**The Responsibility of Scientists, a European View**

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Why should we researchers and university teachers carry particular societal responsibility?—The answer follows from the function of universities within our society, to educate future generations and to act as “truth-seeking” centers. Given the increasing public costs of universities, there has also been a rise in the expectations in their beneficial output for society. The current global political and economic situation places even more responsibility on the universities to be far-sighted.

And why is there a relevant European context?—Fundamentally, science has no national or continental borders. On the contrary, science helps to bridge gaps that originate from political or economic developments or from ethnic traditions. Scientific results have truly universal validity. Nevertheless, scientists are citizens who are rooted in a national, continental, and cultural context. Science is supported by national authorities, and is expected to foster regional prosperity and to help solve national problems. Perhaps most importantly, an active science community is indispensable in any flourishing society that desires to remain competitive on an international scale. Whenever economic or political unbalance starts to develop between nations or continents, national or continental concerns may become relevant also in science. In such a situation, science is expected to contribute its share to strengthening the national impact on a global scale to re-establish balanced competitiveness. Today, where hegemony of the USA on the political, but also economic platform, is becoming more and more of a serious challenge, the positioning of European science and technology needs to be reconsidered. In this respect, it seems appropriate to me for European scientists to develop a specifically European opinion, keeping in mind that the major obligation of science is to remain far-sighted in all respects, also in the geographical ones, and to strengthen international and intercontinental ties rather than questioning them.

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**Thoughts on the State of the World**

The current state of the world concerns me, and in particular the following:

- Many citizens are still convinced that all our visions, even our most daring ones, can be implemented by technological means: Energy and food problems are solvable without significantly restricting our consumption. With detailed knowledge of the human genome, we have a key at hand for preventing and healing most diseases. Interplanetary travel will cause no insurmountable difficulties. And global peace in democratic harmony is achievable, if necessary by force.

- Many of us still trust, unconditionally, the principles of global free market economy. The fewer national or international regulatory restrictions, the better is the functioning of a self-regulating market, and the higher will be the added value, provided it is measured in proper terms.

- Sometimes, we realize, nevertheless, that our natural resources are indeed finite. This applies to air quality, water, fertile soil, and particularly to fossil fuels.

- The gap between poor and rich is growing frighteningly, both within individual countries and between industrial and developing nations. It appears as if the functioning of our global system relies on the existence of a gradient of wealth. It offers incentives for the ascent on the societal ladder, and allows those who have already reached the top of the ladder to gain profits.

- Ethics and moral principles are often mentioned by decision-makers but...
Today, only one single superpower is left with its unlimited claim for political, economic, and ideological hegemony. In my opinion, the world today is far from a multipolar democratic situation in which each nation has its appropriate say.

**Tasks of Universities**

But what is the relevance of these facts for science and for chemistry and for the tasks of universities?—Indeed, at first sight, its relevance seems minute, except that scientists and chemists are also members of the global society and carry co-responsibility or, possibly, co-complicity for mistakes. But this kind of responsibility is easy to bear as it is distributed on not less than 6.4 billion global citizens.

In comparison, our traditional academic obligations appear to be of higher relevance: What could be more valuable than exploring the natural laws and their consequences for gaining insight and enabling technological applications. We are supporting industrial prosperity to the advantage of society and of the consumers, whose consumption, in turn, is indispensable for a prosperous economy.—But sometimes, doubts arise in my mind whether fundamental research is truly our single obligation. Indeed, the generous public support that we receive is justified not only by our specialized knowledge and our scientific excellence, but it is motivated by the expectation of conscientious contributions for shaping a beneficial future for the entire society.

We scientists often like to stress our indispensable academic independence, which gives us the jester’s license to do whatever we want. Although our employment contracts are often fixed-term, it is hardly possible to find anywhere in society more job security than on a professorial chair. The envy of industrial employees is well justified; they never know from one week to the next whether they will still be employed or whether they will meet some of their equally frustrated colleagues, on a rainy street in front of the nearby job center. Politicians do not fare far better, facing the mood swings of the voters and re-election on a regular basis. Who can expect from industrial managers or politicians, in their unsafe positions, to articulate unpopular but honest opinions or even to take courageous measures that could endanger their own position?

