

Heading towards a Better World

Part 1: Wisdom, Compassion and Personal Responsibility

Richard R. Ernst
Laboratorium für Physikalische Chemie, ETH Zürich
Wolfgang-Pauli-Strasse 10, 8093 Zürich, Switzerland

Abstract

This essay in two parts summarizes the author's view on the personal and institutional responsibility of researchers and universities for enabling a beneficial future of our globe. All too often, we have lost a greater perspective and are living shortsightedly on the account of the weaker members of today's society and deplete the resources of future generations. In this situation, academics and universities carry a heavy load of responsibility, remembering that they educate the citizens of tomorrow, especially their political, economic, and spiritual key leaders. - The first part addresses the educational aspects for enhancing comprehension of those essential aspects that determine the fate of mankind. – The second part starts with a brief analysis of some current trends and formulates the particular responsibility of universities resulting from it.

What shortsightedness and overestimation of ourselves to believe that the world has been created just for the sake of man; and fulfilling our obligations boils down to picking and enjoying the fruits, and to multiply! What arrogance to believe that we are the crown of creation! It does not take much foresight to predict a finite lifetime of human civilization, provided we continue our present lifestyle and are not willing to accept major concessions for preserving our living grounds. Soon, fossil energy is gone; soon, the oceans are devoid of any eatable fish; soon, the water level in many countries is too low to pump out sufficient drinking water or even water for irrigation; soon, the fertility of the over-exploited fields will start to decrease at a dangerous rate; soon, the man-made climate change is too rapid and radical for allowing us to take proper remedies; soon, antibiotics needed to prevent epidemics become ineffective; and soon, the gap between the rich and the poor is getting sufficiently large to cause unrest on a global scale. Truly a doomsday scenario which is inevitable unless we drastically change our attitudes!

The Importance of Education

In spite of all our precious inherited genes, we are born in a rather helpless state. We need a great deal of love, care, and of education in order to become viable members of human society. Our inborn instincts are not sufficient for survival and for contributing our share to the survival of mankind. Twenty and more years of education are needed for making us ready for social integration, for reducing our inborn egoism, and for developing compassion, mutual understanding, and responsibility.

Few societal issues receive wider public agreement than the need of first class education within our schools and universities. Indeed, it is likely that the level of education world-wide will determine the ultimate fate of mankind and of the global environment. We often use the term 'Knowledge Society' for emphasizing the importance of knowledge for success in business and in life. Those who know more are expected to accomplish more and to earn more. And, in the end, they are expected to live a happier life than the rest. – This is true, at least to some extent. - But is 'knowledge' alone really sufficient?

In Wikipedia, The Free Encyclopedia(1), we read: *“Knowledge is information of which a person, organization or other entity is aware. Knowledge is gained either by experience, learning and perception, or through association and reasoning. The term knowledge is also used to mean the confident understanding of a subject, potentially with the ability to use it for a specific purpose. The unreliability of memory limits the certainty of knowledge about the past, while unpredictability of events yet to occur limits the certainty of knowledge about the future. Epistemology is the philosophical study of the nature, origin, and scope of knowledge.”* - Knowledge is gained from experience, from experiments and measurements, followed by data processing and data reduction. Knowledge is 'known information'. It fills heads, books, and computer memories, and can be retrieved by sophisticated information retrieval systems.

However, the ultimate goal is not alone collecting knowledge or facts, but attaining, what we may call, 'wisdom'. Wisdom characterizes a state of comprehensive humanness. In its evasiveness, it is much harder to comprehend than knowledge. It can not easily be measured nor quantified. In Wikipedia (1) we find the following definition: *“Wisdom is the ability, developed through experience, insight and reflection, to discern truth and*

exercise good judgment. It is sometimes conceptualized as an especially well developed form of common sense. Most psychologists regard wisdom as distinct from the cognitive abilities measured by standardized intelligence tests. Wisdom is often considered to be a trait that can be developed by experience, but not taught. When applied to practical matters, the term wisdom is synonymous with prudence. The status of wisdom or prudence as a virtue is recognized in cultural, philosophical and religious sources. Some define wisdom in a utilitarian sense, as foreseeing consequences and acting to maximize the long-term common good.” - Wisdom is, so to say, the ultimate distillate of life-long experience. Wisdom might be found in immortal books, wisdom might be transferred from great teachers to students; but without personal experience, true wisdom can not develop nor will it last.

Wisdom has much to do with a broad view, with the comprehension of connectivity. Wisdom does not brag, it does not serve personal advantages, and it will never lead to exploiting others. Wisdom is accompanied by modesty, truthfulness, and farsightedness. The term wisdom is often used as a pair together with compassion, such as in Buddhism. In fact, the two terms can hardly be separated. Both have the same goal: living in harmony with the environment and contributing actively to the wellbeing of others. Compassion comprises the emotional aspects, such as love and pity, while wisdom results from a deep understanding with a strong intellectual component. Knowledge is indispensable for reaching wisdom and for exerting compassion, but it is operative on a different, more supportive level. It acts like inorganic soil, like a fertilizing agent on which life in the form of plants, animals, and tender-hearted beings can subsist. But its neutrality may also allow weed and deadly bacteria to grow. An obvious example is the knowledge on nuclear power that can be used for peaceful and for destructive purposes. Knowledge does not establish a matching pair together with compassion.

