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"THE CITIZEN AND THE EXPERT"

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P R O C E E D I N G S

PHILIP HANDLER: It is my function to welcome those of you who braved the elements this morning to get here on a typical day for a Washington meeting. It may warm up slowly outdoors, but it will surely warm up in this hall.

The title of this Forum, "The Citizen and The Expert," is particularly solicitous for this institution. It has been in business for 113 years, and some of its business is that which is suggested by the title; namely, to gather citizen-experts to assist the government with respect to technical matters. As an institution we still learn very slowly how to get on with that task. When the institution was born, no one could have anticipated the current volume of "business." By that I don't mean the amount of money or the number of people, but rather the extent of our involvement with the public interest, with the unraveling and analysis of purely technical issues, to understand what technical facts must be understood so as to be able to apply the value system of a given time to the ultimate decisions that must be made.

The extent to which we now engage in that process certainly was not anticipated when the Academy was born and is relatively little appreciated at the present time. The governnment itself has a large advisory network. In numbers of committees and individuals it is more or less comparable to that which is functioning within this institution. We now have on the order of 550 committees that have another 350 subcommittees, panels, boards, et cetera, on which there serve a total

of something on the order of 7,500 different individuals. That is about equal to the network that the government itself has.

But we are aware that it does not matter whether we consider these assorted technical questions, or the government, or it be done out in the general sector of society itself. The only resource available for this task is those individuals who have invested their lives in the training and the discipline required to perform these analyses. They are extraordinarily difficult.

It is easy for us to talk about dissecting out scientific and technical facts and separating them from human or social values. But rarely have I seen anyone do so. It is for that reason, particularly, that the title of this Forum is so apt at this time when scientists generally, with greater or lesser degrees of trepidation, are wont to accept public rostrums and deliver their opinions.

In this institution, we take the antithesis of that old saw, "I do, indeed, believe in the committee system as long as the committee doesn't contain more than one member." We take the opposite tack -- there is no one member in whom we will vest that kind of confidence. Hence, we continue to rely on committees.

These matters have been discussed in the past. There is a vast literature which relates to how the citizen-expert can assist his government and his fellow citizens in dealing with problems in the public interest. I collect these. Here is one, for example, from President Wilson in his book on congressional government: "If there be one principle clearer than another, it is this, that in any business, whether of government or mere merchandising, somebody must be trusted." In the wake of Watergate we

have suffered a loss of confidence in our fellows. Hence, the need for institutionalized mechanisms that seek to approach something akin to truth with respect to technical matters.

A comment appeared over Pat McCurdy's signature this last week in the American Chemical Society's Weekly in which he quotes Walter Lippmann fifty years ago. Mr. Lippmann said something quite cogent: "The power of the expert depends on separating himself from those who make the decisions, upon not caring, in his expert self, what decision is made." I don't think I have ever met that man. It is an image toward which some may strive, but there are very few of us who are not simultaneously both expert and citizen. We pretend that we really can make that separation of fact from value, but it is very difficult indeed. Moreover, it is difficult to imagine anyone really working hard at a problem unless he does care very much that it come out well and does feel the matter to be of considerable importance. And again, this is a reason to believe in using the collective mechanism of the committee.

One problem is that occasionally the scientist engaged in this process may themselves have some kind of personal stake in the outcome -- not a financial stake, which is what is usually meant by the conflict-of-interest laws -- but a stake that is really much closer to the bone: one's own status in society, one's own reputation, one's own view of oneself. This has led, again, to a number of misdeeds. The history of what happened to DDT in the United States may be one of the greatest collections of such instances to occur in some time. A marvelous description of this phenomenon was written almost a hundred years ago by Maurice Arthus. I have long cherished this one: "The scientist who publicly adopts a doctrine or a

dogma accepts or rejects the position for reasons which in most cases are personal and not always exclusively scientific. In accepting such a dogma, he performs an act of faith. Performing an act of faith involves the entire man up to and including his conscience, and to persist in one's faith becomes, in a sense, a question of honor. Having adopted such a public position the protagonist, who is not necessarily a man without scientific merit, when he condescends to experiment [a bad translation of the French] becomes like the attorney who defends a client in spite of the evidence of his crime, like the politician who exalts his party even for its mistakes and vile actions which he proclaims to be acts of virtue and of courage. He, the scientist, automatically sorts the facts newly brought to light; he retains those, even the modest ones, that seem to prove him right and neglects the others, even the clearest and the most precise and convincing ones if they appear to indict him. Blinded by his passion, that is, by his immoderate love of his theory, he has recourse to all means, honorable or not, in order to defend it, for to him all means have become legitimate. He has ceased to be a scientist and has become a partisan."

Dr. Robbins, the morning is yours.

FREDERICK ROBBINS: We have asked six members of the panel to make statements, and we have paired them up as follows: Daniel Koshland and Stewart Brand will discuss when experts are needed; Carl Djerassi and Charles Halpern then will comment on how experts are chosen or should be chosen; and finally, Peter Hutt and Bruce Hannay will comment on how one uses experts. Although the remaining three members of the panel -- Philip Morrison, Hans Bethe, and Richard Jencks -- have not been assigned specific aspects for discussion, they will comment whenever and on whatever

seems important to each of them. My role will be primarily that of moderator. I believe that the panel is going to have a good time. We have already had a little discussion among ourselves, and we hope that you will join in the fun and not take all this too seriously and enjoy yourselves.

Although today's subject is part of a series of Forums placed within a Bicentennial context, we will not be discussing matters only from a Bicentennial point of view. It should be recognized, as we consider this highly important subject that is one of great concern to many people, how different it is today from what it was two hundred years ago. The principles are probably no different, but I think one should realize how complex things are now compared to what they were then. I am sure they looked as complex to the people in those days as they do to us now.

It is important to realize that no one is an expert in everything and that each of us is a citizen in respect to those areas outside our special expertise. Whether scientists are experts beyond their immediate field depends not so much on the role of the scientist as it does upon their personal qualities. It is true that a well-educated person perhaps is a better judge of certain things than a not-so-well-educated person, but certainly Jefferson and others would have argued with this statement.

Another matter about which I feel rather strongly is related to what I have just stated and which I think of as "the halo effect" -- a condition from which persons in certan positions suffer. Because you are recognized as an authority in a particular field, people expect you to be knowledgeable and wise in all areas. I think that is something of which we must be very cautious, and I am aware of it because on occasion

people have expected expertise from me that I certainly did not possess, and solely because of the fact that I was recognized in a particular area.

I am not going to say anything more now except to introduce the next person who will make a statement, and this is Daniel Koshland, who will address the subject of when do we need experts, when are experts useful.

DANIEL KOSHLAND: A French prime minister once remarked that there are three ways that a leader can lose power: by gambling, by chasing women, and by trusting experts. This skepticism toward experts is pervasive at a time when a technological civilization depends on experts. So the first question we ask today -- when do we need experts? -- exposes part of the problem.

On one extreme, such as building a bridge across a river, a citizen knows he needs an expert. Common sense alone cannot design a bridge. On the other extreme, judging a beauty contest does not require a professor of art, yet both might qualify under the dictionary definition of expert: "a person with a high degree of skill in, or knowledge of, a subject." Quite clearly that definition fails to define the nature of a subject, and that is very important.

In the case of the bridge, there is a vast store of objective and complex knowledge beyond the training of the citizen. In the judging of female beauty, the background knowledge is peripheral and far from objective. No outside expertise is needed. These extremes are easy to handle, but there is a vast middle ground, illustrated by nuclear reactor safety, FDA drug testing, environmental protection, malpractice suits, and so forth, in which the role of the expert is not nearly so clear.

To give illustrative examples of this middle ground, psychiatrists

are considered experts by courts of law; and each day we read headlines about judges who order the accused to be examined by experts of psychiatry. Yet as citizens we expect that the prosecution's psychiatrist will give one type of testimony and the defense's psychiatrist another. Our distinguished moderator, Dr. Robbins, has informed me that in Cleveland there is a firm that will supply experts in malpractice suits on whatever side the client wishes. These are usually referred to as "the finest experts that money can buy." Economists are usually devastating in their criticism of government policy, but when asked to predict future events they produce widely divergent solutions. These common experiences of disagreement lead the citizen to doubt the authority and sincerity of experts.

To aid in this problem I would like to suggest that we give ratings to experts in the way we rate municipal bonds. Instead of credit ratings, I would suggest we call them credibility ratings, and the rating would be judged on the basis of objective knowledge in the field. There would be a number of ways to obtain such a rating, but one simple one would be to ask twenty independent individuals in the area the same question and compare their answers. Twenty identical answers would give a rating of 1,000; twenty different answers, a rating of 000. It would, of course, be necessary in some cases to run field trials to be sure that the experts are not unanimously wrong.

It is important in this regard to ask questions in the area of policy decision. The ability to design bridges or an SST does not establish an ability to decide on their desirability. The ability to design a nuclear reactor does not make one an expert to decide on the risk ratios to the public. And this would be true of psychiatrists and

economists. They may be competent in some areas; but if they testify in criminal trials or on the federal budget, they must establish that the state of their art justifies an expert rating.

We could go further and even say that it is the duty of a learned society, or even the National Academy, to be sure that the citizen is being fairly treated and to examine certain areas in which experts are used extensively to establish the validity of the expertise that is claimed. In other words, to be sure that behind the scientific jargon there is a corpus of objective truth. Perhaps we need an FDA of expertise to certify which experts can be generally regarded as safe.

Failure to do this has had two unpleasant consequences: (a) it has allowed the citizen to be intimidated in areas in which the expertise is nonexistent or weak; (b) it has allowed the genuine expert to be devalued so that his advice is ignored in cases where it could be helpful.

When, then, do we use experts? The answer would seem clear: Whenever there is a substantial body of objective knowledge beyond the training of an ordinary citizen. If the credibility rating of the expertise in the area is 1,000, the expert should be listened to with great respect and have a decisive role. If the credibility rating is merely 500, his opinion should be taken with a grain of salt. If it is close to 000, we should consider that there is no expertise and the pseudoexpert then has the right to express his opinion, as every citizen does, but he carries no more weight than the ordinary citizen.

This opinion conflicts with some who believe that the expert is inevitably biased and hence should be eliminated from the decision-making process. He should, they say, be put in some minor, subservient role,

speaking only when spoken to. This presumes two conclusions: that the expert has less common sense than the citizen, and that the citizen has no biases of his own. If the expert, by reason of his training, is so biased he cannot act with common sense, then an active citizen prominent in public causes is logically excluded also. This would reduce us to using intellectual eunuchs, individuals so neutral in opinion that one person has suggested to me that perhaps they are neither for nor against apathy.

This brings us to another reason for experts being used in policy-making bodies, and that is the time factor. Most of the current decisions that are highly controversial are decided against the backdrop of urgent deadlines. The cyclamate decision, the SST decision, the recent Red Dye No. 2 decision are all issues in which the scientist involved would have loved to have had two extra years and an extra $2 million to do the studies that might have decided the issue in an objective manner. In fact, the scientist would probably vastly prefer in general to be out of the decision-making process and to be given a question, allowed to devise experiments, and report back only when those experiments have succeeded.

But in issues of vast public concern, no such leisurely time schedule is allowed. In the SST decision and the Red Dye decision, for example, the latest data are being delivered to the policy body even as the final decision is being written. Does it truly make sense, then, to exclude from these bodies those who can understand the data presented? Is the ivory tower of the scientist who would like a few years to finish his experiments any more unrealistic than the ivory tower of the citizen

who wants all the scientific conclusions finished in a one-page, true-false memo in time for a lay board to make the final decision?

Finally, in order to be a little controversial, I might suggest that the expert may in many cases have advantages on such citizen policy-making boards for one simple reason: He has learned to live with complexity. It is nice to believe that the issues are simply whether cyclamates are good or bad, whether genetic engineering is moral or immoral, whether nuclear reactors are safe or unsafe. In fact, the issues of greatest interest are never that clear. They are partly good and partly bad, and only the courage to face the honest fact of partial truth will carry us through. The expert must learn to be more humble at times, to be more rigorous in defining those areas where expertise exists, and where in fact it does not. The citizen will have to learn to use the expert, for he is the guy with the flashlight in the dark forest of our current technological complexities.

STEWART BRAND: Dr. Koshland and I are addressing the question of when do you need experts, and since I am responding I would like to talk about when we don't need experts. This is pretty much respective of the citizen, and I suppose that is the area I am most involved in serving.

I think an expert is not needed or usable when we can't afford one. If we can't get the best expert that money can buy, then money is not part of the equation. It is usually the case that you can get experts rather cheaply -- not in person, but by their writings or by talks or other forms, and it is the other forms that particularly interest me. It is fairly rare that an area of concern is moving so quickly that you can't find something very well thought out and very well written on it, or that you can't make a few direct telephone calls, each of which leads to a

further level of expertise, and in the course of an afternoon you can find out everything you need to know, starting with the yellow pages.

There is another area which is especially tricky, and that is where the actual locus of expertise is different than it appears, such as, for example, in the area of birth control pills. In recent years such expertise was supposed to reside with the gynecologist. What the women were finding was that they were getting very poor information from their gynecologists and getting much better information from other women. Anecdotal reports were more useful to women to decide if they wanted to stay with these problematic devices than the advice of an expert.

It is fascinating to me the actual ways that expertise comes to you. It is not particularly scientific, though that is certainly one increment. You look for someone who is rather good at appraising with some objectivity. But then you have got to appraise the appraiser, and the way this happens is quite informal. It has to deal with experience of the people whose expertise you are testing, with gossip networks, what you have heard about so-and-so and from other so-and-so's whose expertise you are also guessing at. But by and by a feeling for where the real information is develops. This is not supposed to be the case, but it is, and I think perhaps we could improve our sense of how to actually find out where the quality is.

So all this comes back to things that are not so quantifiable, such as character and integrity and the networks of trust that get built up among groups of people who know each other. They don't necessarily agree, but they trust each other. When you get into one of these, the quality of information you get starts to improve drastically. Perhaps

that is the function of things like this Forum, that there is a certain amount of face-to-face contact through which this kind of information passes. It is not quantifiable, it doesn't pass very well through the printed media, but it is absolutely essential to judge real expertise.

ROBBINS: Three members of the panel have not been assigned specific responsibilities for making comments, so I am going to ask each of them -- Philip Morrison, Hans Bethe, and Richard Jencks -- to make a very brief comment to what has been said so far.

PHILIP MORRISON: I find myself interested in emphasizing the absence of discontinuity in this process even though, as the Chairman said, we certainly have inherited in these two centuries peculiarly complex kinds of problems -- problems of scale, I would say, largely more than anything else. I submit that the idea of a special expert's knowledge surrounded by professional training, a particular jargon, a shared experience, is very deeply built into the processes of the republic in two extremely important areas; and, as far as I can tell, was present even in the Philadelphia days of two hundred years ago.

I mention only the two most salient of these. First of all, the idea of the processes and procedures and structures by which a just and visibly just government can be set up is an idea that is entrusted by and large to lawyers. The notion, due process, is the description of a lawyer. The theorists of the law, as well as the practitioners and as well as the draftsmen of legislation, are of course the people who actually operate the government day by day. It has been a long time since we had a president who was not a lawyer.