In this situation, researchers and university teachers are not only predestined but obliged to frankly articulate their opinions and convictions for the sake of society, even to questions that lie far outside of their official teaching obligations. The excuse that we, as classical scholars, as quantum-field theoreticians, or as peptide chemists, cannot possibly possess well-founded knowledge in all conceivable public domains is hardly acceptable. It merely underlines our lack of interest for societal questions and our preset priorities in view of prolonging our already quite respectable list of publications. Karl Popper said in 1958 that: "I am thinking of the obligation of each intellectual to help others for liberating themselves and for developing a critical mind, a duty which most intellectuals have forgotten since Fichte, Schelling, and Hegel. Unfortunately, the desire to impress and, as Schopenhauer said, to infatuate instead of instructing is widespread among intellectuals."[1]

In a similar context Sigmund Freud wrote in a famous letter to Albert Einstein in 1932: "We should be at greater pains than heretofore to educate a superior class of independent thinkers, unamenable to intimidation and fervent in the quest of truth, whose obligation it would be to guide the dependent masses."[2] Even if we use slightly different words today, the two requests harmonize well with the goals of this essay.

After all, we are bound by a contractual obligation to educate a future generation of academics. Hopefully, we prepare them in a way to do a better job in the future than our generation has done so far, preventing a perpetuation of our errors. Education is not limited to acquiring scientific knowledge, which is being taught, hour by hour, at our universities. The real goal of university education is the development of personalities who will courageously address future challenges and who will not succumb to the monetary temptations of our “bluff society”, often to the disadvantage of its weakest members. At nearly all universities, additional, separate courses are offered for widening the horizons of the students. But time restraints are severe, and often these courses are the first victims of low attendance. Most likely, it is best to integrate much of the more general reasoning into the major courses themselves, if only as side remarks, motivating the students for self-studies. It is important to note that the majority of future industrial and political leaders pass once through our universities! Here we have a unique chance to influence them during their development by us, hopefully, positive example.

The German philosopher Hans Jonas has defined “responsibility” in his important treatise “The Principle Responsibility”: “Act so that the effects of your action are compatible with the permanence of genuine human life.” He writes further: “Prometheus, liberated at last, who received from science inconceivable power and from economics the restless imperative, calls for an ethics which, by free restraint, limits its potency from becoming fatal to human beings... What can serve as a compass? The envisioned danger itself!”[3]

Sustainability and foresight are thus required. In order to reach the goal of academic accountability, we do not necessarily have to revise all our current curricula. More important are changes in the personal attitude of the teachers and of the focus in their courses. Often, a few brief comments in a lecture course are sufficient to illuminate the societal context and to relate to questions of general relevance.—By the way, hardly anybody doubts that our spectacular performances in large lecture halls serve more the convenience and the ego of the...
 Universities should consider themselves as cultural centers with far-reaching radiance rather than merely serving as training grounds for academic specialists. The integration of knowledge, perception, and comprehension, as well as compassion, is at least as relevant as extreme specialization. Obviously, scientific excellence is indispensable, but insufficient in isolation. Or as Georg Christoph Lichtenberg put it “He who understands nothing but chemistry does not truly understand chemistry either.”

Naturally, the student population will always show a wide spectrum in terms of receptivity. Some students will rapidly acquire rather comprehensive knowledge and understanding, whereas others will remain relatively narrow and focused on specific technical skills. But in general, a broad education should be encouraged, at least as an option, for all students. Motivation for voluntary involvement in other subjects is far more efficient than regimens enforcement.

I am convinced that science departments with a broad scope, integrating also societal concerns and questions of global relevance in their courses and daily discussions, will succeed in overcoming the present difficulties of recruiting students. Today, potential university students often regard science departments as too one-sided and too focused on specific technical skills. But in general, a broad education should be encouraged, at least as an option, for all students. Motivation for voluntary involvement in other subjects is far more efficient than regiments enforcement.

The European Context

The preceding remarks apply to all universities and the entire academic community worldwide. But where is the specifically “European” element that has been mentioned at the beginning?—The following lines contain proposals that I feel would help to remedy the present global situation. The primary aim is to strengthen the European position rather than to weaken any other one. After all, we can change only our own mind and not the one of our neighbor, or in the words of Mahatma Gandhi: “We must be the change we want to see.” Becoming strong, co-equal players, ready for fruitful collaboration, would be of advantage for all nations and continents.

My admiration for US science, for the American confidence in technological progress, and for the willingness to undergo risks, I share with many, perhaps most scientists in Europe. Europeans, on the other hand, often act rather guided by tradition within a well-developed network of regulations and social security.