The Function of Schools

The preceding remarks define also the ultimate goals of our schools and universities. They carry the ambition to convey more than just knowledge in the form of facts that fill notebooks and heads. The goal is to render the students fit for life, hopefully for a happy

and rewarding life. We know that intelligence, brainpower, and factual knowledge are insufficient for acting as a human being. It is evident that knowledge must be supplemented by years of personal experience, by inter-human relations, by joy and suffering. One might argue that such experience can not be gained in formal schooling, and that schools may safely restrict their function to providing knowledge and skills, in other words, to the training of well qualified professionals, leaving the human development of the students to their own initiative outside of the school. Indeed, this attitude is being pursued all too often at universities by educating specialists who know an incredible amount of details about a very narrow subject. Encyclopedic knowledge seems to be indispensable in many professions, particularly in the scientific world, if one wants to succeed and to advance to the front line where the current innovations take place.

I would like to argue differently: Life is too short and too precious that one can afford to spend preparatory twenty or even twenty five years in school, just memorizing facts and recipes, in the hope that they can once, in the future, be applied fruitfully to 'real life'. We like to use the metaphor of stuffing a backpack with knowledge for life. But often, the contents will become outdated or irrelevant much before an occasion arises for their profitable application.

I prefer schools with a lively community of students and teachers working on real problems and acquiring lasting experiences invaluable for life. Experience can not be gained without doing experiments. 'Trial and error' and '**learning by doing**' are in this context of utmost importance. The learning efficiency of sitting in a lecture room with unidirectional teaching can be frightfully low. It is advisable to reduce such class room activities to a minimum. A limited number of survey lectures might be useful for conveying fascination and enthusiasm to the students in view of what they are supposed to learn, but the learning proper must be done by the students themselves in the laboratory, in nature, in discussion groups, in the library, or in a quiet room by reading and writing.

Project-oriented learning has particularly high efficiency. Projects provide a realistic environment where many unforeseeable incidences occur, just as in real life. In task-oriented learning, the students select themselves those courses or study subjects that are relevant for solving the problems encountered in the course of their projects. In this

way, student researchers are naturally filled with motivation to study in depth the relevant subjects. They develop personal initiative to structure their own learning process. Frequently, the curiosity, excited in this way, carries the researcher to different subjects, off the main road, that might even lead to an unexpected discovery or to novel insights. Here, serendipity may take place, indeed. It is old teaching wisdom that the foremost teaching goal is to motivate the student, to stimulate his or her curiosity, and then the learning will proceed by itself.

Interdisciplinarity

Interdisciplinarity appears to be sufficiently important to deserve a special, rather extended section within this brief essay. Project-oriented activities and 'learning by doing' are invariably inter-disciplinary and reach beyond the scope of a single faculty. Nature does not classify the problems to be solved according to anthropomorphic disciplines! Innovation and creative problem solving happen most frequently right at the interdisciplinary boundaries.

The field of science in which the author was active for more than 40 years, ***Nuclear Magnetic Resonance or NMR***, is an excellent example for demonstrating the importance of an inter-disciplinary approach (5). A brief synopsis of NMR shall serve for illustrative purposes. - The story starts in the rather esoteric field of elementary particle physics. Many atomic nuclei possess a built-in magnetic moment. Applying a strong external magnetic field leads to a precession of the magnetic moments about the direction of the field with rates determined by the magnetic field strength. This precession of atomic nuclei in a magnetic field is called nuclear magnetic resonance (NMR). It is a fundamental phenomenon that reveals most enlightening applications of quantum mechanics for demonstrating basic principles. But, at first, it hardly appeared to be useful for a broader society.

By pure accident, it was found 1950 that the chemical environment of the nuclei exerts a magnetic shielding effect on the magnetic field that is experienced by the nuclei. Each atomic nucleus within a molecule experiences a local field that leads to a characteristic resonance frequency. And each molecule shows a characteristic spectrum of frequencies. This allows for powerful applications to the chemical analysis of

substances. Each of them leaves its 'fingerprint'. In this way, NMR became an indispensable analytical tool in chemistry and in chemical industry.

Experimental NMR developed into a truly high-tech field that, in many respects, stretches current technical limits. Extremely strong and stable magnetic fields are needed. The emitted NMR signals are incredibly weak and require advanced high-frequency electronics for their reception. In addition, complex computer routines became indispensable for the analysis of the highly informative experimental data. NMR truly challenged the technological development.

Mathematics in the form of the Fourier transformation has led to a revolution in the experimental NMR procedures. The Nobel Prize citation of the author mentions this achievement as a major breakthrough. The recording of the inherently low sensitivity NMR spectra could be speeded up several orders of magnitude by a pulsed excitation of all resonances in parallel. With a mathematical Fourier transformation, the various resonance frequencies can then be disentangled readily. The gained sensitivity improvement was seminal for the application to complex bio-molecules and for entering the medical field.