The other extraordinarily important profession, which surfaces

less in the Constitution and in the Declaration and the years thereafter, but is more and more visible in public life today and for the past generation is that important profession hardly mentioned until now, the military. Again I could characterize this profession by the same qualities of expertness and separation typical of the PhD bacteriologist.

These examples have to do with the rather narrow range of the complex technical matters that actually function in our society. They reflect a regulatory, an inhibitory, and policing function of government and the view of it and the judgment of what should or should not be permitted or extended. Perhaps this is right for a state where so much is done by enterprise outside the government, but still I think that the positive actions of government are very important and cannot be elided.

I was very much taken by the notion that the citizen is not helpless in front of this expertise, as indeed the civilian government has never been helpless — perhaps because it is largely lawyers — in the face of the military expertise placed before it by chiefs of staff and their military organizations. The citizen is able to deal with these problems insofar as he shares the experiences and the broad fundamental statements that these professions and these disciplines have always and must put forward. The citizen-solider is a stereotype of American life, but it is absolutely true. American life has been characterized up until really the present time by the small size of the standing army, by the large role of the reserves, by the once-called-up persons who remember for good or bad their experiences and had some sense of the conduct of warfare, by the civilian leaders who immersed themselves in the theory of military statesmen-like actions in war -- from Lincoln to Roosevelt and beyond — and brought us through a

difficult and checkered history.

I think, therefore, that in science and in technology as a whole, there is a good deal of hope -- which I myself feel most important to encourage and foster in every way -- to deal with their expertise in much the same way, to have this experience more widely shared, to have people try to come to grips with some of the numbers and some of the ideas. The expert is a man whose expertise very often consists -- in the anecdote -- of having made all sorts of mistakes. But having made all sorts of mistakes, he has found some partial truths and put those down in a number of nice papers or books, or his colleagues have, or his enemies. By having access to those, a citizen willing to apply himself in some honestness to the logic of the problem can, I think, make great headway.

That has certainly been the case that led the republic, for good and bad in its 200 years, to grow so in the face of domination, it seems to me, by lawyers and soldiers. I don't think it need falter now in face of endocrinologists and public interest lawyers.

RICHARD JENCKS: It seems to me not so much a question of when do we need experts -- there is hardly any situation in which a task cannot be done more expertly than it is being done -- as when should we reject experts even when we need them.

Life is becoming increasingly vicarious in the personal sphere: parents long ago ceded their authority to Dr. Spock, young lovers to Dr. Comfort, cooks to Julia Child. Sometimes it seems to me that the motto of contemporary life should be -- "Mama, I want to do it myself" -- the ultimate cry against the expert.

And certainly in the political sphere, decision-making should

not be vicarious. The SST may not be found by experts to disturb the ozone layer, but political representatives ought to be free to ban it anyway if they wish. Fluoridation might be found by experts to be wholly beneficial, but a city council ought to be free to decide and to reflect the feeling of the citizenry that water should not be tampered with. Educational experts may feel they know exactly what kind of textbooks would benefit the child, but an elected city council should be free to reflect the deep concerns and felt necessities of parents of children.

Lincoln once had to cope with an expert general, General McClellan, who insisted on advising him on the general conduct of the war. Lincoln said he felt like the rider whose horse caught its hoof in the stirrup. The rider said to his horse: "If you are going to get on, I am going to get off." In short, the expert should be servant and not master.

HANS BETHE: I would like to add another point to the circumstances in which one needs experts. In fact it is a point which goes back to my own experience. The first time I was asked to function as an expert was right after the Second World War, when nuclear weapons had been invented and had been brought into our arsenal. My expertise in this case was not so much needed for the way in which you make nuclear weapons -- that is not very difficult, and in fact, you can write it down. The difficult problem was what to do with them. The experts -- the people who had worked with nuclear weapons during the war and had lived with them -- had much more of an idea what nuclear weapons would mean to the world at large, what they would mean not only to the possible conduct of war, but also to international relations. As many of you know, most of the nuclear scientists at that time recommended that nuclear weapons be put under international

control and not be part of the national armaments. The United States tried and failed to bring this about.

This kind of forward perspective -- what a given invention might mean in the future -- can be judged much more easily by the people who have worked on it and lived with it for several years than by people who come in fresh. I perfectly agree with Mr. Jencks that the final decision has to lie with the elected representatives of the people and not with the expert. Nevertheless, I believe that the expert should be heard not only in the narrow field of his expertise, but also in judging the consequences that a given development is likely to have.

ROBBINS: Now we hope that those of you in the audience will be free to participate. I assure you that among the panel there are enough disagreements and questions of each other so that we will have no difficulty in carrying on a very spirited discussion here, but we would be happy at this time to have you participate.

FRED BROWN: I am with the Public Affairs Center of the University of Southern California here in Washington, and I attended the previous Forum in this series. Let me say that Professor Adams, who presided the last time, agreed with the observation of the audience, and it seemed to be a consensus, that the representativeness of the panel on that occasion was not adequate. That difficulty persists today, and I will get to that point next.

My first point is an intense reaction to something that Professor Koshland said, when he proved better than any other way on this occasion that an expert in one thing is not an expert in something else. He is a recognized expert in medicine, and I acknowledge him for that;

but he clearly is not an expert in reading newspapers. The Washington Post today, in direct quotation of Commissioner Schmidt of the Food and Drug Administration concerning the Red Dye No. 2 decision, says clearly that this is not a final decision, that the evidence is not in, and that scientists are going to continue their work. There is no cutoff at all of the need to continue research on the effect of that dye on humans. The only reason -- and this is clearly stated on the front page of the Washington Post, quoting Commissioner Schmidt -- for making the decision now is that since human life is involved and since there is some evidence of carcinogenicity of Red Dye No. 2 in rats, he, as a public official, thinks it is incumbent upon him without the full medical evidence at this point concerning its effect on humans, that he act decisively and declare that it shall no longer be used as an additive in foodstuffs.

Now Mr. Hutt is present today, former counsel with the Food and Drug Administration. If he wants to comment further on this point, I would be pleased that he do it.

My second point concerns the representativeness of this panel. There is no member up there who currently works for any level of government, unless you consider the University of California part of government, It is, of course, part of the California state system, but it is not directly a part of government. As far as I can tell from the biographies of the individuals up there, Mr. Hutt is the only individual with former direct, full-time government service. To speak of expertise and because of the history of the National Academy of Sciences to regard it as residing in the private community and not in government, to indicate that is not government officials who use that expertise by not having a representative of government either

as an expert in science or any other field on the platform -- all seem to me a shortsighted view as to what today's subject is all about.

I have worked in many government agencies, and I have found that it is the outside expert who comes to us in the government for the expert knowledge about many areas. This is not to deny that there are many other fields in which the expertise resides outside, and that there are certain fields in which the expertise is shared between the academic and scholarly community outside the government and the expertise inside the government. To go back to the history of the National Academy of Sciences and think that what was true in Lincoln's day -- that all the expertise was outside and none of it inside -- is to me a very shortsighted and limited view of the nature of expertise today. I myself have been the subject of interviews for books written by outside experts, professors of universities, and almost everything said in the book was what I had told them as a government official involved in dealing with certain very important matters in the area of social security.

So I am very disturbed that Professor Adams didn't convey the message to the preparers of this conference that the representativeness on the platform should be much better than I observe it at this time.

PETER HUTT: Mr. Brown, perhaps I could comment on two aspects of your statement. The first is that I agree both with what Daniel Koshland said and with what Commissioner Schmidt said, and I do not think the two of them would disagree. What Dan said, as I heard him, was that scientists do wish that there were an additional two years to conduct all of the tests that would prove out one way or another whether Red No. 2 is carcinogenic or unsafe in some other way, or is indeed safe. I think he would

also agree that the Commissioner was duty bound by law to make a decision based upon all of the facts available even if the information currently available is incomplete. I really do not see any inconsistency there at all.

As to your second question, I do indeed intend to discuss both the use of experts within the government and the use by the government of outside experts, on the basis of my four years of experience, but I think it would be premature to get into that until I make my other remarks. I do believe, however, from my experience, that no one in the government has all of the expertise, anymore than any institution outside the government has all of the expertise, on any given issue. Therefore, what I urge constantly is a melding of the expertise inside and outside the government in order to arrive at the best conclusions for the public.

BROWN: On your last statement I agree 100 percent. On the first statement I think there may be a semantic problem as to what Commissioner Schmidt said and the interpretation of it. I think he said that scientists do need lots more time to check out the effect of Red Dye No. 2 on humans; the statement that the scientists wish to have it implies that they don't have it. The wish is being fulfilled, the Commissioner is hopeful and the FDA will probably support with funds a great deal of continued research on the effect of Red Dye No. 2 on humans.

HUTT: We have representatives of the Food and Drug Administration here. I have not been there in three-quarters of a year and have no idea whether or not FDA will continue testing Red No. 2.

BROWN: Commissioner Schmidt said they would.

HUTT: I think the central point is that a decision had to be

made before that testing could be completed. I doubt that Dr. Koshland, who can now speak for himself, has any real question about that.

ROBBINS: I think we better let Dr. Koshland respond. Then I am going to respond briefly to the composition of the panel question, and Dr. Djerassi has comments to make on this point. I hope we can avoid, however, getting into a discussion of Red Dye No. 2 specifically. That could go on all morning and still not get us anywhere.

KOSHLAND: I think that I probably didn't express myself well, because the point that Peter Hutt just made is exactly what I think should happen in government. A decision had to be made, but the research should go on. This illustrates the very important point of expertise in timed decisions. The cyclamate decision, several years ago, was very similar probably to the current decision on Red Dye No. 2. I hear that cyclamates are now being reexamined and may, in fact, be let back on the market. In their daily lives scientists are used to such revisions. Even though Newton's theory of the world was a great one, Einstein's theory required that it be revised. The public is going to have to learn not to have villains and heros if decisions made with inadequate scientific evidence are later changed.

CARL DJERASSI: I do want to comment on Red Dye No. 2 as an example of one fact that I think everyone has ignored, including the panel members here. I think Mr. Brown has completely oversimplified the situation. It is not true that you have any opportunity of changing your mind. Red Dye No. 2, in my opinion, will never be reintroduced. Thus, even if the FDA changes its opinion about cyclamates, they will be only a minor sugar substitute in the future, unless saccharin gets removed.

It is very difficult to reintroduce a drug or a commodity or chemical once it is in sufficient trouble to be officially withdrawn.

Incidentally, it is not true that further studies can really be carried out. This would be relatively meaningless because the argument is one that cannot be answered, namely, whether animal experiments have any relevance to humans. Now Red Dye No. 2 has been on the market for many years, and you might say that the clinical work has already been done. There are now questions whether certain animal experiments that have been carried out recently have any relevance. How will you establish this; by further clinical work? There is a real contradiction in Commissioner Schmidt's statement in today's Washington Post that there is no real health hazard but that the burden of proving safety belongs not to the government or public but to those who claim it is safe. The people who claim it is safe are in no position to really demonstrate this. The dye will be taken off the market and the FDA will of course not do any further work in the field except for possibly carrying out some additional animal experiments that will have no relevance whatsoever to the issue. So the issue is dead.

This is an example of why so many of these decisions are in fact irrevocable. You are dreaming if you think that we really will change our minds and subsequently reverse such a position. The industry and the public will have adjusted to the circumstances and introduced substitutes.

ROBBINS: I want to just very briefly comment on the composition of the panel. We recognize full well that it is not entirely representative of every possible shade of opinion that could be introduced into the panel. Some of the efforts that were made to get certain types of people were

not successful. Nonetheless, there is a spread of opinion here, quite a spread of expertise, and I hope that we will not spend a great deal of time belaboring this issue. We are sorry if it doesn't represent everybody, but it isn't always possible to have exactly what you would like.

DORIS HAIRE: I am President of the American Foundation for Maternal and Child Health, and I am on the Consumer Advisory Ad Hoc Committee for the FDA. For over a half a century the dictionaries have defined the word safe as "free from harm or injury." There is very little variation in this definition. Butazolidin, according to the drug package insert, is a drug that can cause hearing loss, detached retinas, aplastic anemia, leukemia, coma and death. Pitocin, which is a drug we use to stimulate the pregnant uterus, according to the package, can cause uterine rupture and hypertonic contractions. Both of these conditions can cause a serious trauma or death to the fetus. Both of these drugs meet the FDA experts' standards of safety. It is my contention that the expert standard of safety is invalid, and I feel strongly that while the expert can certainly advise the patient, what we need in this country is a patient label so that patients can be involved in decisions regarding their health care. I would like a discussion of patient labels from the group if it is possible.

ROBBINS: This is a somewhat different area of concern than we are talking about. I would make a comment, though, that if you are assuming that every drug or every therapeutic agent on the market, including aspirin, is fully safe, then you have a very false concept of therapy because this is not true. Every drug and every therapeutic procedure has a built-in risk that cannot be avoided under any circumstances, depending upon how you use that particular agent. So I am afraid your comment is misleading

and should be put in the context that we use many drugs, all of which are highly dangerous if improperly used.

HUTT: I think that a point is being made by Mrs. Haire that reflects some of the earlier comments. The average citizen is beginning to distrust the expert, in this case the physician, and may desire to do what Stewart Brand was talking about, to gain the information from either the doctor's package insert or a new concept of a patient package insert, or indeed to go to a textbook on pharmacology to obtain that information for himself or herself -- in effect, to second-guess the expert. I think that is worthy of some discussion and gets to the heart of the issue of when you use experts and how the citizen can interact with the expert who is most widely used in our society, the practicing physician.

CHARLES HALPERN: I would just like to second the point that Mrs. Haire and Peter Hutt made. I think it is terribly important that citizens be given access to expert information in the most expeditious way possible. The plain fact is that women have discovered in recent years that they can understand much more about the hazards inherent in various birth control technologies, and they are starting to insist quite properly that they be given access to this information.

This, along with the point that Stewart Brand made earlier, raises another question about the representativeness of this panel, if I may be permitted one more word on it. I have never been on a panel of this type without its being criticized for being exclusively white, male, and middle-aged. I was really taken aback by Mr. Brown's objection to this panel that there weren't any government employees here. I must say that I am more impressed by the conventional criticism than I am by Mr. Brown's.

The fact is that women and racial minorities enrich discussions of this kind and bring quite novel perspectives. I have seen this in discussions in two areas of my own interest -- birth control technology and psychosurgery. The participation of racial minorities and women have been extremely important in the policy debates on these subjects in which I have participated. I would hope that the planning of subsequent Academy Forums would not fall into this error.

BRAND: I can't resist one comment about this question of developing your own expertise as a citizen. We carried a great book called the Merck Manual in the Whole Earth Catalog, first edition. The Manual is essentially a layman's presentation of the full body of general-practitioner medical knowledge. With a little application and experience it is quite extremely useful in the home. So we carried the book and also made it available through our Whole Earth Truck Store. I immediately got a quite curt letter from the publishers, saying that we could not make this book available to the general public and that they would do everything they could to prevent us from doing so. We then had to say, "You can't get the book from us, but just go to the nearest university bookstore and pretend you are a medical student and you can get the book." It seems too bad that you have to go through that labyrinthine approach to get information that should be available to everyone.

