Let me tell what i think to now scientist is
probably a secret a surprise. I'm sure that 95 or 99 percent
of papers published in scientific journals today are read by
nobody, nobody. Not anybody including the editor of the journal.
In fact papers are produced today that have not even been read
by there authors. It is possible today to take and it happens
here at mit all the time it is possible to take a text
stored in a computer. Pick out things and put them together
by certain criteria. And what comes out is a paper. That paper
gets sent to a journal. The journal editor asks where did
this come from. Answer is mit. Oh well of course we will print
It then it gets printed. And nobody has read it. The editor
has not read it. Nobody has. Nobody has reviewed it. And of
course the reader of the journal does not read it. And I'm
sure that the vast majority of scientific papers today are
read by nobody. That's just an eg out of science and I'm sure
its true out of many many other things and I'm sure that it
is true out of many other fields of human work. There is an
enormous flood of information which because of its gigantic
size has become essentially useless.

WEIZENBAUM
BETA 41A

Antonello: Are we living in a mega machine?

00:01:50:24Þ Like for eg the structure that existed in Egypt that
constructed the pyramids. The pyramids even today would be a
major engineering project. And how in the world it was done
in that ancient culture including even the mechanical
problems including even just lifting the heavy stones
transporting them from one place to another and all that
required according to mumford and its of course true the
enormous amount of organization and basically an
organization in which the individual worker was simply a
tiny piece in a very very big machine. That's how we
characterize a big mega machine at the time. I think its fair
to characterize life in the highly developed countries say
the countries i have most experience with USA and Germany to
characterize that life as life in a mega machine.

And i think
that one criteria of whether in fact if one is living in a mega
machine or not. Is the degree of power that the individual
feels. And power over events. Power of the individuals own
life and so on. And i think today we see that an enormously wide
spread and one could say universal the conviction on the
part of individuals that the individual is powerless.
The idea of powerlessness. Theres nothing that can be
done. Even in the face of evidence to the contrary. I think
for eg in the USA some 30 years ago a simple woman, a black
woman, Rosa Parks, in Alabama refused to move to the back of the
bus and ignited the civil rights revolution in the usa. Which in
a certain sense was very successful transformed the usa. Not
enough but never the less transformed the usa.

00:04:21:07Þ There's evidence that the individual can do things. We see
today the enormous changes that have taken place in eastern
Europe. And i think that without Walesa in Poland and certainly
gorbachoev in the Soviet union you know these things would not
have taken
place. And one can say that gorbachoev is a powerful man.
Well of course he has power but he was not always powerful. And
like walesa certainly he was a simple worker fairly a short time
ago. But i think the general experience that people have of
powerlessness is an indicator that people experience reality
today as a huge machine of which they are a small part. Which
by the way is interchangeable. It doesn't matter if i am
sitting here or somebody else. What matters is that sitting
in this chair is a functionary. The individual who exercises a
function can be replaced at any time.

00:05:32:14Þ   And we can see if i
may say so in the presidential elections in the usa that we
behave as if it really does not matter who's there. For eight
years it is a film actor and now comes an administrator
who's left no record anywhere. He's been in the congress of
the usa theres no record of what he did there. He's been
head of the CIA no record of what he did there. So we think
of the function of the president of the USA. It does not
matter who has that job you see. Even at that level i think
that's true. And i think that if the world is to change in a
very positive direction we have to find a way of having
experience.

I don't think we can tear down the mega machine
entirely. But i think what has to happen is that much more
politics industrial politics as well as social politics
financial politics and all that have to become much more
local. And i think that's what happens in Europe today. I
think that instead of having countries with fixed boundaries
that sort of work on and solve there own problems independent
of their neighbors. What's happening in Europe today is
regionalization. And problems are discussed in regions. That
have some functional reality for eg with respect to ecology.

and so on And smaller units and that's the kind of thing
that has to happen in the USA. Whether it will or not i don't
know. But now its not only a mega machine in the US especially.
Its a relentless mega machine. Its so experienced its really
like being caught up in a machine that was programmed by
someone else in some other place maybe god but theres
nothing we can do about it. I want to quickly say i don't
believe that. I say we can do something about it but i think
the general experience is one of helplessness.