Later, it was found that the three-dimensional structure of biological macromolecules in solution could be determined by an extension of NMR spectroscopy, making a great impact on molecular biology. Instead of one-dimensional NMR spectra, two- and three-dimensional spectra are used for this purpose. 2D and 3D spectra visualize the mutual proximity of nuclei within the chemical bonding network of the molecules. Also inter-nuclear distances can be measured and represented in this way. Based on two complementary types of two-dimensional spectra, it is then possible to triangulate the positions of the magnetic atomic nuclei within a biological macromolecule. This allows the determination of accurate three-dimensional models of bio-molecules. The obtained molecular structures became indispensable for studying the function and interaction of biologically relevant enzymes and functional building blocks.

Three decades ago, an exciting possibility was discovered for medical NMR applications. Magnetic resonance imaging (MRI) beautifully reveals the inner secrets of patients in a clinical environment. By the application of magnetic field gradients, it is possible to localize the origin of an NMR signal emitted from an organ in a human body

and to derive fascinating images that reveal much about healthy or diseased organs and delivers invaluable information for a clinician who is planning surgery. Today, MRI provides the most powerful and universal diagnostic tool for clinicians being interested in the health condition of soft tissue. Especially in the context of cancer diagnosis, the method is of undisputed value.

Most recently, functional MRI (fMRI) procedures were developed that allow a detailed study of brain functions. Today, most of the functions of a brain can be localized accurately in the brain matter. This allows for revealing insights for psychologists who can study in great detail the human reactions and the interplay of various senses. For numerous brain diseases, diagnostic markers have been developed already. Much further development can be expected in the near future, improving our understanding of the most complex and most fascinating human organ, the brain.

NMR has taken advantage of mathematics, physics, and electronics for solving problems in chemistry, biology, and clinical medicine. And in the near future, even clinical psychology might become unthinkable without access to functional MRI. Indeed, NMR is today a truly multi-disciplinary endeavor.

A close interaction between academic institutions and industry was seminal for the design of the required sophisticated NMR spectrometers. The development started in the 1950ies within the Stanford Industrial Park that was the birth place of the famous Silicon Valley. It became a metaphor for the benefits of university-industry collaboration. The development of NMR spectrometers at Varian Associates in Palo Alto, California, presents an excellent example for such fruitful interaction. The author was personally active at Varian in the 1960ies. A similar collaboration between academia and industry, on a somewhat smaller scale, took place a little bit later in Switzerland between ETH Zürich and the company Trüb-Täuber, leading, finally to the foundation of Bruker-BioSpin, the present worldwide market leader in NMR. The author was also actively involved in this interaction.

Multi-disciplinary research activities and cooperation are indispensable in many other fields as well. In this context, one often makes the experience that collaboration between narrow-minded experts, knowledgeable in one field only, is difficult if not impossible.

Collaboration is most efficient when the involved researchers are acquainted themselves with several fields. A strong overlap of knowledge is highly desirable.

The consequences for university teaching are obvious. Multi-disciplinary education is a must for those who desire to work at the frontier of science. Obviously, the wide range of inter-disciplinary demands on the students and researchers is enormous. Nevertheless, disciplinary detail knowledge, in at least on field, is indispensable. Allrounders without depth will achieve little or nothing. One may summarize the situation in the aphorism: *Focusing is indispensable for understanding, while widening the scope is needed for comprehension.*

Humanities and Social Sciences

Multi-disciplinary education does not stop at the outskirts of science. We should not forget how much in our world is beyond the realities explored by the exact, natural sciences. The sciences impose on themselves restrictions for exploring exclusively phenomena of nature that can be measured reproducibly and quantitatively. The humanities have a wider scope and deal also with all human and inter-human aspects. They try to comprehend human reactions and thoughts, feelings, anxieties and happiness, perhaps even love and hatred. And the social sciences provide clues for understanding the functioning and malfunctioning of human communities and societal structures. Their fascinating and highly relevant conclusions can not be disregarded, when planning our future. Technology is not sufficient!

Many phenomena in the human sciences can not be quantified. Nevertheless, today, the human sciences are under pressure to apply methods similar to the ones of the natural sciences in order to be taken serious. Sometimes, one is struck by the feeling that the powerful methodology of the natural sciences is running like a steamroller over the human sciences. Many of the relevant subtleties of the humanities are swept under the carpet in this way. A certain resistance against the rational and materialistic attitudes of the natural sciences is in order to save some of the traditional humanistic spirit.

There is little doubt that we, 'the exact scientists', can learn much from the humanities and social sciences. On the other hand, the latter are equally dependent on our technological discoveries and achievements for their professional functioning and for their personal survival. Obviously, there is an urgent need for breaking the long-standing

barriers between natural sciences, humanities, and social sciences, also within our universities. We need combined projects addressing questions that can not be solved by one discipline alone; and many questions concerning our global future are of this kind. In addition, we need discussion groups and think tanks that combine the knowledge of all faculties in order to progress, perhaps, towards the 'wisdom' necessary for developing visions of a beneficial, future. I am coming back to this point in the second part.