HUTT: I would add just one final comment, Mrs. Haire. I personally have supported the idea of a patient package insert for every prescription drug. I happen personally to believe that education of the public in that respect is a first-rate idea. On the other hand, the experience with the only situation where that has been used, with oral contraceptives, has been

that those patient package inserts are not widely read. Very, very few people ever read it beyond the first time perhaps, and there is some evidence that many do not even read it then. So two things must go together in approaching this matter: first, the availability of the information, and second, education of the consuming public to use the information that already is available.

BROWN: I think it is in the spirit of this conference that there be back and forth, so I hope you won't object if I give a back to a couple of forths. I think it is very demeaning of the point I made concerning no government experts being on the panel to refer to my point as having to do with "government employees." That is a very demeaning word; it shows that there is no understanding on the platform of the point I am making. Furthermore, the demeaning statement that no panel can be 100 percent representative of anything also shows very little understanding of my point. I am not talking about a very minor point, I am talking about a major point: the government today has within it experts, and I don't want them called "employees." They are professionals working for the government who are, in certain areas, more expert than the people outside, and there are many of them. The National Institutes of Health, the Defense Department, the various economic and social agencies of the federal government are very much involved and very much able to provide expertise in all these areas, and I regret very much that they are called in a demeaning way "government employees."

HUTT: I would like to respond to that as someone who, for the past four years, has been a government employee. I was proud of that term, and I wear continuously the two badges of honor that were given to me as

a government employee. Whether I was an expert or not, I thought somewhat irrelevant.

BROWN: I was a government employee, too, and I was proud to be called one. But when it is used in a demeaning and insulting way, as it was, then I have to object to it, not you, Mr. Hutt.

ROBBINS: Your objection is heard and I am sure an insult was never intended.

BROWN: I have another point concerning the irrevocability of an FDA decision. These two examples may not be quite in the same order and quite of the same quality of the Red Dye No. 2 decision. I remember that smoked fish was taken off the market for about six or eight months or a year and then restored. Canned cranberry sauce was taken off the market for quite a long time and then restored. As I say, I am not an expert enough to know whether Red Dye No. 2 comes in that same category.

DJERASSI: It does not because there are no substitutes for smoked fish or cranberry sauce. This is exactly the point I made about cyclamates. If saccharin were taken off the market at the same time that one permits cyclamates to be used again, then cyclamates would be reinstituted. But I would like to emphasize that for most of the items that are removed, like dye stuffs, drugs, et cetera, there are alternatives. In fact that is one of the key arguments that the FDA uses with some justification -- that they are not even willing to take a minor risk because there are alternatives: people don't have to use Red Dye No. 1 or No. 2, they can use No. 40, for instance. The same is true of cyclamates, because people could use saccharin, and in many other drugs there are many other substitutes.

While I have the floor I would like to ask Mrs. Haire one question,

because I also happen to be quite sympathetic to the belief that there should be package inserts and, in fact, am a firm believer in this. I am not quite sure how this can be handled because I think that you are only talking about prescription drugs. In my opinion, package inserts are even more important in the context of over-the-counter drugs. Have you, for instance, ever looked at the real list of side effects of aspirin? If you look at that list you could construct a horror story out of aspirin. How do people really evaluate the question of applicability rather than validity of the information? There may be side effects, such as the ones cited for Butazolidin, that are horrible but which apply only to very few people. You have to be able to evaluate that, and the physicians, in fact, do so.

HAIRE: Today there are a lot more people who use a cold cloth rather than an aspirin than there might have been two years ago. There is a lot more awareness of the possible hazards of aspirin among the general public. But I feel that a patient package insert would be so valuable because it would encourage patient education as to the risks in the drug. If the doctor knows that the patient is going to read that package insert, he is going to make more of an effort to see that the patient gets this information in a more intimate discussion than is presently done.

ROBBINS: We will take one more question and then we are going to move on to the panelists in order to have a resemblance even to the timetable. Yes sir?

ERIC REISFELD: I have no affiliation that has any possible pertinence here. About thirty-five years ago or so, when I arrived in this country, I very soon discovered a violent and national disease that we all seem to suffer from and one that has been getting more and more

severe -- expertitis. As we all know, and this has been well discussed at length, the emphasis in the scientific community has been towards more and more people knowing more and more about less and less -- in other words, overspecialization. We are having more experts who know more about their particular field but have no knowledge of possible side effects outside it. Frankly, the average citizen like me has a basic, fundamental gut distrust of institutionalized experts. Consequently I was wondering what the scientific community is doing in regard to making certain that people do become aware of the disciplinary effects of their actions.

KOSHLAND: I think what you say is a very serious problem. There are moves, in fact, supported by funds for interdisciplinary studies, and the present proliferation of knowledge is almost forcing people to be generalists as well as specialists. But I would answer your general criticism with a story which I think puts the expert in perspective.

A lady who had broken her lamp went next door to a physicist, a university professor, and asked him to fix it. After about an hour he had taken everything apart and couldn't get it back together. The lady turned to him with great exasperation and said, "My goodness, man, don't you have any common sense?" He bowed very low and said, "Common sense is a rare gift of God; I have only a technical education."

ROBBINS: With that I am going to ask Dr. Djerassi to address himself briefly to how you choose experts.

CARL DJERASSI: I wish to discuss this in a limited way, making an argument that is neither populist nor popular. In order to do this I would like to define the areas in which experts are needed.

First of all there are two major types of problems: prospective

ones, which frankly interest me more, and retrospective ones. A retrospective one, for example, would be whether Red Dye No. 2 should be taken off the market because this and that side effect may or may not occur. A prospective one would be one where expert knowledge was needed to evaluate whether work should be done on a certain topic -- whether to go to the moon, build nuclear power stations or develop a new kind of drug, an oral contraceptive at a time when oral contraceptives were an unknown concept.

These are the two main divisions where expert knowledge is probably needed. But then there is another type of division which I think is possibly more relevant to the question of citizen and expert or citizen versus expert, and that is that most problems can be divided into three categories: the first is a purely technical, scientific component; the second refers to societal desirability and acceptability; the third deals with political feasibility.

I would like to emphasize that almost every expert is also a citizen. It is by no means clear that every citizen is also an expert. We really need experts for the first category -- the question of expert knowledge -- and I am going to address myself to this question in a moment. For the second one of societal acceptability or desirability, there are frequently times when the expert can make a contribution as a citizen and not as an expert although his expert knowledge ought to help. When it comes to the third category, the political feasibility, experts are frequently used by politicians for their own purpose, and I think that experts should be careful not to be so used. It is in that area that I am least comfortable about the role of experts. When it comes to the nonexpert citizen, it is perhaps in the third category, political feasibility,

but particularly in the second one of social acceptability and desirability that I think he or she should play the main role. It is rather important to distinguish among these different categories because one usually has to proceed in that order. In general, decisions about societal desirability or political feasibility cannot be made until some information about the technical and scientific component of the question is in hand.

I now would like to talk about an aspect of selection of experts that has been bothering me for quite a while. It has been bothering me in part because I have always worn two hats at the same time. I have been a university professor and at the same time I have had something to do with industry, being involved usually with corporate management of research enterprises that were not "me-too" enterprises, but rather dealt with innovative projects. For instance, I was involved in the development of the very first oral contraceptive, which was not a negligible development at the time it was done. I now am involved in trying to design completely new methods of insect control, of a type that has not been done before. I would say in this case people won't question that these are societally important topics. Whether we should do such work or not is part of a different question.

The thing that has bothered me is that people -- and I am sure it applies to most of you here -- use "conflict of interest" or "potential conflict of interest" and "bias" synonymously. I think this is grossly unfair. I find that in general someone who has anything to do with industry is automatically suspect. Irrespective of whether industry selects that expert, or whether he comes from industry, he is suspected and much of the evidence is automatically discounted. This is so because he or she

presumably is biased and subject to conflict of interest. I think the bias of the government employees, the academic, or the consumer is as great as the bias of the expert that comes from industry. Furthermore, the definition of conflict of interest which lawyers usually use is that of stock ownership. I am not that uncomfortable with such ownership provided it is fully published and everyone knows it ahead of time. I am much more concerned about the conflict of interest which is not necessarily illegal and of which particularly the press and lawyers, as well as the entire legislative branch are guilty. I am referring to the conflict of interest generated by your position in society or in your profession and where this may lead you to conclusions or actions that are as inappropriate or as full of implied or actual conflict of interest as those of the person owning stock in a corporation.

We live in a society in this country where almost all of the practical things that we do in which expert knowledge is needed in one way or another are implemented by industry. This is particularly true of the sort of industry that is controlled by regulatory agencies such as the FDA or EPA. I am a firm believer in the importance of these regulatory agencies. However, I am not so happy about the manner in which some of the decisions are made, in part because of the selection of experts on certain advisory committees. The selection is always based on having only people who presumably have no conflict of interest or bias on a given topic. I think that this is preposterous. This is like selecting exclusively a group of virgins, of nuns or monks, and of seventy-year old cardinals to write a book on the joys of sex. They could write something very academic and theoretical, but for such a book you also need people who have been in

bed with someone. I would invite the entire range from prostitutes and homosexuals to happily monogamous husbands and wives to tell me about their experiences, and then I would make up my mind whether I want to enjoy sex or not.

This is exactly the mistake we have been making consistently in many problems of regulatory importance -- we deliberately eliminate all people who have real-life, practical, operational experience in an area.

I will end up with a topic needing expert inputs that bothers me the most. It is relatively easy to make decisions -- and they are made all the time by the FDA and EPA -- to take something off the market or to permit something to go on the market. But is much more difficult to determine what research never gets done because of certain actions that regulatory agencies may take. I maintain that it is precisely the people who have to make operational decisions about research who could contribute most along those lines. I will give you a somewhat embarrassing personal example. A few years ago I got the National Medal of Science for my work on the first oral contraceptive. This was a couple of years after I made the prediction -- while still associated with the company (Syntex) that had pioneered much of the initial oral contraceptive work -- that less and less practical work would be done on fundamentally new methods of birth control unless drastic changes in government and regulatory policy were initiated.

This is a very serious problem that I have tried to bring to the attention of regulatory agencies with very little success. My predictions were largely discounted because of my connection with industry. I did have the courage of my conviction to publish this prediction five years

ago, and unfortunately I proved to be about 120 percent correct. At that time I was called a cassandra. But now I have, according to Dr. Koshland's credibility index, a batting average of 1,200.

I would also like to give you a personal example of how someone can have a potential conflict of interest and still not confuse it with one's role as a responsible citizen. I currently am advising the World Health Organization on how to develop a long-acting injectable contraceptive, which happens to be of interest to certain lesser developed countries. I am very attracted to that idea, and I have made proposals to the WHO that would be directly competitive with industry. Yet I am still a stockholder in a pharmaceutical company that is active in the contraceptive field. I happen to be very interested as a world citizen, not just as an American citizen, in the world-wide problem of fertility control, and I am making suggestions to the WHO which if implemented will be contrary to the interests of the company in which I own some stock. I consider this type of conflict of interest acceptable provided you know something about it. The WHO does know that I own stock in that company. I am convinced that the FDA would never have considered me as an advisor in that particular context in spite of my widely recognized expertise in this field.

I am not suggesting that one should get only experts who are "contaminated" in this way. I feel that all experts are contaminated, just as I feel that most citizens are also contaminated. What we need are appropriate checks and balances. But the type of exclusion that we practice in our country is quite counterproductive. The actual operational exclusion of people with industrial connection or discounting the evidence right from the beginning if it originates from industry is shortsighted. In the end

the people who suffer the most are the citizens.

ROBBINS: I think we will get a slightly different view from Mr. Halpern now.

CHARLES HALPERN: I have to start with a confession -- the Chairman has already referred to it. I am a lawyer, and a member of that most suspect of classes, namely, Washington lawyers. If Mr. Reisfeld is right that there is suspicion of expertise, there is a special suspicion of that expertise that lawyers have, and of Washington lawyers highest of all.

My career as a Washington lawyer has been roughly split in half -- half in a large corporate law firm and half in the field known as public interest law, which means providing representation to unrepresented groups, be they poor people, racial minorities, environmentalists, consumers or the like. I start with this autobiographical information, because my experience in Washington law practice has very much shaped my comments today. I am not going to talk about the scientist as citizen; I am not going to talk about the procedure by which the government hires experts either as employees or as consultants. Rather, I am going to talk about the way that citizens get access to experts and develop the working relationships with experts they need to affect public policy decisions in which they have an interest and which have a large technical or scientific component.

These are the kinds of decisions which are made every day by the government, frequently in administrative agencies, in the Executive Branch and in Congress. They relate to our regulation of cigarette advertising, our regulation of the pesticide industry, our regulation of auto safety, our regulation of cable television and, as we have already discussed, food additives. In all of these areas there are issues of public policy of direct

concern to large numbers of citizens, and these questions are ones which have a high technical or scientific component.

While I certainly agree with Stewart Brand's observations about the importance of citizens' trying to understand and educate themselves on expert matters and their ability to do so, nonetheless I feel strongly that the citizen who wants to affect decisions made by government where there is a large technical or scientific component is going to have to have effective access to experts -- experts not of the type that we just call up on the telephone for an off-the-cuff conversation, but experts who will really lend to the citizen group the benefits of their information and knowledge. It is my thesis that citizens at the present time have grossly inadequate access to experts, particularly when contrasted to the kind of expertise that corporations can marshall in order to persuade decision makers of their positions.

While I recognize the force of Carl Djerassi's argument, it seems to me nonetheless that corporations in marshalling experts and presenting the fruits of their learning enjoy an extraordinary advantage that citizen groups do not. This disparity is growing and is one which should be of concern to the scientific community and to the larger community of citizens.

Let me take as an example of this thesis the decision on whether to permit construction of a pipeline across the state of Alaska from the North Slope to Valdez in order to remove the oil that had been discovered on the North Slope of Alaska some years ago. A consortium of oil companies that leased those oil fields, for good and sufficient commercial reasons, decided that the pipeline running to Valdez was the proper method from their

corporate standpoint for taking this oil out, a basically economic decision informed to a large extend by their in-house experts who told them what was technologically feasible and what the cost factors would be. On the other side you had a number of environmental groups who viewed the pipeline route as a threat, to put it mildly, to the last great wilderness area on the North American continent. Their decision was less well informed by expert opinion and more thoroughly related to value judgments; these were certainly not people who were unbiased or disinterested. They were dedicated to wilderness values, and they saw the pipeline project as antithetical to the values that they held closest.

The Secretary of Interior had to make a decision. Was he going to issue a permit for the construction of this pipeline across federal lands, or was he not? How he got his own in-house advice is something that Peter Hutt will touch on. What interests me is the process by which the oil companies and the citizen groups, the environmentalists, built their cases. First of all, the basic fact is that they had to rely on experts. In part, their reliance on experts was a matter of persuasion. They had to persuade the Secretary of Interior and the American people that they knew what they were talking about. In addition, in refining their positions, experts also played a critical role.