The positive and negative consequences of American motivation and initiative are obvious in politics, economics, and science. Although Europe, as a continent, exceeds the USA in terms of population numbers, the USA appears to dominate in all these three essential domains. Without a flourishing economy, top science could no longer be financed, and without advanced science, the American economy would cease to stay ahead.

It is often claimed, not incorrectly, that a strong American economy will also support the economy in the rest of the world, in the same manner as the wealth of the rich creates jobs for the poor, for those who still believe in Adam Smith’s “invisible hand.”[4] But it leads to a situation that is hardly compatible with the national pride of other countries. At this point, novel long-term concepts are required to heal the international relations. Surely, the solution cannot be found in perpetuating and cementing the present situation in which a single nation dominates world affairs.

But who can develop such novel, far-sighted concepts?—We can not expect much radical change and idealistic development from the side of economics. Too dominant are company’s interests in the fight for survival and profits. Also in politics, there are few free valences; the short-term monetary and hegemonic problems are of sufficiently high priority to forget the lurking dangers of our long-term global future.—No doubt, the academic community has to accept the challenging obligation for conceiving avenues towards a future global equality in politics, economics, and in science. This task deserves a high priority among academic obligations, more important, perhaps,
than any single, specific exploration at the forefront of science.

It would be unreasonable to expect a ready-made concept from me. Its development requires the cooperation of all academics from all disciplines and all countries, including the USA, and it needs time to ripen. But it is essential that this concern remains constantly in our consciousness, that it moves our thoughts, and influences our decisions. It will become necessary to organize conferences and symposia to discuss the global development. It is advisable to form discussion panels for treating this issue. At the ETH Zürich, for example, successful interdisciplinary lecture series have been organized for many years, and for the last six years, the Collegium Helveticum has functioned well as a platform for in-depth interdisciplinary discussion.

Europe is still weak in terms of transnational academic institutions. They need to be strengthened to achieve sufficient influential power. The European academy, Academia Europaea, is still lacking in many European countries, and for the last six years, the Collegium Helveticum has functioned well as a platform for in-depth interdisciplinary discussion.

Europe is still weak in terms of transnational academic institutions. They need to be strengthened to achieve sufficient influential power. The European academy, Academia Europaea, is still weak and exerts very little, if any, political influence yet. Strong support by national academies would be necessary. Unfortunately, national academies are still lacking in many European countries, and, when they do exist, they are hardly representative for the entire academic community. Academies need to be more than, what many of them are today, just scientific pigtails. Numerous European journals have gained international profile, and they deserve to be further promoted and supported by international authors. Another issue is international conferences in Europe that also need additional support to strengthen the European science position.

Influencing the long-term development is intimately connected with educational issues. We are supposed to be educating a future generation that is capable of promoting, at the same time, global responsibility and European self-esteem, without neglecting the interaction with the USA, but without overrating its importance. In this context, it is certainly indispensable to further unify the European educational system with a well-conceived European educational model. Not stream-lining is required but liberal, open-minded coordination that will satisfy a broad range of requests and that will lead to an error-tolerant system that allows for more than one chance. The general usage of a single teaching language, English, in all higher education would help to convert Europe into a freely permeable educational area. The Bologna declaration on the European space for higher education: “searching for a common European answer to common European problems”[6] is a positive beginning of a unifying process, but certainly not yet the envisioned final goal. It is advisable, for example, that all students attend part of their studies in a foreign country, to help break down the barriers between nations and to develop a European identity. And university teachers should satisfy part of their teaching obligations in another country, as well. In spite of European coordination, traditional cultures deserve to be preserved; they are valuable and form our safe living grounds.

Independent universities are a prerequisite for educating courageous, independent thinkers.