The Arts

While the humanities are still part of an intellectual perception of reality, the arts are devoted, in addition, to human sensuality in its widest meaning. In the arts, the senses and their sensations are taken serious, even if many experiences happen rather subconsciously, such as in musical adventures. The humanities attempt to rationalize artistic impressions, functioning as external observers of the arts and applying a descriptive, historical, and analytical view. Often, they concentrate on a classification of the art's products, while the innermost artistic message can only be emotionally experienced by a devout, patient, and humble observer and by active artists themselves. A true appreciation of art requires a personal involvement in the form of a performing artist or interpreter and is beyond an impersonal scientific and often rather stuffy humanistic analysis.

Let us read, as an example of revealing poetry, some beautiful words, written by Jalaluddin Rumi (6):

*The morning wind spreads its fresh smell.
We must get up and take that in,
That wind that lets us live.
Breathe before it's gone.*

Twenty five unpretentious words that span a poetic world, full of spirit! Here, the author seems to be not far from what we aspire by the term 'wisdom'.

How shall we scientists deal with the arts? Shall we ignore art or try to integrate it into our scientific edifice? Shall we take advantage of artists' gifts to enhance the appeal of our results for better performance on the intellectual market? I am convinced that true art can never be 'useful' in this sense. Art can not be exploited or it ceases to exist. Art has rather a complementary function that supplements other, more intellectual human activities and sets an imaginative and reflective contrast. The relevant contacts between

the arts and the sciences happen deeply within our personal sense of life, the domain where all experiences and emotions unite to form our self, the self that defines our identity and that renders our life meaningful and unique. Here in the union of arts, humanities, and science, finally, we find the true origin of all encompassing wisdom. Wisdom is often transitory. It may be experienced just as brief glimpses or flashes of revelations that reveal eternal insights and lead to moments of comprehension. Such mental experiences have enormously stimulated the development of all human activities from the arts to religion, and to science.

In fact, science and the arts have much in common. It is being said that those humans who maintain some of their youthful curiosity and spontaneity might become scientists, or in the best case artists. Both fields are driven by creativity and invention.

The Two-Legged Person

Instead of a summary, I would like to invoke metaphorically a two-legged person for describing my vision of a well-balanced human being. The first leg stands for his (or her) professional activities which might have been developed to near perfection. But still, it remains difficult for a professional to hop on a single leg towards a distant goal along a long and dusty road. Indeed, he or she needs a second leg, representing his or her complementary passionate aspirations. They may be and should be centered far outside the professional realm, forcing the person into a nearly painfully wide spreading of his imaginary legs - painful, for example, due to the lack of time needed to pursue all interests simultaneously. Only these additional passions, irrespective of what they refer to – it must not be art- give the person a safe stand and allow him to progress professionally. The spare-time passions provide more than just relaxation and enjoyment. They are often a rewarding source of professional and human creativity and inspiration. Analogies between remote subjects, brought into juxtaposition within our mind, are most inspiring and invaluable for inventive searchers and researchers.

Indeed, in personal terms, I consider myself also as such a two-legged, perhaps even a three-legged person. My early personal interest for science, particularly for experimental chemistry, developed during my teens in parallel to my active enthusiasm for music, having played the violoncello and composed classical music. Chemistry and music formed my two legs for the first 35 years. And indeed, they were complementary in many respects; my knowledge of NMR opened the avenues to the wide world; and music laid

the foundation to a harmonious family life, my wife playing the violin and me the cello already on our very first encounter. In addition, I experienced how mentally similar the activities of a scientific author and of a musical composer are. Having written a piece of complex music is equally rewarding as writing a complex scientific paper. Both evoke a mix of pride and inadequacy. In retrospect, I was hardly ever satisfied with my own products in either field. There are indeed close analogies between science and writing music. For example, a sonata and a scientific paper are similarly structured with 'introduction', 'exposition', 'development', 'recapitulation', and 'coda'. The parallel voices in a musical composition find their analogy in the harmonious or disharmonious cooperation of several authors on a research work. Musical compositions are full of symmetries and broken symmetries that are so essential in fundamental physics as well as in nature. Symmetries radiate special appeal to the human mind. They act on us like rhymes in poetry.

We all know that three legs are needed for a stable stand. Indeed, I acquired later a third leg that became very precious and important to me. I discovered accidentally my love for Tibetan paintings (7, 8). Tibetan painting art is unique in the way it blends with the entire daily and spiritual life of Tibetans. Through fascinating and most colorful paintings, called thangkas, one easily gains access to virtually all aspects of their culture and customs. All human activities are represented skillfully in this great art of Central Asia. Tibet is special by its position at the interface between the different Asian cultural trends originating from India, China, Persia, and Mongolia. All these cultures left their traces in Tibetan painting art. Nevertheless, the latter developed a very particular style of its own kind.