Take a look at the structural advantages that the corporations enjoyed in obtaining expert assistance and advice. The first and foremost is money. The corporations were not looking to experts who would contribute their time, who would have nothing to gain in a pecuniary fashion from their work. I do not mean to suggest that scientists are venal or will sell their souls; like other people, they have financial needs which they can legitimately pursue by selling their services so long as their sale of service is consis-

tent with their personal integrity and their professional commitments.

Nonetheless, money is an important factor. And it is not just the consulting fees in this particular case. There is a promise of repeat business for experts consulting with oil companies, and there is a network of established relationships between whole academic departments and the industries to which they feed their graduates. This is most obvious if you are looking at a discipline like geology or seismology, where there are very close relationships that are extremely complex and difficult to sort out between the industries and the academic departments. It makes it easy for the corporations to find geologists who are expert on this sort of matter, and makes it relatively hard for the citizen group to find volunteer experts -- not impossible, but extremely difficult. I only want to point out the fashion in which the system weights the balance. It is not a black or white situation, but one of weighted balances.

There is another important point that flows from the corporation's economic advantages, and that is the ability to choose among experts. This was a process in which I participated as a private lawyer. If you are trying to persuade an administrative agency or an executive department of your position, you don't have to take the advice of the first geologist you go to. You can shop around and find that geologist who is both solid on the merits of the issue you are trying to address and also has other skills that you think will help to persuade the final decision makers. Again, you are not asking any expert to bend his views to the corporate position, you are simply shopping around until you find that expert whose advice you like best.

Finally, I would like to mention the fact that corporations have vast in-house expertise. They are not going out as lay people to look for

the right geologist or plant biologist to present their case. They have those people on their staff who can help in the selection process -- a very significant factor.

I dwell on the advantages of the corporation because, in my view, an effective adversarial process leads to the best policy decisions. The Secretary of Interior would be likely to make the best decision on the pipeline if he had the scientific facts marshalled by the corporations on the one hand, and the scientific facts marshalled by the environmentalists on the other hand. He could compare them and encourage mutual criticism by the experts involved in the process. The problem is that for the citizen group it is very difficult to make a presentation of the same scale and sophistication as the corporations can. Typically, they lack money; they lack access to experts and the sophistication to judge among them. In terms of rewards within the scientific community, the scientist who aligns himself with citizen groups loses respectability and legitimacy; he becomes a "scientist advocate," which, as I understand the hierarchy of values within the scientific community, is a very bad thing indeed.

As I said at the outset, I believe that access to experts is critical to citizens if they are going to affect policy decisions which have a scientific or technical component. There is, in the situation which I have described, an important challenge to scientists and to institutions within the scientific community. An institution like the National Academy of Sciences, for example, should make it a high priority to try to improve the inter-connections between interested citizen groups and relevant scientists. It is an extremely difficult process, but not impossible. The recent hearings held on the Concorde by the Secretary of Transportation are rather a good

model of the process by which policy decisions with scientific components should be made. In that case you had highly sophisticated scientific experts on both sides. They cross-examined each other. The ultimate decision was left to a public servant who had a free hand to decide on the merits, and he has been presented expert information in a manner that a lay person can grasp and deal with.

The challenge is not only to scientists here, as my remarks have suggested. I consider the citizen group which wants to affect policy decisions to be in the hands of a number of experts, and they are not all scientists. One of the most crucial experts for the citizen group is the lawyer, and up until the present time -- and to a large extent now -- lawyers are available only for corporations. The misallocation of legal resources, which is very similar to the misallocation of scientific resources, exacerbates the problem. So you have high priced, highly effective lawyers representing corporate interests and frequently no one at all representing citizen interests.

In short, it seems to me that if citizens are to affect major issues of public policy they are going to have to have better access to experts of many kinds -- scientists, lawyers and other.

MORRISON: Could I put a question? It seems to me that your case as put almost implies a classical answer which I learned in civics. The Department of Interior has a staff of persons who know very much better about the environment, the tundra, the fish, game, and the wildlife of Alaska than perhaps any other group. It seems to me that what the citizens' group really needed was an advocate and a statement of value. Within the Department there resided some expertise, some knowledge of the community and of the techniques and conservation knowledge from which the Secretary

could draw. Your picture took the view, it seems to me, that the Secretary of Interior was there by himself, and or maybe with five other administrative aides. But is the Department of Interior not probably the employer of more conservation science people than any other agency in the country?

HALPERN: Frequently, the people inside an agency, like Interior, view themselves as having a judge-like role, balancing and evaluating the evidence that comes into them. And their situation is frequently similar to that of a judge who has only an advocate on one side. Suppose the prosecutor comes into a criminal case with a staff of psychiatrists to try to establish that a defendant is insane. If the defendant were in court without a lawyer and without a psychiatrist of his own, he would be in a very much handicapped position. That would be so even if the judge had his own psychiatric experts. In my view, the adversary process is crucial here. If you are going to have effective citizen participation -- and the pipeline is a perfect example -- it cannot just rest on citizen groups coming in and stating their values. That is a hopeless, losing situation to be in. The effectiveness of people like Ralph Nader in many forums rests on their ability to mobilize experts to inform the positions they take and then to try to present their positions in a persuasive fashion. I am afraid the lessons of the civics class are highly deceptive, as I think anybody who is familiar with the decision-making process in Washington would attest.

MORRISON: I think what you say is so. However, it goes not to the scientific-technical input then, but to the nature of the process, to the political process. Because it is hard for me to believe that the facts and the circumstances of what would happen to Alaska were not as well known in the Department of Interior biological-conservation circles as they were

to any set of experts at the oil companies or the citizens group.

HALPERN: I do not believe that is true. And that highlights another problem. In many government agencies experts, including lawyers and scientists, frequently view the industries they regulate as a likely place for themselves to work after a period of government service. That can, needless to say, have a somewhat corrosive impact on their willingness to serve as vigorous advocates while they are inside the agencies. Again, that may not be in the ordinary civics course, but it is a fact of Washington life.

BRUCE HANNAY: It seems to me that the dilemma that is worrying you is, to some extent, the result of the process that you are advocating, namely, that the decision should be the result of an adversary process. The concern that you then have is that having set up an adversary process, the two sides of the controversy are not similarly well equipped with experts. There is no reason at all, under those circumstances, having heard what the advocacy on each side can produce, that the people who are making the decisions can't solicit any kind of inputs that they want from any experts and select them on any basis that they want. They do not have to accept as experts the ones who are presented by the advocates on either side; they are entirely free to settle on their own. I think, therefore, that what you are doing is to blur the boundary between, say, a regulatory type process which does involve adversary proceedings, advocates and so on with the kind of process that we talk about for advisory groups, where the selection is certainly intended to produce different viewpoints.

HALPERN: You are talking about very fundamental reform of Washington decision-making. If you want to make the study section of the

NIMH a model for how decisions are made at the FCC and the Department of Interior, we could talk about that. What that would mean would be limiting corporate access to decision makers. It would be a quite revolutionary change, and one which I consider undesirable.

Let me go back to the focus of this Forum, which is the expert and the citizen. It seems to me that that presumes a role for citizens in decisions of policy which affect them and involve science and technology. If you are going to start with the premise that citizens should have the right and the power to affect such decisions, it seems to me to follow inevitably that they must have first-class expert advice.

STEPHEN SUNDERLAND: I am Dean of the College for Human Services in New York City. I would like to expand on Mr. Halpern's point and direct the conversation back to Dr. Djerassi because there is an assumption in his remarks, and in some earlier remarks as well, that there really is a balance between the citizen and the expert. Mr. Halpern has opened up at least the possibility that there may be an enormous imbalance, and there may be a continuing imbalance to such degree that it is hard to even characterize the discussion. On the large-scale issues such as the Alaskan pipeline and the SST, average citizens sit in shock and wonder what is their real relationship or their real participation in the outcome. But in terms of citizen decisions that are more at home, such as the selection of a doctor, a lawyer, a teacher, selection of any professional indeed that affects the home life of the citizen in a more day-to-day way, the possibilities for informed decision-making are almost negligible, they are irrelevant. Citizens are emasculated, even though they may have enormous technical input and experience themselves either as parents or as teachers or as amateur

scientists or whatever it is. The opportunities for any kind of informed input on the part of the citizen are shrinking rather than increasing in the same kind of dramatic ways that Mr. Halpern is talking about in terms of the absence of money and access.

In short, what we don't have -- and it is remarkable that it hasn't been brought up in a more elaborate way -- we don't have any standards for determining what is quality expertise in terms of doctors, lawyers, teachers, social workers. We don't have any credibility scales. We don't have any methodology of performance. We don't even have an ethos that makes Dr. Koshland's original point, which I don't know whether he made facetiously or as a real alternative. We don't have any process right now whereby citizens, even informed ones, can decide whether or not the doctor that they wish to go to or bring their child to, or the teacher that they are looking at, or the classroom that they are sending their child to, is in fact working in a way that is effective to them as a citizen. So in fact, the discrepancy and the disparity at the macro level or the enormous societal levels in terms of technical expertise is enormous. But even in the more micro level or at the interpersonal level, where the technical expertise of the citizen, of the parent, of the child might be used in a potentially useful way, the ethos, the philosophy, the ideology is that the citizen is irrelevant. As a matter of fact, the citizen is getting in the way, and the professional cannot be bothered by that. We see that most clearly in the admission policies of professional schools. We see it in the whole furor surrounding malpractice and the fear that in fact the person who will pay most will be the citizen.

So I think, Dr. Djerassi, you have not seen the structural power that you have on your side as a corporate representative, the conflict of

interest that is posed not only against the large-scale consumer and citizen but is posed in the even more paralyzing ways to the person who does not have the citizen group behind him, the average citizen who is terrified of the doctor, the lawyer, of the dentist, of the teacher.

DJERASSI: I don't want to be looked at as a corporate representative because there is no such thing. Corporations and industry are very diverse. I am sure that some corporations would shudder if they had to consider me as their spokesman. I simply tried to present a specialized argument that a considerable amount of useful technical expertise -- highly useful to the citizen -- is eliminated. But let me get to your very specific question which was asked at the micro level and which no one has talked about so far. Philosophically I would agree with you, but operationally I think it is meaningless because you raise the question of quality of professionals in the context of individual physicians and teachers. Quality in this context is a purely subjective criterion, as subjective in a way as safety is. I think Mrs. Haire used the dictionary definition of safety, but this is meaningless in the operation of drugs. You can define safety in a dictionary sense, but in an operational sense there is no such thing as a safe commodity. Just as there is no such thing, I think, as a first-class physician or a first-class teacher unless you ask, First class to whom? Perhaps to you, but not necessarily to me. Some person needs a physician where the human relationship is of crucial importance, while the diagnostic capability is less so. In other cases the physician can be an absolutely ruthless, arrogant character, but he can be a first-class surgeon, and this can make all the difference if you are up for surgery. The same thing is true of teachers. I think the quality of a teacher can really be debated. If it were a

one-to-one relationship it would be simpler, but in many of these instances unfortunately it is not because you have to make quality judgments in the context of the larger society -- there are only X physicians for Y patients -- there are only X teachers for Y students. There has to be some sort of compromise. There are standards of quality that in the end are established by society in a very nebulous and dubious way.

I would like you and perhaps Mr. Jencks to respond to this. No one has talked about the use and especially misuse or total absence of use of expertise information by the communications media, be it radio, television, or newspapers. I think that more pernicious mischief is done there than almost anywhere else. Sometimes it is completely ignored; sometimes it is selected out of context in a very special way. And that really has a much more monumental effect on citizens than almost anything else.

SUNDERLAND: There seem to be a lot of people who would like to talk about this particular issue of assessment of professionals and perhaps the media as well. Basically I think that answer -- that it is impossible to objectively assess professionals -- is the fundamentally destructive comment about American professions in general. We must be able to not only have professions assess themselves in terms of quality, in terms of credibility, in terms of usefulness, but we must find ways of sharing that information with the consumer. I think your response, if I understand it, should not be taken as an insuperable problem. There are many attempts going on to educate citizens and even to do more than educate, to empower citizens to be able to start making some statement other than a malpractice statement, to begin to say that there are other forms and structures for citizens to provide health, education, service, counseling, and so forth to other people,

and that we should not be embarrassed by the absence of a technology of evaluation. But we should be striking, it seems to me, a path toward some form of humanistic assessment.

DJERASSI: You misunderstood me about one thing, and I think it is important that I interrupt you so that you can continue. When I refer to this inability to evaluate people objectively, I am talking about absolute criteria. In the two particular disciplines that you have picked, the one-to-one relationship of the teacher or the physician to the single student or patient implies components other than just pure professional competence. I think there are many areas of expertise where, in fact, you can carry out a practical, completely objective evaluation because the other components that I have referred to, the personal relationships, do not enter. I have very little difficulty in evaluating objectively my own professional colleagues, chemists. I can do it with nuclear physicists, and I can do it with engineers; these are very different from the professionals to which you addressed yourself. I find your question a very interesting and important one, but rather different from the one that I spoke about. You talk about the perspective and relationship of the individual citizen, and you pick particularly teachers and physicians where you have other components, not just a purely technical one. The personal relationship has a great deal to do with the quality in that case, and that is what I meant when I said it could not be evaluated objectively. I didn't mean it in some other professions.

SUNDERLAND: I don't want to debate the fine point of what is technical and what isn't. But in the area of teaching, in the area of health, in the area of counseling, it is not clear what is technical and what is not technical, and the credibility of the professional is equally on line in terms

of his relationship to the individual. The point I would like to finally end on -- Mr. Jencks and I were just talking about this -- is how remarkable it would be if in fact there were national television programs where there were opportunities to hear professionals and citizens talk about what makes for a good doctor, a good teacher, a good counselor, or a good chemist. If, in fact, your statement that you can assess chemists but you can't do it with doctors is accurate, I would like to hear chemists debate you on that or discuss it with you. The fact that there is a paucity of any media to empower the citizen in terms of basic day-to-day decisions is a crying shame in America right now. The fact that we have a high literacy rate, the fact that we have a great deal of interest on the part of many different consumer groups should not confuse us. The very basic life decisions remain the most puzzling, the most confusing. All of us who move to different cities do not know how to select the professionals that we need to care for the most basic and important functions that we have. If the media addressed itself to that, and if scientists and professionals and citizens addressed themselves to it, we could have a different environment than we now have around the issues of evaluation.

JENCKS: Since the question of the media has been raised in a couple of connections I would like to comment on it. Carl Djerassi observed a while back that the media are mischievous --

DJERASSI: Can be --

JENCKS: Almost always are. My dictionary definition of the media is that they are mass disseminators of mischievous information. The fact of the matter is that the primary function of the general media is to be a defense against any attempt to institutionalize truth. They do

a pretty good job with that objective, while in the process creating all sorts of chaos in the public mind regarding experts and expertise. I do agree with Carl Djerassi that by and large the media give too little attention and assign too little credibility to corporate experts or experts produced under corporate auspices. That, to a degree, is the corrective for the propositions asserted by Mr. Halpern a while back. Look at the coverage in the Washington Post or, for that matter, in Newsweek or Time or on CBS of almost any Washington hearing involving experts, and you will see, I think, a press predisposition to give the greatest attention and assign the credibility to experts who are produced by public interest organizations as compared to those who are produced by corporations. I don't complain about it and perhaps, under the circumstances, it is the best corrective for the problem which has been outlined. But that is what happens.