Necessary Prerequisites

The leading role in conceiving a long-term future, that the academic community shall assume, presupposes that the universities receive also the required autonomy. In many countries, the bureaucratic control of universities is still excessive and impedes the acceptance of full academic independence. Universities are a prerequisite for educating courageous, independent thinkers. More important than excessive dependendencies on the local magistrates are transnational academic connections to universities with similar goals, leading to cooperation and mutual stimulation. But autonomy alone is insufficient. Without adequate monetary means, it is impossible to improve quality and impact of universities. For financing the societal tasks emphasized in this essay, support by private, idealistic foundations is highly desirable, but a significant part of the funding will have to come from governmental sources. In general, the funding of European science has to be put on a significantly stronger basis, if Europe is to continue to succeed as a global player. It goes without saying that additional funds should be distributed according to thoroughly evaluated quality measures. It is often suggested that also in Europe, similarly as in the USA, research (and teaching) is financed much more by private donations than today. This desire has its good justification, but for its implementation numerous obstacles have first to be removed. They concern a tax system that does not encourage donations, a regionally too fragmentated educational system, and particularly the missing tradition of generous donations. In spite of increasing efforts in this direction, no miracles should be expected in the short run.

The European Framework Program will have to assume special responsibility in promoting the European idea by the support of interdisciplinary initiatives for planning our future. A separate, well-funded program is needed for this purpose with an open-minded scope that allows interaction also with the human and social sciences. Many voices have been raised deploiring the excessiveness of the European Framework Program. It is hoped that the planned European Research Council, “focusing on excellence as the basis for its funding decisions”,[7] will introduce more flexibility and more scientific professionalism into the organization. Bringing more competition into the funding of European science may be to the disadvantage of less-than-top scientists. But generous autonomy and adequate financing are still not sufficient for...
reaching the proposed goals. Most important is the proper mind set of researchers and teachers who adjust their priorities to the long-term requirements of a global society. Some of the presently treated scientific questions may superficially appear to have limited relevance in view of the existential questions. It remains one of our obligations to put the daily work into a relevant larger context. Scientific research necessarily deals with meticulous details, but it must remain explainable in terms of its general significance, also to non-specialists. I am convinced that even the most abstract theoretical work can be explained and justified in simple terms, provided it makes sense.

Scientists who acknowledge their societal function will more easily gain respect and admiration by students and by society, and the financing of their endeavors will be facilitated. My experience is that young, highly motivated students have a particularly clear sense for relevance. They still retain their inborn idealism that the elder researchers often have lost in their daily routine.

Specific Questions Concerning our Future

The questions of long-term relevance and development to be addressed in university discussion groups are obviously not restricted to academic concerns. On the contrary, political, social, and economic questions are most relevant for our future. Clearly, they cannot even comprehensively be listed within this brief essay. Just two questions shall be mentioned as examples.

In the political realm, perhaps the most relevant questions concern international collaboration and establishing strong supernational organizations. These institutions form our best hope for a peaceful and globally just future. The democratic postulate deserves to be implemented not only within but also between States. In this regard, the academic community could make a significant contribution. Within science, transnational collaboration is a daily reality. Why not try to transfer some of the beneficial scientific experiences into politics? The concept of the UN, where also smaller nations have a say, corresponds well to the fundamental principles of democracy.

Not only has the US government followed almost exclusively its own interests, also European States act primarily to their own advantage. But the case USA is truly remarkable. Its government systematically boycotts supernational organizations whenever they seem to serve not directly American interests; there are more examples than fingers on two hands, from banishing the Kyoto protocol to rejecting the International Criminal Court (ICC). The present tragic play for achieving immunity for US offenders abroad defies all our legal understanding. It is well known that also within the European Union, the diverging nationalistic tendencies are often stronger than farsighted cohesion. The conception of strong and lasting international organizations is a problem that requires the close attention by the scientific community. Let me cite once more from the exchange of letters between Albert Einstein and Sigmund Freud, this time with the words of Einstein: “The quest for international security requires that each Nation unconditionally surrenders some fraction of its liberty of action, of its sovereignty, and it is obvious that there is no other way towards this security.”[2]

Numerous open questions remain also in international economics that are strongly interlinked with politics. Even if we will be unable to conceive a better alternative to the present free market system, we are nevertheless encouraged to question some of its principles: How free shall be the “free” market economy? What is a proper balance between the entrepreneur’s profit taking and societal concerns? How can an economic domain survive in a fully saturated market without creating unnecessary desires by dubious sales promotion? How can international trade laws be effectively implemented? How can poor nations be developed and traditional cultures efficiently preserved?