Tibetan painting art can not be separated from Buddhist philosophy and spirituality. Even for a rational Western scientist, Buddhism is easy to comprehend due to its simple philosophical and ethical rules that are not in contradiction to our basic scientific principles. The colorful surface of Tibetan painting art and the enormous complexity of the Tibetan pantheon might be disturbing (and fascinating) on the first sight. But soon one realizes that the multitudes of displayed deities have been conceived as metaphors for philosophical principles and are in no way assuming or even frightening.

It is the author's experience that the deeper one digs into the fundamentals of a particular religion, the more similarities between religions one discovers. In fact, all the great religions have common foundations and only their superficial and, after all, irrelevant manifestations differ. Such irrelevancies are indeed responsible for many of

our sad clashes of cultures. If we would take them less serious in claiming infallibility, the coexistence of cultures could be more harmonious.

In this way, we have closed the circle from the introductory critical remarks to a more comprehensive view of the position of man and woman in the universe. The first part of this two-part essay may be taken as a plea for education towards bias-free and limit-less openness, combined with critical thinking, and, most importantly, combined with wisdom and compassion.

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Heading towards a Better World

Part 2: The Current World Situation and the Responsibility of Universities

Richard R. Ernst
 Laboratorium für Physikalische Chemie, ETH Zürich
 Wolfgang-Pauli-Strasse 10, 8093 Zürich, Switzerland

Abstract

The independence of academic teachers gives them the liberty to freely and honestly express their views in the hope of influencing the long-term societal development. Scientific explorations of the foundations of nature are important for gaining further knowledge to address urgent issues of our common future. But, in addition, academics are obliged to develop wisdom for comprehending the trans-disciplinary and trans-cultural connections that are the clues for solving major pending problems. An overarching view may help us to conceive innovative societal models and to find possible avenues that will lead towards long-term prosperity and human dignity for all citizens on our globe, also in a distant future.

Societal responsibility of academics

The attainment of wisdom, described in the first part of this two-part essay, helps individuals to become well balanced human beings. But academic professionals are not luxury plants, nurtured by society, for their own pleasure. The dilemma is well expressed by Nawab Jan-Fishan Khan (9): *The candle is not there to illuminate itself*. The academic community has a mission and a function within human society that alone justifies the great public expenses for universities.

First of all and most importantly, as discussed in the first part, universities have an educational function, fostering a next generation of citizens, specialists, and societal leaders. Education is by far the major obligation of universities. Karl Popper said (10): *"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 wide spread among intellectuals.” Students shall be educated broadly and comprehensively as explained in part 1. We do not need mere experts knowing everything about very little. Encyclopedic knowledge is better stored in data bases. Society is in need of innovative and initiative citizens who are ready to assume responsibility.

Before describing possible societal responsibilities of academics, let us have a candid look at today’s world.

A Sober View of Our Lives

Our daily lives become more hectic every day. Competition is lurking behind each corner. In order to succeed, everybody has to run faster. We scientists have to produce more inventions and to write more papers per unit time, stimulating industry to produce more (often useless) consumer products. The consumer is encouraged to buy and consume more to keep industrial productivity up. Indeed, the term ‘consumer’ is a very ugly, but accurate designation of function of citizens. They just serve as incessantly consuming black holes for emptying the shelves in the supermarket. Occasional abdominal pains are accounted for and further stimulate the sales of pharmacies and the visits of medical doctors. A well functioning self-sustaining system of consumption! – We produce piles of waste in this manner; and in the evening before sleeping, we ask ourselves: what sense do all these hectic activities make? We hardly will find a reassuring answer! But nevertheless, next morning, we continue to operate our senseless treadmill. Robert H. Frank, a professor at Cornell University has well characterized the situation (13): *“That many goods become more attractive to us when others also have those means that consumption spending has much in common with a contagious illness. The explosive proliferation of sport-utility vehicles in American parking lots is simply unintelligent.”*

True, there is no life without dissipation. Life represents thermodynamically a state far from equilibrium that can only be maintained by dissipation. To live means to commit environmental sins. The pertinent question is not whether to live on the account of the surroundings or not, but to which extent, and how this extent could be further minimized.

Today, humane forces that could give life a deeper meaning, a sense, are lacking. The balance of incentives and interests, described in the first part, has been lost. The only remaining drive (today we would call it a Mega-trend) is making money. In some

'advanced' countries, even the children in elementary school are trained in the procedures of fast money-making. Indeed, all forms of success are, ultimately, measured in monetary units. The dance around the golden calf with all its excesses has become actual reality today as hardly ever before in history since Moses and Aaron in the 13th century BC! Ethics has no longer a place in our world, except when it can be exploited for money-making purposes. Money-mindedness is probably the most abundant and most dangerous disease today!

A Sober View of Today's World

Our world seems to be in a process of disintegration, despite all available means of communication and much too inexpensive means of transportation. Also in our world at large, fairness and compassion are ebbing, leaving behind plain ruthless egoism and shroud money-mindedness.