BRAND: There is a sequence that goes on in this access to and evaluation of information. You start out with access to the services that are available in the community, and as a certain confidence grows around that, then there is also a market for evaluation. For example, in a good many colleges there is usually a quite outlawed and informal publication of some sort by the students to evaluate teachers, often quite independent of the particular subjects the teachers are teaching that semester or quarter. It is often the most important guide to the best use of that college or university. It may be a fuzzy Xerox copy, but it is read and valued, and people will buy it.

The same thing can be done on the community, neighborhood or city level -- a separate evaluation document going on in quite personal and often insulting terms about the professionals that are available, indicating

which are the good ones. This is a thing that the market can satisfy.

E. A. SEAMAN: I am an ecologist with the Bureau of Reclamation, Department of Interior. I can't resist a few remarks in the discussion by Mr. Halpern about the Secretary's decisions. The Secretary of Interior at any one time has before him many issues with industry, pipelines, fossil fuel power plants, nuclear power plants, and so forth. Certainly we have in the Department of Interior lots of expertise. But when you get into the field of ecology, I am afraid there is some real serious lack of full understanding. I happen to have five acres of land in northern Virginia. As an ecologist I know that five acres quite well, so I know it is quite complex, and there is a lot I don't know about it. But I can't apply the knowledge of my own five acres to five acres in Arizona or five acres in Massachusetts or even somewhere else in northern Virginia, because there is great need for intensive study in the field of ecosystems, and that takes two things. It takes a tremendous amount of money and manpower. Although the Department of Interior may have a lot of people working in the life sciences and related fields, they don't have the manpower or the money to apply that to these vast projects like the pipelines mentioned. In order to study and know the environmental impacts of a project of that sort, you have to have a tremendous amount of money and a tremendous amount of manpower available to get out and study the ecosystems and the impacts on this vast area.

I am reminded of a discussion I had with some of our engineers once. An engineer said in a discussion in our own bureau, "Why don't you ecologists just apply the information you know about one ecosystem or several ecosystems to others? Why do you have to go and study every last mile?" A colleague

of mine responded, "Why don't you engineers have geologists take the core drawings of Dam A and use them for Dams B,C,D and E?" There is a vast lacking of knowledge in the ecosystems studies of our planet Earth that must be done for us to fully understand what can be done in regard to finding out what the impacts are where industry or others would decide to come up with projects.

It is purely a case, as Mr. Halpern said, of money. The corporate side could take one percent of the cost of the Alaska pipeline and spend that without even the board responsible for that spending and do a great study of the ecosystems of the Alaska pipeline or a gas line through Canada or anything else of that nature. The thinking about and understanding of ecological impacts is very important. But as far as the public is concerned, I think they understand this better than many scientific disciplines in knowing that it takes money and manpower to do it. So, I praise Mr. Halpern for pointing out the fact that it is the money that does it. I have done some consulting work of my own in the past, having had an ecological consulting firm back in the fifties, and I know that industry can put forth that effort in a small percentage of their total budget to get the scientific information and study these things. I think there is a greater will to do so these days, but it isn't all that easy. I still think that money is the big figure we should be talking about.

HALPERN: Let me respond briefly to Mr. Seaman's comment and call attention to a report that the National Science Foundation is now preparing and will shortly submit to Congress on a program that has been called, as a shorthand, Science for Citizens. Its purpose is to give citizens the kind of scientific assistance and advice which will permit

them to participate effectively in these policy problems. For those of you who agree that it is important for citizens to have this kind of access to expertise, I think this might be a program you will be interested in. It is one which will be considered by Congress during this session.

If I may return briefly to Stewart Brand's comment and Dean Sunderland's regarding evaluation of expertise. I think it is interesting to see what the response of professionals has been to the efforts to develop guides for citizens who are making selections among experts. This has become an issue in the medical and legal areas. The reaction of both those professions has been to try to stop the people who are trying to put together citizen guides and to make damn sure that consumers are not given the kind of comparative date they need to make intelligent judgments. Cases are now pending in a number of states, and the legal profession and the medical profession are closing ranks behind one proposition on which they can truly agree -- the consumer should be kept in the dark.

MORRISON: Can we look forward to consumers' reading the report one day?

KOSHLAND: In response to Mr. Halpern, I do think learned societies would be very pleased to provide help to public interest groups. In fact, most scientists I know are delighted to talk to anybody who will listen.

But we have all been getting along so well I think I ought to attack the lawyers a little bit. Adversary proceedings are desirable in the case of the SST. But the need for adversary proceedings means that the objective data are not available, or that we don't have conclusive expert advice. I would just like to bring back these credibility ratings and suggest that if a corporation can shop around and eventually find an

expert who agrees with its side, and a public interest group can shop around and find an expert on its side, it is really a bad situation. It does not mean that all is well because each side has equal experts. It means the facts are not known and it is not the way to solve technical issues. I hope we would do more research and come back to the same decision on a more authoritative basis than who has the best lawyer. I think the reason scientists are skeptical about the media is that they are a little worried that the most simplistic but not the correct approach does win.

HUTT: The reason that lawyers are sometimes skeptical about the scientific approach is precisely because you can shop around and find a scientist to say anything.

ROBBINS: I would like now to ask Mr. Hutt to make his presentation. Then we really can have a full discussion because you will have heard from everybody.

PETER HUTT: My comments today will focus on the use of experts by the government as part of the decision-making process. I say this in contradistinction to Charles Halpern's comments, which focused on the use of experts by advocates to try to influence the government to make a decision. I am speaking here of the use of outside experts by the government as part of its own decision-making process.

I recognize the existence of experts within the government, to which Mr. Brown has already alluded. But I also strongly support -- and I doubt there is anyone here who supports more strongly -- the use by the government of outside experts to help in the decision-making process.

Whether we like it or not, I agree completely with Mr. Halpern that the adversary process is part of our government. It always has been

and always will be as long as there are differences of opinion. I also agree with him that imbalance of representation is undesirable. In my judgment, one of the best ways to help solve the problem of imbalance of representation is to strengthen the government's capacity to solve issues by the use of expert independent advisory committees. I do not believe that use of an advisory committee in any way denigrates government employees who already are experts in the field, or those who are kept off the advisory committees because of conflicts of interest.

The issue should not be whether the government has its own experts who can do the job, but rather whether the governmental decisions will be strengthened by the addition of outside experts -- strengthened in substance, strengthened in credibility, and strengthened in public acceptance. Mr. Halpern has pointed out that experts bombard the government from all sides -- from the industry side, the consumer side, the professional side, and others. It is necessary, obviously, for those in the government to choose between the competing experts. This relates to my earlier comment to Daniel Koshland that it is a problem among scientists, not among lawyers.

I do not believe that those with conflicts of interest should be permitted to serve in the government as part of the decision-making process, and therefore, I respectfully disagree with my colleague Carl Djerassi on that point.

DJERASSI: I didn't say that they should participate in the actual decision-making process.

HUTT: This does not mean that those with conflicts of interest cannot make their views known. They can participate as an advocate for their position before the government without participating as part of the

governmental decision-making process itself.

My own views, obviously, are based upon my four years with the government. My guiding principle is that an open government, a completely open government, is far and away the best government, and that anyone who wishes to participate, including outside organizations like the National Academy, must do so in a completely open atmosphere. My paper at the first Academy Forum discussed at length the obstacles to reasoned decision-making in the government and my belief that the principal hope for overcoming these obstacles lies in procedural reform and innovation. I believe that an open and proper procedure is critical in terms of where the government winds up with respect to the substance on any particular issue, and this procedure will be the subject of my remaining remarks today.

Let me start briefly with the selection process, which no one has touched upon thus far. The formation of advisory committees that advise the government, including those in the National Academy, must be on the basis of a public procedure, not a private procedure. There should be provision for public nominations to those committees. Conflicts of interest and imbalance must be looked at very carefully. Obviously one can always get agreement on a committee if you select people with a bias towards one particular result. Instead, they should be selected to represent a variety of backgrounds and opinions. Finally, I believe that all the relevant information on the individual members of the committee should be made public -- their curriculum vitae, articles, any information on consultantships, and stock ownerships in companies that might in some way be affected by the results of their deliberations.

With regard to the specific procedures governing the operation of

advisory committees, I have evolved four principles.

The first principle is that there must be adequate public notice of every meeting of the committee. Adequate notice does not mean, for example, following the current National Academy requirement of placing notice only in the National Academy newsletter. It means use of the Federal Register and press releases, going to consumer organizations and telling them, establishing mailing lists, and making certain that everyone who has an interest knows of every single meeting.

The second principle is that there must be an opportunity for anyone to present his views orally as well as in writing at any meeting. Obviously, there must be some reasonable degree of restriction. You could not have fifty people show up and demand an hour each at every meeting. On the other hand, governmental agencies who have been living with this requirement for the past few years have found that it not a problem. It is a manageable situation.

It is important, and indeed the essence of democracy, that those who make a decision for the government or participate with the government in making a decision must listen to those in the citizenry who will be affected and wish to make their views known. This adopts, of course, the adversary process, but it is much more informal than the traditional form of trial-type adversary process in the courts. It is modeled more along the line of scientific discourse, which I believe much more appropriate for technical issues. A court trial is simply not a practical or reasonable mechanism for resolving scientific disputes.

The third principle, and probably most controversial, is that virtually all the committee deliberations should be completely open to the public. I would allow perhaps three very limited exceptions: national

security, which I confess I think would be a very limited exception and inapplicable to most scientific issues; trade secret data, which are discussed on rare occasions before advisory committees; and invasion of privacy, where one is talking exclusively about a man's reputation or something of that kind. But all other discussions of scientific issues should be open to the public from beginning to end, including the final vote of the committee on all conclusions and recommendations.

I find that secret sessions breed suspicion and distrust of government and of advisory committees. If people have something critical to say, if scientists want to criticize the conclusions of other scientists, they should learn, if they have not already learned, to say it in public and not to whisper it in private in the confines of an advisory committee meeting. If this has a chilling effect on certain experts being willing to serve the government in advisory committees, then I say good riddance to those who do not want to participate in that way. The country will be better off having people who, like other government employees, must stand up in public, say what they believe, defend their views, and not hide behind a cloak of secrecy.

The fourth principle is that all conclusions and recommendations must be given in writing, with an adequate justification and rationale in that written report. The written report should be complete in all respects, and stand on its own feet. There should be nothing that is not in that written report if, in fact, it was considered and concluded by the committee. That written report would then, of course, be subject to full scrutiny, criticism, and attack by anyone outside who does not agree with it.

The Federal Advisory Committee Act already contains some of these

four principles as requirements for federal advisory committees. That statute does not go as far in some respects as I have outlined I would like to go. The Federal Advisory Committee Act may at some point be amended to tighten up some of these requirements; for example, to make all of the advisory committee proceedings open to the public, even the deliberative portions, and to cover the National Academy of Sciences and other prestigious organizations which currently are exempt from the Act when they advise the government pursuant to contract. I anticipate, however, that it will be some years before all of these principles are adopted and fully implemented.

I have reviewed the guidelines on public access to information that were developed by the National Research Council dated September 20, 1975, in compliance with the policy that was developed by the National Academy on April 20, 1975. I find this an extraordinarily imperceptive approach to the desire of the public to participate in decision-making by the government. I believe that the Academy ought to reconsider that policy and those guidelines and that the government should take the initiative in persuading the Academy to do so. Either the Academy should follow the same requirements as government decision-making advisory committees, or else it should get out of the business of advising the government. In short, the government itself should say that the views of the Academy will not be solicited, and will not be considered except in the same way that it considers any advocate's views, unless it begins to follow these democratic principles. I do not want to single out the Academy, however, because I would say the same about any other group that purports to advise the government as part of the decision-making process rather than being regarded as an advocate for a particular view.

N. BRUCE HANNAY: Mr. Hutt has dealt with matters of procedure in the use of experts, and I want to address myself to another aspect of the use of experts, namely, the question of substance. What is that we want them to tell us or to recommend or perhaps to decide? Obviously, if our only concern were with purely technical or scientific issues we wouldn't have to be meeting in this Forum here today. Our concern is clearly with the role of experts in connection with issues that ultimately involve, in addition to scientific and technical judgments, political, social, economic or other judgments or actions. So what is it in such situations that we can legitimately seek from scientists and engineers as particular examples of experts?

The basic question we have to face is: Is it possible for experts to separate facts from opinions? Or to put it somewhat more gracefully: Can they recognize the point at which their expertise runs out and their biases take over, and political and moral or other attitudes substitute for scientific objectivity? I think the answer is that they can make that separation, they often do, but unfortunately not always. One reason that they may proceed to the point of recommending actions even when the scientific or technological evidence is insufficient is that there may be a compelling need for a decision even before we have all of the facts. Someone is going to make that decision. It is tempting, perhaps, to help it along by taking the available facts to be more conclusive than they really are. The strongly held opinions of experts sometimes blur their perception of facts. Perhaps Jacques Ellul put his finger on it when he said that "intellectuals absorb the largest amount of second-hand, unverifiable information. They feel a compelling need to have an opinion on every important question, and they consider themselves capable of judging for themselves."

There is little doubt that there has been a certain loss of credibility for scientists and engineers. Occasional excesses in statements to the public that represent opinion rather than knowledge, perhaps given through advertisements in the public press or conflicting public assertions; they are part of it. But I think equally, and of particular concern to the Academy, committee reports that lack scientific objectivity or give advice on policy in areas beyond the committee's competence are at fault. I doubt that this has reached a truly critical level, but I think we have to take warning that we are losing ground on the acceptability of what we have to say, which is too bad since most of it is sound and worth listening to. As professionals I think we would find it worthwhile to institute better quality control.

There are some who despair that a committee -- and I speak of committees rather than individuals, for the reasons that Dr. Handler referred to at the beginning, although this is only part of the problem -- some despair that a committee of experts could ever deal satisfactorily with issues involving both technological and value judgments. Arthur Kantrowitz for one has proposed that we abandon the idea, substitute courtroom adversary style proceedings so that advocates of all sides of the issue can present their viewpoints like trial lawyers, and it is indeed reported recently that the Ramo Committee plans to try this. Both of the lawyers on our panel have spoken kindly of processes that are well known to and practiced by the legal fraternity.

This is an interesting idea, but I don't think we need to go that far. I think we would do better to minimize the tendency to advocate rather than to encourage it. The appealing feature of the suggestion, of course,

is that then we can just accept bias, label it clearly, and balance opposing biases while deliberately encouraging them. But in fact, a well constructed committee contains all of the elements that are required, that is, people of differing viewpoints as well as a body of impartial and knowledgeable people to add objectivity. I am more impressed with the level of truth that I have heard in committees than I am with that I have heard in courtrooms.