Science is an intellectual activity, relying on rationality, intuition, and idealistic concepts. Correspondingly, scientists might also expect from economics a more idealistic motivation than appears to be compatible with reality. Instead of letting a self-regulating feedback system, with profit and shareholder value as optimizing targets, operate freely by itself, it is tempting to define beforehand idealistic goals which should be shared by all partners. An economic operator would then act out of idealistic conviction rather than to optimize his own personal profits, in opposition to the principles put forward by Adam Smith in 1776,[1] proposing the action of an “invisible hand” that will turn even very selfish actions to the benefit of society. It is easy to show that the Smith’s “invisible hand” often turns into a cloven foot, rather than fostering beneficial providence. Long-term damage is, for example, unavoidable when the feedback mechanism acts too slowly, particularly when detrimental effects in nature remain invisible for a long time or when, by market forces, invaluable human cultures and traditions are destroyed irreversibly. No corrective reaction can be expected in such cases. Frequently, the monetary gains will be spent long before the damage becomes manifest. Besides the strengthening of the idealistic motivation of future managers—one of the aforementioned tasks of today’s universities—the introduction of corrective taxes could serve as an appropriate method to establish a more accountable lasting economy.

I am left with the feeling that our economic system is in the midst of an identity crisis. Overproduction, saturation of the market, and senseless consumption are a few keywords that come to mind about our—and by the way that also includes the Swiss—economical system; a small but insatiable minority remains unhappy despite of its material surplus, while the majority suffers. A self-regulating feedback mechanism, maximizing material wealth, can never lead to a deeper justification and to a gratifying meaning of our existence. To support personal attempts in finding a
meaning in one's own life is an everlasting obligation of the academic community.

It is worth mentioning that the application of free market principles to the educational domain, as it is intended by the GATS agreement (General Agreement on Trade in Services; is an initiative from over 140 members of the World Trade Organization),[8] could have frightening consequences. A complete liberalization and partial privatization of the educational market could torpedo much of the previous achievements towards equal educational chances in Europe and even more so in poor nations. Here, greatest restraint is in place to maintain the previous accountability of our States for education, in general, and to preserve their willingness of making major investments into the future of our children without restricting in an undue manner content and form of teaching.

Numerous further domains of societal relevance are even nearer to our scientific interests. They also deserve intensified attention from our side: the vast environmental domain, sustainability, recycling of waste, economics of energy usage based on sustainable sources, sociological studies on competition and collaboration, on consumption and superfluous luxury, on progress and cultural tradition, and on fairness and social peace.

Concluding Words

Two main aspects have been addressed in this essay: The long-term responsibility of universities, which goes far beyond our common understanding of academic obligations, restricted to teaching and research, and our specifically European contribution to a future global equilibrium. It was not my intention to give answers to specific questions but rather to appeal to the academic community to discuss, more than in the past and on all conceivable occasions, questions that relate to society and its future, in the hope of stimulating a lively discussion culture at universities. It may well be that I have misjudged numerous facts, causes, and effects that determine the societal and scientific developments—but my main goal was to raise the awareness for societal questions in the academic community.

The appeal to accept more societal responsibility is compatible with our future-oriented scientific endeavors. When we set out, by our research activities in the laboratory, to incrementally influence the course of history, we are also requested to contemplate the desired long-term global development. Who else, if not the scientists, is responsible for setting guidelines for defining progress and for protecting the interests of future generations? Even we rational researchers are human beings with ethical principles and with compassion towards the less favored members of society. Only when we act as full personalities, taking serious also our emotions and our anxieties, our hope, and our despair, will we be able to make valuable cultural contributions with a lasting effect.

The second appeal to strengthen European science and the European identity in general is a consequence of the fact that regional boundaries contradict our universal understanding of a limitless science. To achieve a global equilibrium, a specific strengthening of the scientific aspirations in Europe is necessary. The goal is not to disfavor others but to increase the impact of our own European contributions, allowing for true partnership of equivalent players. A unipolar world will surely lead to a disaster in politics, economics, and science. Only a multipolar dynamic interplay between equal partners can lead to long-term stability. To strengthen the European position, we need more European collaboration in science and an improved funding situation. Only then, will we be able to play a significant role in the international science community.

The appeal to researchers and teachers to widen their scope beyond their fascinating specialties is close to my heart. I am convinced that we academics have to search actively for valid answers to the great existential questions of our time. Nobody else, for practical reasons, is in a better position to provide long-term guidance into a prosperous future for the entire globe. In conclusion, we perhaps should take to heart the two brief sentences that Karl Popper expressed on December 17, 1993, in Berlin: “Optimism is our duty. We all are co-responsible for what is coming.”

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