Politics: Perhaps, the most frequently declared political goal today is to install universal 'human freedom' for all citizens in all countries; freedom from all conceivable restraints. Its attainment appears to sanctify nearly all, even detestable means to reach the goal. No question, freedom is one of the most precious human rights. In the Universal Declaration of Human Rights of the United Nations of the 10th December 1948, 'freedom' is defined in a universally accepted formulation (11): *Article 1. All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood. Article 2. Everyone is entitled to all the rights and freedoms set forth in this Declaration, without distinction of any kind, such as race, color, sex, language, religion, political or other opinion, national or social origin, property, birth or other status.*

Inspired by this document, a number of major wars has been started and, some of them, not yet terminated. Often, it is claimed that bringing freedom to an alien country gives the aggressor blessings, rendering him a savior! – But blessing by whom? Certainly not by the UN or by the World community!

In many cases, 'bringing freedom' is just a pretext for extending the domain of influence and power, leading to commercial dominance and opening new markets for questionable products, and getting access to the dwindling energy resources. Again, the monetary and power cravings are the driving forces. The justification of aggression is frequently

based on undeniable historical facts. But the chain of previous historical fact is normally discontinued purposely at an instance suitable to leave the guilt on the shoulders of an adversary. Instead of justifying crimes, it would be much better to listen to Mahatma Gandhi (12): "*An eye for an eye - makes the whole world blind.*" Crimes, even crimes done in revenge, never lead to a lasting and just peace!

Economy: Another misunderstood interpretation of 'freedom' underlies the ideology of 'free market economy'. A free market implies freedom for the stronger, the more successful entrepreneurs. It gives the stronger ones the 'freedom' to take advantage, by legal means, of the weaker ones, making grandiose profits on the account of the needy. This process further enriches the rich and impoverishes the poor. Today, all success of business is measured in monetary units by using the shareholder value as a well accepted indicator. - Right is what pays out!

Free market economy is conceived as a freely running system under the only constraint of optimizing profits. The principle is highly functional, and, at first sight, also to the advantage of the consumer when, under competitive pressure, prices drop (usually, quality drops as well!). But the consumer's advantages are illusionary because the large and powerful international companies decide on the products the consumer has to consume. Psychological marketing, exploiting the naivety of the consumer, is of greatest importance today.

Perhaps the most disturbing aspect of the free market system is the disrespect of possible long-term damage of the environment and the plundering of the finite natural resources. Well before the damaging effects of our selfish misuse become apparent, the gains are dissipated in luxury. The claimed self-correcting features of a free-market feed-back system are ineffective in the longer term; they just serve to optimize the short-term profits. Here control mechanisms by impartial authorities would be indispensable.

The consequences of the ruthless usage of misunderstood 'freedom' in political and economic respect become frightfully apparent today. Our world is in the course of being split into two halves, the affluent one and the suffering, despaired, and poor one. Obviously, a split world is inherently unstable. The strong gradient of wealth and (apparent) happiness leads to a strong surge to commit crimes for correcting injustice and suffering. This gradient can only be maintained by brute force, for example by the building of separating walls and barbed wire fences. The first known example is the Great Wall in China. Many further real walls have been erected in the millennia since

then, but even more mental walls were created, separating social groupings, and some of them still exist today. Certainly, the worst walls are those in our own heads. They lead to preconceived notions and to racial hatred.

Our Academic Mission

In this sick world, the academic community is obliged to fulfill a rescue mission. It is essential to realize that this mission is truly long-term. An immediate beneficial result can hardly be expected. Universities and the academic community possess no executive power. Their influence is through conviction by giving good advice and through public teaching. However, the most powerful means universities possess to steer our global space ship is through education of students. Today's students are tomorrow's leaders in politics and in industry. The positive seeds that are implanted into their brains might germinate after one or two decades.

But several further societal obligations rest on the shoulders of our universities:

Life-Long-Learning: We all know how essential learning and re-learning remains during the entire life span. Obviously, everybody has his personal responsibility to remain up-to-date. But the universities are encouraged for offering opportunities to everybody for refresh one's own knowledge. Academics in industry and public life shall obtain opportunities to return regularly to the university to refill their back-pack, to get acquainted with most modern technology, and, particularly, to critically reflect on the present course of industry, society, and our world today. The preparation of suitable courses and seminars by the faculty is quite demanding. Often, the professionals in industry have gained more experience and know far more than the university professors, scratching their heads detached in their ivory towers. For this reason, it is indispensable that all university professors spend at least once in their career an extended time period in industry or in a public institution outside of the university. Only in this way, they can develop a proper understanding of life beyond their realm. – Myself, I have spent nearly five years in industry in the US just after finishing my studies, and I profited enormously for my entire later teaching career.

Life-Long-Learning applies to everybody, and universities shall offer courses also for non-professional citizens. Many possibilities exist for implementing this demand: from TV broadcasts to articles in the daily, weekly, or monthly press, to public lectures, courses

on special subjects, and days of Open House at university institutes. In this context, let me just mention two recent activities at ETH Zürich in which I was personally involved.