What we really need to do is to use committees more effectively, not get rid of them. The essential thing, I think, is that we must ask the committees to do only what they can reasonably do well. That is, they can assemble the scientific and technological facts as they are known; they can assess these facts; they can relate them to social or policy issues in terms of options, tradeoffs, probabilities, consequences. Committees can and should assess the possible consequences of various policy options; they should state the uncertainty associated with this assessment as well as the time and cost that would be required to reduce these uncertainties. They can make recommendations when the scientific and technologic evidence is clear. I think the instructions to committees should be to do what I have just said. What the committee cannot be allowed to do is to make recommendations based on a substitution of its own value judgments for scientific objectivity. It is in this murky region that I think committees go wrong, and I am immediately in sympathy when Milton Katz suggests that the Academy advisory groups sort out, recognize and identify whether they are rendering an objective assessment or advocating a cause, and whether they are speaking as experts within their field of special knowledge and confidence or as citizens concerning a general public policy. I would add further the admonition that they should generally refrain from giving advice in the citizen mode since their credentials for

this are generally lacking. If opinions must be given, which I mainly doubt, let them be separated out, clearly labeled as opinion, and be signed.

As long as we believe in free speech, we are not going to stop some of our colleagues from going to the public with their biases. But one thing we can do is to excise these biases to a greater degree from reports issued by the National Research Council and the Academies. Valiant efforts are being made to strengthen the review system for our reports, but we can go further in this direction. Committees have to recognize the legitimate role of reviews and be prepared to accept constraints on their expressions of opinion. In this connection we could greatly aid committees by making entirely clear to them and to the sponsors of a particular study what the charge to the committee is, and therefore what it is not, before the committee begins to do its work. Committees are reluctant to abandon what they have written; and we should endeavor, therefore, to keep them from writing what they are not particularly qualified to do.

Even when committees do stick to science and technology I think we can find ways to use them more effectively. We can surely inject into the committee processes a wider variety of inputs without necessarily adding unwieldiness. Some open meetings at which nonmembers of the committee could express their views might be generally useful in this respect, and of course these are used in many instances. More explicit reporting of dissident views, even when the majority of the committee have agreed on a particular position, would make it clearer that these views have been expressed and considered. The greater degree of openness of committee selection and records seems entirely reasonable. Of course, Mr. Hutt spoke of that.

In summary, it is my view that the processes for using committees

are essentially good, but that they need some tightening. I adhere to the belief that experts will retain their status as experts only as long as they talk about things they know something about. Senator Muskie has been reported as desiring to meet the one-armed scientist after hearing "on the one hand and on the other hand" testimony. Unfortunately, political decisions clearly are taken, they may even have to be taken, before all the facts are in. But I don't think that we should succumb to the urging to pronounce judgments beyond the limit of known facts and then attribute them to science and technology or to claim expertise that we don't possess. We must continue to state probabilities and to point to gaps in the knowledge. Let the politician deal with these if he will and must, but let us not hide from him the uncertainties that are there.

ROBBINS: Thank you. I always thought that a committee was peculiarly good at constructing camels that were supposed to be horses. That seems to be an attitude which has been abandoned here.

MORRISON: We have had an account of the limitations and virtues of the committee system. But I feel that at least in the past decade or two, since the time we have had most of the discussion about public advice from scientists, the chief complaint about committees that I detect from those people who point with great vigor and considerable merit to the establishment nature of scientific advice has been not the anxiety of the committees to appropriate to themselves moral judgments or nonscientific judgments. That has occurred certainly, and I think it has occurred with relatively good results. It goes back to the days of the General Advisory Committee of the AEC, which Professor Bethe mentioned. Recent studies have been made showing, for example, that the famous H-bomb report, had

it been carried out, would have left the situation at least as good as we are now because there is no way in which that report could have been used more poorly than it was in fact in the political circumstances.

But I think the principle complaint has been rather the opposite, that scientists accused by their worst antagonists of concealing the facts were probably persons who were simply insecure outside of their own disciplines and therefore not willing to agree in writing and who have neglected to carry the conclusions to the less certain but probable or possible externalities, the side effects, the bad circumstances that might but wouldn't necessarily arise. On the whole I think that has been the principle attack -- the narrowness of their judgments, not the over-width of the judgments. I absolutely agree that nobody could conscientiously serve on such a committee and try to say we know for a fact some consequence that was not at all established. But to say this decision or this process or this construction implies the following possible side effects or dangers or mishaps would be very worthwhile; to say we don't know these and can only poorly assess the problems; to say here is where study, research and other groups are involved -- all would be useful. Don't you feel that particular error is at least as salient as the error of broadly painting the consequences without reference to the expertise on which the judgment is based?

HANNAY: I think, by and large, you are agreeing with what I just said, namely, that we must encourage the committees to state these uncertainties and to evaluate all of the options in terms of the uncertainties and the consequences that would ensue. There is, however, in some reports a tendency on the part of committees then to sort through these and decide

which of these options is the one that they would favor for reasons that are known best to them. If you go back and comb through the details you discover that they may be arranged to lead up to that conclusion and that is where I would say the committee has lost its objectivity. That is, having reached their conclusion, did they really try to marshall all the evidence and make it all lean the same way so that it would seem plausible as a conclusion? I would be much happier if what emerged from their report was a much more neutral statement of the various options in terms of what the consequences might be. I don't want them to omit any of the consequences, I don't want them to imply that the uncertainty is less than it is, in support of a particular conclusion that they may state. They may be correct about it, and they may feel very strongly. But I think they should be very careful to avoid that kind of bias. I think that is what the reviewer can spot because the reviewer isn't committed to the same view that the committee is after long hours put into writing it. The reviewer looks at it afresh and says -- Do I see any evidence of that kind of bias in here? I think the review is what we are going to have to rely on very heavily, in the reports that, for example, the Academy produces, as a way of avoiding that kind of bias.

HUTT: I would carry this one step further. I have far, far less concern about outside experts called in to advise the government including policy and value judgments in their conclusions as long as they clearly are stated as such. To ask outside experts who have delved into a particular area in enormous depth -- usually far greater depth than the government can do because of its limitations, as has already been pointed out by Mr. Seaman -- to stop at the threshhold of the decisional process is, I think, extremely

unwise. It may be that the government administrator will ultimately disagree with the value judgment that is made by the advisory committee, but he ought to have the benefit of that value judgment in making his decision. In this respect I disagree with Dan Koshland's earlier comment that you need outside experts primarily where there is a discernible body of technological or scientific knowledge to be weighed. I think you can also use outside experts where there are simply difficult judgments and moral values and where people can be brought in who have background that is relevant to the questions involved.

HANNAY: The kind of thing that disturbs me is the analysis that is carried to the end of the logical process, as far as the science and technology are concerned, and is then carried on further. I have specific cases in mind, where, let us say, a cost-benefit analysis is done to allow the kind of decision that ultimately somebody has to make. But, in fact, the costs may be a straightforward process, and limited only by the quality of the data that are available, but the benefits are very subjectives ones. The benefit to me and the benefit to you may be quite different from what is put into that analysis, yet it is used and put forth as a basis for a final recommendation. I think that has gone too far at that point. I think the committee has substituted its value judgment. Let anybody put in any benefit that he wants under those circumstances, but I don't think that the committee has any insight as to what the value of a human life is, or any other purely subjective benefit.

HUTT: I think the committee can give its judgment, recognizing and specifically stating that it is only a judgment which is subject to review by others.

BLAIR BOWER: I am an economist, engineer, and consultant to Resources for the Future. I serve on two Academy panels, which by today's definition automatically makes me an expert. I would like to pursue Mr. Hutt's line of recommendations concerning the selection process for experts. I think Dean Sunderland has raised a very critical issue about the problem of selection from the bottom up that faces the individual in society. But I don't expect the panel really to come to grips with that issue. I do think that it might come to grips a little more with the process of selecting experts in the various contexts in which it takes place. These contexts vary from the legislative committee established by Congress, for example, at the federal level, to the various administrative or executive advisory committees established at that level, on to the various committees and panels established by the august National Academy of Sciences, and the various committees established at state and local levels. I also would suggest that if the term expert is meaningful, it would also then include the so-called consultants selected at all levels of government to advise the government on various issues.

My question then to Mr. Hutt: Would you broaden the application of particularly your first provision, with respect to how the selection process works? In making it open would you require and specify that this is the procedure under which a committee should be selected: namely, all candidates nominated in the open with the further requirement of going to various groups, industry, public interest groups, academic community, professional associations for nominees, and so on down the line? Would you also have the same kind of provisions for the selection of consultants to government agencies, as perhaps the state of Maryland suggests might have been somewhat desirable in terms of what we have seen over the last few years?

HUTT: With regard to your first question the answer is clearly yes. I think that all government advisory committees and all advisory committees that are used by the government under contract, which includes the National Academy and the Federation of American Societies of Experimental Biology, should be chosen in that way and subject to the procedures that I outlined. Some government agencies are already doing that, namely, soliciting nominations through a public notice in the Federal Register. Of course, selection of those who will serve on the committee, from among those nominated and others not nominated, must be the responsibility of the official convening the committee.

With regard to individual ad hoc consultants, I think that use of the same public nomination procedure might be too cumbersome. An individual consultant is often simply called on the telephone for an opinion. It is not a terribly formalized concept. Consultants are not used in the same way as an advisory committee. I have not thought this aspect of it through entirely, but I believe it would depend on the way the consultant is used.

BOWER: If I may, Mr. Chairman, just respond to that. There are many cases in which a government agency hires a consultant or a consulting board: for example, the State Highway Commission in Virginia, in pressing its particular view as an advocate, incidentally. Your first statement suggested when you began that perhaps only the public interest groups were advocates. I am sure you would agree that many government agencies are advocates of particular positions. Given that, which is normal behavior pattern of institutions in any society, when the government agencies do select, for example, an environmental consultant or a set of engineers to advise them on the design of a highway system, they are in fact hiring advice

formally and often with large expenditures of money. But that selection process takes place essentially behind closed doors.

HUTT: And I think that is incorrect. I do not believe the government should ever get in the position of becoming an advocate in that way, where it goes out and does what Mr. Halpern described, namely, it shops around for the scientists that agree with it and selects a lot of them in order to arrive at a one-sided position. If the government is doing that at any level, federal, state or local, it is making a major mistake. I think it should always be in a position of judging on the basis of a balance of opinion and not trying to set up a predetermined result.

KOSHLAND: James Thurber has a recurring nightmare that he wakes up in the lobby of the Waldorf Astoria in only his pajama tops. And I have a recurring nightmare that I am going to end up on a platform arguing with Peter Hutt. Some scientists have a little concern about turning everything into an adversary procedure and not just because they are unwilling to be in a fight; I think a lot of them enjoy combat. But just as the scientist has to be educated to learn about the public process, the public has to learn about the scientific process. De Tocqueville said many years ago that the public will always believe a simple lie in preference to a complicated truth, and that is emphasized in an adversary process. Maybe the current SST hearings are an example of a good adversary process. Each of us can express our annoyance at sonic boom, so the citizen needs no experts. On the other hand, in the case of cyclamates a preliminary report (which all scientists know is very tentative) is published in which we are told of rats being fed thousands of times more cyclamates per body weight than any human will ever consume and a few of these get cancer. Suddenly the Commissioner

is pushed by the public excitement to make a decision. Maybe the courageous decision is to say that we just don't have the data, and, in spite of this one little report, we shouldn't make a decision until the data are available. Isn't that one of the problems of publicizing too early?

HUTT: There are benefits and risks to everything. You and I would agree with that. Clearly, if all advisory committee proceedings were opened up in the way I advocate, it would have risks. There would be a chilling effect on some discussion. Some otherwise very useful people would decline to participate. Things that are said in a preliminary way by individuals could be misquoted or quoted out of context or quoted accurately and blown up into newspaper headlines, and panic the country. Those are all dangers.

Indeed those dangers exist today in view of the massive amount of information that is leaked out of the government and gets into the newspaper headlines before any final resolution of a complex issue is made. I have learned to live with leaks. They happened to me every day.

On the benefit side, though, you have the credibility and public acceptance that comes with an open government. Where I come out, on the basis of four years of living with these risks and benefits every day of my life, twenty-four hours a day, is that the openness and what comes with that is worth the dangers that all so necessarily accompany it. It is not a black and white situation, however, I would never pretend that.

HAIRE: I would like to say that although the government professes that they want consumer involvement in these committees, our particular committee has never had more than eight days notice. If the scientist were asked to participate in the government committee, he would probably be given

a month minimum notice. But when the consumer is asked to participate in any of these committees, it is not often more than a one week notice.

ROBBINS: You are implying something that I don't think is true, namely, that a scientific member of the committee is treated differently than another person.

HUTT: You are talking about something that is clearly not within my knowledge at the present moment. I do not recall any special treatment ever being given to the members of any committee who were scientists as opposed to consumer representatives or industry representatives. They were all told on exactly the same day when the committee meeting would be.

HAIRE: The other thing I would like to comment on is the composition of some of these committees for the FDA. I am sorry if I dwell on the FDA, but that is my area of specific interest. The obstetrics-gynecology advisory committee of the FDA, which is considered its panel of experts on obstetrics, is composed only of obstetricians. There are no neonatologists, no pediatricians, no behavioral scientists and obstetrically related --

ROBBINS: As a pediatrician I deplore it.

HAIRE: Let us hope we can do something about it.

HOWARD GREYBER: I am a scientist and consultant. My question or comment is really aimed at Mr. Jencks. Since you represent the television you would be a whipping boy or something. The point I am making is that we have a great deal of pessimism today in the world and among the American people. Part of that comes from the notions of limits of growth, of doom, that we must economize on energy. Most of this comes from people of very well meaning in ecology and environment, and from even a few physical scientists. As Professors Morrison and Bethe certainly know, mankind's

use measures zero compared to the energy sources in the universe and even those roughly accessible on Earth. I wonder why commercial television could not take over more effort to acquaint people with the way the physical scientists at least see this. We may be going through a temporary shortage over the next thirty years; but I would venture to say that in forty years from now, 2016, the United States alone will be using twenty to eighty times its present consumption with no particular ill effects necessarily if population is limited and certain obvious cautions are observed. I would like to see some of the optimism that is reflected among most physical scientists given on a medium that at overwhelmingly by one or two orders of magnitude is the one that communicates to the public.

JENCKS: If I understand you correctly, the charge is that in our news judgments, or in the news judgments of the media generally, the knowledge and opinions of physical scientists as to energy and the use of resources and so forth are not fairly reflected.

ROBBINS: Maybe you are not using experts properly.