Last year, ETH Zürich celebrated its 150 years jubilee (14). On this occasion, 150 professors were asked to interact with the public in the streets of Zürich. Small pavilions were erected at some busy crossings in downtown, equipped with PowerPoint projection and screens, and seats for about 80-100 participants. Here, 430 lectures were presented in three weeks on subjects freely selected by the professors. Most of the lecture events were overcrowded. The public interest was enormous and the response very positive. I hope that we will be able to continue this kind of teaching activity in the near future. A major goal was to stimulate the discussion with the public for gaining valuable input to the university faculty and to increase the public trust in the universities. The professors were excited about their positive experiences. Surely, they would do it again!

Another, still on-going activity is “ETH in Dialogue”. It consists of an open-ended offer of ETH faculty members to present lectures at varied occasions all around Switzerland. For this purpose, an internet access exists where the list of possible lectures is publicized, and at which requests for lectures can be placed (15). In this way, it becomes possible to adorn any planned event with a fascinating lecture by an ETH faculty member, perhaps even a birthday party for Grandma! This is an attractive way of spreading knowledge and reflection to the general public. Last but not least, it presents good opportunities to stimulate young people for studying sciences.

Conceiving a Beneficial and Sustainable Future: Who else, if not the universities and the academic community, have an obligation to reflect on our common global future? We can not expect much long-term reflection from society’s busy operators, the politicians and business leaders. They are fully absorbed by solving today’s problems in the hope of surviving themselves on their chairs and of making short-term profits for their companies (and for themselves). The short-term responsibilities on their shoulders weigh heavily and leave them little room for farsighted planning of a global future.

The academic community at universities does not suffer under this kind of load. Many have tenure and are free to conceive novel, unheard ideas. Indeed, this is one of their primary obligations. To some extent, they are paid for serving as critical voices that offer alternative avenues towards a better world. The universities shall serve as incubators of

novel concepts and act as radiating cultural centers that stimulate the discussion in the general public.

Let me mention a few issues of global importance that should be discussed in university circles in this context:

International Cooperation and Regional Unions: The international collaboration is functioning rather poorly today. Nation States mostly defend their own interests, analogously to the individuals. The European Union, however, is a shining positive exception in a dark world. Just compare the state of Europe sixty years ago with the presence! Nobody could have imagined that a peaceful cooperation and coexistence of former enemies would ever be possible. Despite all difficulties, the European Union functions very well, and another major war in Central Europe is virtually inconceivable. The origin was an economic collaboration in a competitive world, but slowly, also a political unification is taking place. Europeans consider themselves truly as 'Europeans'. The experiment has worked better than was to be expected.

Why not use the EU as a role model also in other regions of the globe? Already Albert Einstein has written 1932 to Sigmund Freud (16): *"Thus I am led to my first statement: The quest for international security requires that each nation unconditionally surrenders some fraction of its liberty of action, of its sovereignty."* In none of the world's regions, it will be easy to find a common denominator, but the example 'Europe' shows that it is not impossible. For example, an East Asian Union is imaginable, unifying Japan, Korea, Mongolia, and hopefully also China. A South Asian Union could bring together peacefully India, Bangladesh, Nepal, Bhutan, Sri Lanka, and even Pakistan. It would also highly desirable to conceive an Islamic Union in the Middle East. As is well-known, it had its predecessors with the United Arab Republic and some other attempts to unify. Their failure is no excuse for not trying again. Indeed, without a unified voice, the area has no chance of facing the devastating pressure from outside. Unless the Arabic countries take coordinated action, they make themselves co-responsible for today's tragedies within and around their countries. Such thoughts might be worth discussing in conscientious university circles in order to prepare the public opinion for moves in the proper direction. And also an African Union, with stronger ties than at present, could be beneficial for the continent as well as for global society.

International Organizations: Regional unions would be beneficial but are insufficient. Strong international organizations and binding international agreements are needed, in addition, to define the rules of peaceful cooperation and problem solving. - Democracy is advocated as the best system for internally organizing a State. Each individual has the same rights and obligations, defined and guaranteed by the State laws. – On the international level, similar principles could apply as well. Each State should be entitled to the same rights and obligations, warranted by international laws.

Unfortunately, the most powerful State on our globe blocks the installment of an efficient network of international laws and organizations that could implement these laws. Selfishness prevails in the international relations that seem to reflect a state of development several hundred years behind the situation within modern democratic States where the concepts of equal rights have become common place. Indeed, that superpower is the most active promoter of inner democracy, but at the same time a real stumbling block for reshaping, in a democratic manner, international relations. It is urgent to develop at universities a new spirit that, finally, may inspire a new generation of far-sighted politicians. Joseph E. Stiglitz, a US Nobel Laureate in economic of 2001, said (17): *“We can not go back on globalization, it is here to stay. The issue is how we can make it to work. And if it is to work, there have to be global institutions to help set the rules.”*

Energy Problem: Finding solutions for the threatening Global energy problem is of immediate academic concern. Our future may crucially depend on a conscientious usage and fair distribution of presently available forms of energy, and on making new sustainable energy resources accessible. Major technological breakthroughs are needed towards this goal, but, in addition, the present misuse of energy must be minimized. It is inconceivable that all global citizens could ever dissipate as much energy as we today in “advanced” countries. Again, gripping international agreements are needed, together with an energy-conscientious education of the population. Indeed, universities have a great responsibility in this respect.

Converting the Free Market into a Responsible Market Economy:

It is apparent that an unlimited free market can not solve the long-term problems of mankind. Short-term thinking and egoistic reasoning prevail today, as mentioned above.

Adam Smith characterizes the human motives by his well-known saying (18): *“It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our necessities but of their advantages.”*

Indeed, his words reflect facts about ‘natural’ and inborn human behavior that we experience daily. But he seems to disregard the constraints imposed by society and by our responsibility for their beneficial long-term development. This responsibility can not result from human instincts to which his words refer. Only by conscientious education and by convincing role models, it is possible to motivate people to behave in a compassionate and unselfish way to help others.

My preferred (perhaps utopian) model of an economic system is a ‘responsible market economy’. In contrast to the ‘free market economy’, where the personal profits and the shareholder value are the driving forces, in a responsible market economy, the participant acts out of conviction that certain actions are needed for the sake of today’s or tomorrow’s society. And he does not ask for his own personal gains, whether directly or indirectly. Altruistic behavior would be the basic drive in such a model. May be, this sounds too idealistic, but still I think it is a goal that is worth pursuing. Certainly, universities are the proper place to further discuss the consequences and how to reach such a goal.

Help for the Poorest on the Globe: For easing the fate of the poorest people on the globe, it seems to me indispensable to implement a responsible market economy. Indeed, they need help and support to be able to live a humane life. A free market economy can not provide this perspective. It invariably leads to exploitation. Joseph Stiglitz, Nobel Laureate in economics of 2001, writes (17): *“International humanitarian assistance is a form of collective action that springs from a shared compassion for others. As efficient as markets may be, they do not ensure that individuals have enough food, clothes to wear, or shelter. Poverty can lead to environmental degradation, and environmental degradation can contribute to poverty.”*

Helping the poorest has much to do with ethics. I think that ethical principles should be articulated more in our university courses. They are the basis of a well functioning human society. After all, it is immaterial where we draw our ethical principles from. They

are virtually identically found in the foundations of all our diverse philosophical and religious systems. From Christian to Islamic, to Buddhist, and Hindu thoughts, the same principles of charity and compassion prevail in all great traditions. Ethics in a scientific context has been discussed in a convincing way by Hans Jonas (19): *“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 impetus, 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!”*

Respecting Cultural Diversity: The Clash of Civilizations is in full swing today, partially because of the short-sightedness of politicians and their self-centered advisors, partially due to disastrous effects of unrestricted profit optimization. - Following the theme touched above, indeed our world cultures have more in common than is apparent on the first sight, and their coexistence and mutual enrichment should cause no major difficulties. This is also what we experience daily in our universities where fruitful collaboration is easily possible across all racial and cultural barriers. In this sense, the life at universities might serve as a metaphor for peaceful human coexistence. The university is an ideal meeting place for different cultures, for becoming acquainted with each other, and for understanding each other. When we actively take advantage of this unique situation, we could contribute significantly to the inter-cultural understanding and to world peace. We should not forget that our cultures are treasures of heritage that we must preserve. Cultures are our living grounds that give us confidence and stability. Some of those who have lost their cultural roots might become terrorists, as they have nothing left that they could lose or sacrifice - except for their own life.

Many more subjects could be mentioned that should form part of the academic obligations. We are encouraged to constantly question our value system in the hope of finding universal wisdom that better reflects the needs of our own and the future society.

Concluding Remarks

When we step back and impartially observe the course which our world has taken, we might arrive at a frightening doomsday scenario that leads sooner or later to a technological and societal dead end. The energy dilemma clearly reveals that we are irreversibly depleting resources. But in many other respects, we deplete them as well:

We deplete goodwill and societal balance. We deplete the significance of compassion in favor of personal monetary enrichment. When all these precious resources are gone, human culture is gone, and we endanger our own existence.

In this situation, universities share co-responsibility for a beneficial and sustainable future of our globe and of the human community. Besides our basic research efforts, we need to spend some of our resources to clarify our dangerous global situation and to find avenues for improving the chances of a happy continuation of human culture. We need the courage to articulate our views, peacefully of course. And we have to sensitize and train our students in a way that they can contribute actively to a beneficial future. Our responsibility is great and unique. Let us recognize our role and improve our performance, even if the direct profits for us, teachers, might be negligibly small. Certainly, the satisfaction will remain to us that we might have contributed all we ever could to save our beautiful world and our precious living grounds. In conclusion, we perhaps take to heart the words which Karl Popper expressed on December 17, 1993, in Berlin (10): *"Optimism is our duty. We all are co-responsible for what is coming."*

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