JENCKS: I am in no position to agree or disagree with that. News judgment, of course, is not quite the same as scientific judgment. Nor do I believe necessarily it should be. I do think the media have been fascinated by what might be called the consumer revolution; they have been fascinated by the concern about the environment. The development of concepts like zero population growth, I think, has been largely contributed to by the fact that the media has caught this fever and transmitted it. Some, including I suppose many in this audience, will think that the media in that respect have done a great service for mankind, and others will disagree. There is in any running news story of great appeal an element of sensation. Oscar Wilde

once said that nothing succeeds like excess, and that is probably true about the reporting of new and arresting developments. I make no apology for it -- I merely observe it. I don't know of any way, however -- and I don't understand your suggesting a way -- in which the media can, as it were, scientifically validate or exactly reflect opinion in the scientific community or for that matter in the political community or any other community.

DJERASSI: You can do that easily because what I object to is the quality of that coverage and not really whether it is done. The media can go to the trouble of consulting with more than one person rather than just selecting one nugget of information without really offering a balanced account and usually quoting it quite out of context.

I also would like to respond to Peter Hutt. You talk here about the adversary relationship, that this is really the nature of the government process. Frankly there is nothing new about this; it is also the nature of the scientific process. It is a more civilized adversary relationship than the adversary relationship to which you refer, but it is part and parcel of the scientific process, and therefore scientists would not object to it. In fact it is indispensable when you talk about any of the prospective problems that I referred to earlier. And here I don't object to many of the things that you have pointed out -- public notices, publication, open meetings -- I buy all of this with great enthusiasm.

However, you don't really quite practice what you preach, for instance, in the FDA. I am not suggesting that you should get people with potential conflicts of interest and have them make the decision. Of course not. The decision finally has to be made by someone -- in this case by the FDA Commissioner. But I think you are selecting the information in your

advisory committees. You exclude categorically a very important group of people to whom I have referred as the people who have had practical information. They are not present there; you treat them basically only as advocates and even discredited advocates; you are not considering them as equals in advisory committees. This is one place where the government is making a gross mistake. Regulatory agencies -- notably the FDA and the EPA -- have long passed just the role of a policeman or the protector of the consumer. This is an important function that I, the consumer, would not want to eliminate, but they have gone way beyond this and have now an enormous impact on research. nd they have that impact because of legislative mandates. Yet they do very little about this in a prospective, policy-directing way. They say what research does or does not get done. You are talking about your ob-gyn committee -- why does the FDA not have a committee that wonders why the only new developments in birth control that occurred in the last twenty years addressed themselves to women? In other words, why is so little being done on male contraceptives? This is a question that the FDA should ask, but never does because the FDA does not really worry whether anyone is working on that problem or not.

In 1973 I made a formal proposal in the only editorial I ever wrote in Science. At that time Mr. Hutt was still working for the FDA, and I sent it to him. I don't know whether he remembers the reply, but I will remind him of it. The editorial said that it should be necessary for regulatory agencies to issue research-impact statements just as these agencies request of others environmental-impact statements. The research-impact statement to me is one that advisory committees and regulatory agencies and others should always consider; namely, if we take this and that step, what impact

may this have on the research that is societally and socially important, that may not get done as a result of a given regulation? Regulatory agencies have never paid any attention to the impact of their regulatory role. This is a form of discipline, an intellectual one, that I think would be of crucial importance. When I sent this letter to Mr. Hutt, his reply was that of a bureaucrat, namely, saying that he did not want to have more bureaucracy to deal with. Sometimes you need a little bit more bureaucracy.

ROBBINS: One further comment from the gentleman who started all this --

GREYBER: I did not suggest a solution for the use of media, but the point has been made that many network news people have a prejudice against this. It has been said that if nuclear power had been developed first and you started promoting coal with the present attitudes that are overwhelmingly projected on the news media, coal would never have been developed because of its obvious terrible disadvantages -- smoke and a hundred others. The general optimism that forty years from now you may have, for instance, a significant production of energy from fusion power in the year 2016 well within the lifespan of some of the younger members of the audience could be presented on television and would counteract this sense of pessimism that is so extremely popular today.

EMILY SWET: I don't belong to any organization that I wish to align myself with right now. I am speaking as a private individual. Several months ago we got the outline of this series, and I found myself thinking about it while doing a tremendous amount of driving during the week. I came today because I was afraid that perhaps one point of view was not

going to be expressed. I hear glimmerings of it, but truly the thrust is generally or really strongly against it. And that is there is a thing called a private individual, and the world is run for that individual. My ancestors in Philadelphia, Philadelphia lawyers --

ROBBINS: You are very brave to let that out.

SWET: Though I am not sure they were all lawyers at that time, there were some back before 1776. In my lifetime I personally have experienced a tremendous change in attitude from those that I grew up with in that Philadelphia lawyer context and the feeling that the individual is the most important thing. I don't quit know how to explain it clearly. But, back in 1776 the people who ran this country were people who were very capable, very ingenious, and who educated themselves. Education was quite easily available to them. They could go out and subscribe to the library, receive a box of books, and just sit down and read. If they had a question they knew that Dr. Rush was around the corner, and they would go down and ask it.

ROBBINS: By the way, he gave them very bad advice.

SWET: He did the best he could. Today that is no longer true. Many, many more people are educated, and you would think that they could find out more. But there is this conspiracy of silence. I am glad to hear a number of people today speaking about the importance to have open meetings, open information. But there is something that is still hidden, and that is this bias which guides the interpretation of all this information. It is not biased toward the individual. When we worked on the electronic battlefield, it was all very technical but nothing was mentioned about what was happening as a result of it. Never, at the time of such studies, do we hear the strange details about what happens to humans when they are maimed by bombs, or what

happens to someone who is living in West Virginia near some of the paper companies, or what happens to me as I drive back and forth and am exposed to a lot of the problems as a result of vehicular traffic. I would like to hear more of what Dr. Hannay mentioned -- the absolute result of all these studies, all the disabilities, all the strange problems. If we have ideas which may indeed be good ones, but which may have some very bad side effects, is it possible that we might restrain ourselves from the commercial push? This is a commercial nation, it grew up as a commercial nation. But is what is best for commerce what the individual really needs? Sometimes we need to be able to restrain this push for research and be willing to wait another few years. Red dye has been studied for over twenty years. Now we find that there may be a question about it. Perhaps it is better if there is a question not to use these things, not to implement them, but to wait until we have decided without feeling that it is a question of money or time. Time is a strange thing; you can't quantitate time. Sometimes the decisions are made --

ROBBINS: It is possible to quantitate time, and I must quantitate yours --

SWET: I just want to finish this last thing. Sometimes a decision is made because there is a push for it to be implemented right then, and it turns out to have been one that was unnecessary twenty years later.

CLAIRE NADER: I have a mixture of comments and questions. One extends the remarks of the last speaker in a sense that we have been talking about the inadequacy of the composition of advisory committees. I would like to comment about the inadequacy of the composition of this particular panel, because although we are talking about the citizen and the expert, I really see all professionals on the stage, including public interest professionals.

This amorphous body called the citizen has been talked about as being at a disadvantage in the variety of ways, and I agree that the disadvantages are pretty large. On the other hand, we mustn't forget that there are some citizens who have taken action and who have dealt with technical information, starting with economics and extending to engineering, who have managed to ask their questions and bring the technical information to bear that they needed for satisfactory answers.

You could have invited, for example, June Allen who is very active in the North Anna coalition, who tried to make a statement about the geological information associated with th North Anna plant, and whose group, as a matter of fact, succeeded in, or was vindicated in, its position when the nuclear regulatory commission fined the utility $60,000, I think, for misinformation. I don't know if they put it as directly as to say that they lied, but they did say misinformation. So she could have been on this panel and enriched the discussion in quite an interesting fashion. I have the feeling that many of the panelists and other panels of this kind are really divorced from the field activities that are going on, and I wish that we would start at least in the design of the panels to consider all the members that should be there.

A comment on the press -- that it can be mischievous, or that the media can be mischievous. Of course we all can be mischievous. Members of the professions represented on the stage can be and have been mischievous. I would like to say that the coverage can be improved. On the other hand, there are instances where it is really quite good. Recently, when FDA Commissioner Alexander Schmidt was on "Face the Nation," the three questioners from the media were really quite well-informed about their subject matter. What you

got was a pushing, investigative questioning, and even little speeches on the part of the questioners bringing out additional information. When the viewer finished, he or she felt that they had some better understanding, that the issues were joined on the questions that faced the Food and Drug Administration. In that you have to credit, really, the questioners in having done their homework.

A third point and my last has to do with performance standards. Fun has been poked at the law. However, the bar associations discipline their members when they go beyond the standards that the bar has set for itself much better than the members of the scientific community, perhaps because they have had to. I think one of the issues concerning any discussion on citizen and expert has to do with the increasing problem of what does the scientific community do about its members that go public, in a sense, become politicians for their particular technical viewpoint, and where they do not say, at the same time, that they are advocating a technical viewpoint, where they do not say what the limitations of their information are. Here we are talking about mechanisms to discipline that kind of discussion. Your peer review in the technical community has been pretty good when it had to do with chemistry, physics, biology, and so on. But when it has to do with biopolitics or physiopolitics or psychopolitics it becomes more complicated. Here also we have some precedents. When the National Academy of Sciences was doing a study on the effects of herbicides in Viet Nam, some members didn't like what was going on, dissented, went to the AAAS for a countervailing study which was undertaken --

HANDLER: No, that is not the right history. I am sorry. You can't say that --

ROBBINS: That is Dr. Handler back there, the President of the National Academy of Sciences --

NADER: I think we can say that the fact that two studies on the same issue were going on helped discipline both studies. If we can't give it as an example, if Dr. Handler disagrees, I think we can say that if you have countervailing studies like that you are likely to get closer to the truth.

DELANO MERRIWEATHER: My name is Delano Merriweather, I am a physician who happens to be a government employee. I would like to make two comments that do not necessarily relate to my occupation. The first is to underscore the statement that was made earlier as to the value of a broad representation, particularly if we are to interpret the purpose of this and other conferences to reflect the thinking in the perspective of all Americans. I don't think that I need to go into detail but this is true particularly with respect to the scientific community. It is important that not only the information be interpreted accurately, which all of us can do, but it is important to find a perspective based on one's experiences, background, economic and social interests that would be helpful in giving a broader perspective to the decision-making process.

My second comment has to do with the fact that I am very concerned about the attitudes toward committee activities and what we consider to be a democratic process. I get the feeling that there is a growing concern in committee activities for the membership not because these activities are perceived to be a forum in which advice is given, but as an outgrowth of suspicion that individuals have in protecting their own interests. I think committee activities and their purpose should be based primarily on the advice

that can be achieved by having various inputs and that their activities not be concentrated primarily or solely on protecting one's personal interests.

ROBBINS: Thank you. Dr. Handler? I will apply the same rules of length of time to you --

HANDLER: I only want about sixty seconds. I have listened very carefully this morning. I guess if there was someone with whom I could easily identify, it was Emily Swet. But my Philadelphia ancestors also taught me that the host is polite to his guests and therefore I will not respond to much that I have heard although I was tempted to rise on several occasions.

I think, for example, that Claire Nader and I would be considerably at odds. I thought that that television session involving FDA Commissioner Schmidt and three questioners was a travesty. I thought it was one of the ugliest moments I have every seen on our television. Three reporters, all with negative attitudes, used rhetorical questions to badger a gentlemen who could not defend himself under the circumstances. He had to be polite and decent and respectable, and he was. I thought he was remarkable, I thought they were merely unpleasant. And the audience was not one whit enlightened by the experience.

[The following material was added in proof.]

It seems only fair to indicate some facts about the two studies to which Miss Nader referred.

1) The AAAS actually commissioned their study more than a year before the Academy was asked by the Congress to examine the effects of herbicides in the Viet Nam defoliation program. Miss Nader's statement regarding this matter is completely fiction and most extraordinarily misleading.

2) The only report of the AAAS study appeared in Science before

the Academy study was organized. Dr. Meselson, principal author of that report, voluntarily assisted the Academy committee in numerous ways and they were grateful for his assistance.

3) Dr. Meselson later served on the Report Review Panel that critically reviewed the Academy report. The Academy study was far more detailed than that which Dr. Meselson had opportunity to conduct. To the extent that both examined similar aspects of the possible effects of herbicides in Viet Nam, the two reports were in general agreement. The Academy report took exception to some speculations by Dr. Meselson, made elsewhere, that herbicides may have increased the incidence of birth anomalies.

4) A major aspect of the Academy study was an assessment of the extent of damage to inland forests that had not been accessible to the AAAS group. The estimate of this damage made by the NAS study team was challenged not by the AAAS "countervailing study" (completed long before) but by the NAS Report Review Panel. In the end, this led to a relatively minor upward revision by the study committee of the extent of damage (assessed as loss of potentially merchantable timber), a change of little meaning when contrasted with the picture of harsh ecological damage to the less densely forested areas already contained in the report.

Countervailing? [Conclusion of material added in proof.]

I asked for the microphone, however, because I am concerned by the suggestions that Mr. Hutt has made here today. He left out of his discussion several important notions. To begin, let me assert that somehow there must be institutional responsibility for advice given to the government. The system which you described, sir, is a great way to run the United States government and may be a fair model for the FDA. But it is not a model for

the National Academy of Sciences. The facts of science are not to be established by votes from "interested organizations." If you wish to have a vote as to the value of π, you may do that -- but not inside this building.

We choose the members of our committees with extreme care, but not so as to create a participatory democracy. This is an elite organization, sir. We go to great care to elect the members of the Academy, and our advisory activities are guided by their experience, their understanding, and their insights. We rely on them to distinguish good science from poor science, high scientific competence from mediocrity. To appoint our committees by accepting nominations from diverse other organizations is to give away the only special asset we have in this building.

I knew why Carl Djerassi was a great chemist long before he was ever appointed to a committee of this institution. And it was because of his remarkable chemical insights and knowledge that we would seek him out. But that is not the basis for a participatory democracy. With respect to purely technical matters, and there are such and they can be identified, some people really are more equal than others, and we wish to make use of them. However, we make no attempt here at the Academy to pretend that we are the decision makers for the United States. We are a voice, not the voice. We provide our opinion concerning the facts by a set of institutionalized mechanisms at which we have worked very hard. We have gone to great lengths to remove bias from our reports where bias can be identified. We are not always successful; it would be foolish to pretend that we are. But we go to great lengths to try to remove bias, to assure that no systematic prejudices are built into our reports. And we do our best to eschew value judgments. We render our technical reports to the people of the United States

and their government and let them bring all the disparate values of the United States to bear in finding decisions. It is this sense of institutional responsibility, this insistence on scientific excellence of which I would like to remind you, because in your four points you made no room for it whatever.

ROBBINS: Mr. Hutt will have a chance to comment as we go around the panel, but this lady wishes to make a comment very briefly.

ELLA FILIPPONE: I find it is very difficult to follow Dr. Handler, needless to say. I guess I am the citizen here. I am the Chairman of the Passaic River Coalition, and I came here from Basking Ridge, New Jersey. We have a multidisciplinary team of scientists who work with us on land and water resource management. Before coming here I read the brochure to them and asked who in their view should have a greater voice -- the citizen or the expert? And my experts all said, "Naturally, we should: we are the scientists; we know more." I, not being a scientist but a social scientist, feel we should also have a voice. It seems to me that today I came here, spending the limited funds we have, as has been mentioned, to begin to learn how the Academy can better relate to the citizen, how we who are working to the benefit of three and a half million people in the most densely populated part of the United States can call better upon the resources of a prestigious agency such as the Academy and make participatory democracy work. For ten years I worked here in Washington and preached much of what we have heard today. But I think that the institution, whether it be this one or another one of high standing and high calibre, must reach out. My question to a very distinguished panel is how are you going to reach out to the many citizen organizations who need your guidance, your assistance and sometimes

possibly that professional ethic that should be established of the ethical scientist-citizen who sees the truth, or at least searches for it?

ROBBINS: I am not sure we are going to be able to answer you perfectly because we do not speak for the National Academy even though we are meeting in its building and under its auspices. But as we go around the panel we will see if we can extract from them something useful to you. Can you speak very briefly, sir?

CARL BAKER: I spent many years at NIH in cancer research and would like to bring up a point of trends that concern me a good bit and the increasing popularity of participatory activities at lower levels in government. I am all in favor of the broad participatory activities at higher levels. But on technical subjects such as cancer research we have so much participatory activities now I am having trouble seeing that we always have cancer expertise. So even within government at certain levels, Mr. Hutt's approach and certainly the adversary roles seem to me to have been increasingly diverting us from focusing in on solutions of certain technical problems because of this increase in the participation and adversary roles. I remember Krebiozen very well and the proposal that we select a tribunal to vote on it, which seemed to me to be very much like voting on the value of π. So I wonder if the panel would have anything to say about the upside-downness of this, the introduction of nonexpertise into technical matters.

ROBBINS: I am now going to ask each member of the panel, starting with Professor Bethe, to give us a brief summary. If on some of these last questions you have comments that are pertinent, please be brief.

BETHE: Listening to both Mr. Hutt and Mr. Hannay, I could agree,

more or less, with both of them. I think what Mr. Hutt said about freedom of information and openness is very important. At the same time I thought Mr. Hannay had a very important point that committees should separate clearly fact from opinion, but that they should not refrain from giving opinion when so designated. In fact, I was rather troubled by the quote from Mr. Lippmann, which Dr. Handler gave at the beginning of this session, that the expert should not care what the decision will be. I think this would be a very sorry human being who doesn't care what the decision will be, and I don't remember any case in my own expert time where I didn't care. I think the expert should care, but he should clearly distinguish opinion from fact.

JENCKS: I think we are all in agreement that we need to improve the transmission of expertise, particularly at the government decision-making level, because our lives and our fortunes depend upon it. I think, in this discussion of how to improve it, that there is a tension between two ideas. One idea is to refine expertise and validate and legitimize experts to a greater degree. But the danger of this is that it creates the possibility of forming a closed system, an establishment, an institutionalization of truth. And in this country we have always striven to avoid the creation or the sanction of any form of official truth, the more so, of course, where scientific inquiry is involved.

It does seem to me that there ought to be -- and here I would agree with Mr. Hannay -- a greater scrupulousness in confining the expert to the field of his expertise. As a citizen, if he feels and cares deeply -- as we hope he does -- he can find another forum in which to express his views on the value judgment, perhaps, for example, before a congressional committee, where he will be welcome. But he should not confuse the forum

of his expertise with the forum of his political views.

It does seem to me that the media and others, including the schools, should better ground the public with an attitude toward science and information which will be responsible and which will be skeptical. Finally, I think a certain chaos and confusion is better than too much structure, too much refinement in this area. Our strength as a nation, including in the scientific field, has been due to our diversity and to our contentiousness. The best protection for us in the long run is a reasoned skepticism and the improvement and opening of our procedures.

HALPERN: There was a theme that ran through many of the comments today and was very sharply focused by Dr. Handler and the speaker immediately after him. Dr. Handler made it very clear to those of us who are not scientific experts that we are <u>his</u> guests in <u>his</u> building. We non-elitists who come in should enter with an understanding that the relationship is that of guest and host. The next speaker asked what the Academy is doing about outreach. The answer, of course, is nothing. The door is unlocked, and if you come in here and you understand you are a guest, then you are welcome. Nobody put the issue as sharply as Dr. Handler, and I am grateful to him for that -- as well as for his invitation to come into his building.

The issue was less clearly drawn, I think, by some of the other panelists, but there is an issue there and a terribly important one. I would suggest a spectrum on which you can organize many of the agreements and disagreements among panelists and audience with these two ends to the spectrum. At one end is a model that encourages maximum interchange between citizen and expert with an implicit recognition that you cannot separate out scientific issues from value issues, that these things are intermixed,

and that there is a vital and urgent interest that the citizen be educated and informed and have experts available so that he can understand these issues.

And at the other end is a model of experts drawing into their own closed circle. As Dr. Hannay described the scientific committee, I lost sight of the fact that we are here to talk about the citizen and the expert, because he was talking about how you organize the expert community. According to the model, the expert community organizes itself; it limits itself to a very narrow range of inquiry; and it presents its jewels of wisdom. The government or the citizen or anyone else can pick them up if they will.

I prefer the more open process. Let citizens and experts interact with each other in a much freer and more egalitarian manner. This does not mean we have a popular vote on π, but it does recognize the competence of citizens to deal with experts.

KOSHLAND: This panel has been a delightful education for "hard" scientists like me who really don't like to discuss anything unless we can study it to two decimal places. We are faced with the situation that we really do have to make decisions without all the data and interact with even lawyers and public interest groups. Lawyers and the public will have to learn that even the best procedures may not be as good as some solid facts. I think that in the long run this combination of fact and adversary proceeding is the way the country is going and possibly has to go. We are really learning something very new: how to make decisions in a public democracy on very complicated technological issues. I am very hopeful that sound decisions will be made if both the citizen and the expert are tolerant of each other.

BRAND: I could add a report I have heard about the use of committees

and truth. I understand there was a study done on the Delphi Technique, which is a means of predicting the future in a particular, say, technical area like computer science by polling a number of experts in that area to predict what is going to happen in the next ten years. There was one study that was done where there were enough experts to do a double polling. They asked one set to come together and confer for several days and come up with a set of their expectations of what was going to happen in this area for the next ten years. Another equal set of experts who knew more about it than the first set were contacted by letter and telephone and asked to send in their individual opinions about what was going to happen in the future. This was then put in a file for ten years. The dramatic opening of the file ten years later found that the people who had been individually polled and not brought together were far more accurate.

MORRISON: An even older society than this one has as its motto, "We do not trust words alone but must deal with what goes behind them." I think that is going to be the judgment, at the end of 200 years or 300 or 400 or whatever it may be, of the relationship between experts and citizens in this republic and all others.

There is another spectrum, besides that of Mr. Halpern's, that has been very much in the background here, and I want to elucidate it just at the ends. It is the relationship between substance and process. It is quite clear that we feel differently about those things, and it is clear also that these are interacting strongly: there is no permanent substance; there is no absolutely perfect process. But I feel that it is indeed not by words alone, but by the judgment of the citizenry -- who in the end maintain all our institutions and ourselves and educate us and to whom we

are beholden -- who through their own experiences, the substance of life, will determine what is said about advice. We are going through a peculiarly bad period, because looking back to the past twenty years, looking ahead to the next ten, we don't have that substance of success that might have been the case at the glorious time when Captain Cook sailed through the American blockading forces. He carried a letter saying that he was on a scientific expedition, and the American Navy let him through, because after all, who would attack a scientific expedition. Now I am afraid all the radars of the navies will be aimed exactly at those people. It is not that the science has changed all that much. It has become more powerful, and around power we are clustered with difficulties that we have tried very feebly to deal with in a context that I think does represent some small effort on the part of the Academy for an outreach.

HUTT: I would like to pick up on the comments on process versus substance. I said earlier, and would like to reiterate, that process is extraordinarily important today to the citizenry as a whole. If we look back, particularly at what has gone on in the highest levels of government in the last few years, procedure has been the great failing of the country -- the inability to find out what is going on and to remedy problems that, if brought to light, never could have occurred in the first place. So perhaps, as I pointed out in my remarks, a lawyer looking at these types of issues uniquely focuses on process in terms of straightening out problems that we have all seen occur.

I would like to respond briefly to one of Carl Djerassi's points, on the need to bring into the process people with unique practical information, and also to the comment of several individuals in the audience asking how

the ordinary citizen can participate. The Food and Drug Administration has attempted to encourage industry and consumer participation on advisory committees in a way that has been uniquely successful and could be applied in other areas. In addition to the usual use of independent experts on an FDA advisory committee, in the recent past there have been two additional people on each advisory committee as nonvoting members: someone selected by the industry that is affected by the work of that advisory committee, and someone selected by representative consumer organizations since consumers are also affected by those decisions. They are full members of the committee except that they do not vote. They participate in all the discussions and bring the practical experience from two somewhat different viewpoints, those who produce and those who consume. It has been, I think, an eye-opening experience for the scientists in the group and certainly for the regulatory agency. It has been successful beyond the agency's wildest hopes. And it gives an idea of some innovation that can be tried to bring together these divergent groups in ways that Dr. Koshland and Mr. Halpern have talked about.

Finally, I would like to respond very briefly to Dr. Handler and his concern about my attempt to dismantle the National Academy of Sciences.

HANDLER: Lock the doors.

HUTT: It was pointed out to me last night that the National Academy started as solely an honorific society. Perhaps it might be better eventually if it returned to that function and got out of the business of advising the government. It is at least possible to postulate that the Academy ought to go back to being solely an elitist organization, where the members would meet and talk among themselves, and would not participate, as it does today, in governmental decision-making. Dr. Handler, no matter

what you say, that is what the Academy does when it issues its reports; it is directly participating, and looked upon as an element, in government decision-making.

HANDLER: I said we are not the voice and there is a different way to handle the decision-making process from an input.

HUTT: I understand. But the impact of an Academy recommendation -- which is, after all, viewed not as being an advocate's recommendation, but rather that of an independent expert body -- is quite different from the way that a consumer advocate viewpoint or an industry viewpoint is received. I think we all have to understand that.

With respect to democratization of the selection process, all I was suggesting is permitting people to make nominations. I was not suggesting that the public at large vote upon who should be on Academy committees, just that some consideration be given to nominations by the public. Outsiders do sit on some Academy committees. I see no reason why public nominations would destroy anything in that respect.

The same considerations apply with respect to paying more attention to conflicts of interest. Dr. Handler himself has recognized that as important.

Interestingly, Dr. Handler did not touch upon the question of open discussion. I find that it is the scientists, not the government employees, who are concerned about open discussion. We will have to pursue that at some other time.

Finally, Dr. Handler mentioned institutional responsibility. No one has suggested that there be a public vote on Academy reports, much less on mathematical computations. Once there has been open committee

discussion and voting upon the committee recommendations, the Academy could continue to use the same review process it has always used. Indeed, Dr. Handler would retain his full ultimate responsibility for each report.

In short, what I was urging was a change in process and procedure, not substance. In my judgment it would strengthen the Academy, and in no way do it harm. I say that from the standpoint of a person who has been serving on an Academy committee.

DJERASSI: The lawyers on this panel and the "citizens" in the audience are unhappy about the arrogance of scientists in general and the Academy in particular. I myself am rather unhappy with the arrogance of these same lawyers and same citizens who are not willing to afford me the privilege of considering myself an honest citizen -- not an expert or scientist, but an honest citizen. It is for that reason that I would like to defend Dr. Handler's position with respect to the Academy. The Academy, as he pointed out, is not the ultimate body, it is just one exceptional group of experts. The topic of this panel was not to discuss the role of the Academy -- we would have discussed it very differently -- but rather the role of experts in general. But let me point out why I think the Academy mechanism is an exceptional one, a unique one, for people like myself.

I consider myself an honest citizen, and I say this with great emphasis. Yet frequently I find myself excluded by groups like the ones that are sitting here in this audience, just because I happen to be contaminated in their eyes through my past or present industrial contacts. Professor Djerassi is considered an honest person. Dr. Djerassi is considered suspect because he has some industrial contacts. Frankly, I resent this intensely because Professor Djerassi of Stanford University and Dr. Djerassi

of Zoecon Corporation are the same person. The Academy is the only place where experts are accepted purely on the basis of their expert knowledge, and even if they are "contaminated" by industry they are present, they can be elected, nominated, or appointed to advisory committees. Everyone has to fill out a conflict of interest statement. One knows what bias there may be, but this does not disqualify me from acting both as an expert and a concerned and honest citizen. I would say that this is one role the Academy plays, and it is an exceedingly important one. If you didn't have that advisory mechanism for experts you would eliminate an enormous proportion of American scientists.

I would now like to get to the role of the citizen. I guess one thing that I was really unhappy about -- I seem to be expressing now my own unhappiness -- is Mr. Brown's statement right at the beginning when he said that he resented the manner in which someone referred to him as a government employee. Frankly, I resented that he or someone else here spoke about me as a private industry spokesman. I am not here as a corporate spokesman, not of any corporation, and I don't like to be categorized in that context. I am here first of all as a citizen, and secondly as an expert and as a scientist. And I don't think I need any further description. Your description of me was quite symptomatic of the arrogance of the nonexpert citizen.

I have frequently wanted to act just as a citizen myself, Mrs. Swet, in exactly the context in which you want to do it. What about the citizen like myself who lives in California and not in Washington, D.C.? Do I have to read the Federal Register every day, every week? By the time I get it the meeting has probably already been

held. Am I supposed to fly over here each time I want to speak up? Do I have to depend on some spokesman on my behalf who may be a consumer advocate group that may or may not represent me as a citizen? How do I as an individual citizen speak up? I have tried to do this a couple of times, and I would like to give you just two examples.

I wrote to Senator Nelson that I wanted to testify before his committee on a topic on which I thought I was most qualified and about which I had thought deeply in a human and humane way when he had his birth control hearings. His office didn't even have the courtsey of replying to my letter. The second time was at the occasion of Senator Kennedy's hearings around 1974-75, when again I volunteered to testify. Again, not even the courtesy of a reply. Was it because of my well-known past industrial background would have made me an inappropriate witness?

Why is it that I am not satisfied as a citizen to be represented by some consumer advocate group? As a consumer I like them to speak out even though they often speak in a very limited way, with very limited knowledge. Also, they have their own axes to grind. I am not completely satisfied with them because they have concerned themselves almost totally with the past and with the present, but they usually ignore the future. I as a citizen am very much concerned about the future and about the impact that scientific knowledge can have, both positively and negatively. I have seen a deplorable lack of information, of interest, and of attention in this area, and I find no group that is adequately representing me along these lines. I find it very difficult to get the opportunity to speak as an individual citizen, and I can assure you that Carl Djerassi is not the only person. I am sure there are hundreds, perhaps even thousands of people

in this sector of the scientific-technological community who have practically been disenfranchised by the arrogance of the citizen, the lawyer, and some of the government officials.

ROBBINS: I am going to take the prerogative of the chair and forego making any wise and summary comments. You have heard from a remarkable assortment of people. I want to thank every one of you who came here. I wish we had been able to cover more territory, but I don't imagine anybody could have stood it if we had. Thank you all, and thank the panel.

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