J. A. Scott Kelso
Editor

Learning To Live Together:

PROMOTING SOCIAL HARMONY

S.T.E.P.S.
Springer

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ISBN 978-3-319-90658-4 ISBN 978-3-319-90659-1 (eBook)
https://doi.org/10.1007/978-3-319-90659-1

Library of Congress Control Number: 2018940637

Printed on acid-free paper

This Springer imprint is published by the registered company Springer International Publishing AG
part of Springer Nature
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

This book is dedicated to the life and work of Epimenidis Haidemenakis, the founding father and creator of the idea of The Olympiads of the Mind. Epimenidis was born on May 4, 1932 in Chania, Crete, Greece. As the youngest son of a Brigadier General in the Greek Army and Valedictorian of his Gymnasium in Chania, Crete, Epimenidis, or Epi as he is affectionately known to his colleagues throughout the world, has always held close to his heart the classic Greek philosophy—that competition is not about competing "against" but about competing to better oneself and one's fellow competitors.

Epi came to the United States on a scholarship to Columbia University in New York where he earned his BA degree in Physics in 1954. After completing his undergraduate studies at Columbia, Epi did research in solid state physics at various laboratories in the US including MIT National Magnets Lab, Honeywell Research Center, RCA Engineering Laboratory and the U.S. Naval Research Laboratory. His research took him to France (L'Ecole

Normale Superieure) where he continued his studies at the University of Paris.

After 12 years of scientific research experience Epi realized that he might be more skillful and productive in science administration and so continued his career as a consultant in international science, technology, industry and educational policy, conducting studies and ex- post evaluations for corporations, governments and intergovernmental organizations. These included International Telephone and Telegraph, International Harvester, Alsthom-Atlantique, the Ministry of Industry of France, UNESCO, UNIDO, UNDTC, and the Organization for Economic Cooperation and Development. On returning for the first time to his hometown of Chania, Epi felt that the students needed to connect with the giants in science and technology and that there was a need to offer new knowledge to these young students. So he invited his friends from a Physics Conference on Semiconductors in which he participated in Kyoto in 1966 to organize a conference in Crete. Epi managed to bring together well known physicists and the 1st Conference on the Physics of Solids in Intense Magnetic Fields took place in July 1967.

It was such a great success and the reception to Epi's idea of further international scientific interchange was so overwhelming, that it sparked the first of nineteen "Chania Scientific Conferences" mostly on topics in Physics. The success of these Conferences inspired Epi to form the International Science

Foundation—a world renowned organization to this day. He then pursued a Ph.D. in International Relations which was awarded to him in 2008 from Camden University.

The International Science Foundation developed a stellar reputation in the 1970's and 80's inviting Nobel Laureates from all over the globe. In 1991, the scope was broadened to include all disciplines and the first Olympiad of the Mind was held under the newly formed International S.T.E.P.S. Foundation (Science, Technology, Economics and Politics for Society), a U.S. non-profit organization. By definition, S.T.E.P.S. begins with the inherent and inevitable human curiosity for scientific research. In turn, technology, being the application of science, has a direct impact on the economy, which itself influences the flow of politics to a large extent.

In unison, these four elements are of major importance in affecting our lives, and thus have distinct consequences for our society. The Foundation, by bringing together people belonging to countries with different or competing national interests, worldviews and perceptions of global peace, created a context of mutual understanding and trust. Many friendships were developed, even between nationalities which were in political and ideological conflict then (such as American–Russian, vodka-whiskey exchanges). As the intellectual counterpart to the Olympic Games for the body, Epi's Olympiads of the Mind (OM) assembled some of the world's most powerful minds to apply the synergy of

Science, Technology, Economics and Politics to the major global and regional challenges facing our Society.

The ultimate goal of each Olympiad of the Mind is to contribute to the development of humankind by formulating policy recommendations for action and solutions to problems of global urgency. Throughout the years, Epi has ensured that the Olympiads remain free of any political agenda, controlling body or influence, so that uncensored and "real" solutions can be proposed for world problems. For example, the Olympiad held after the 9–11 World Trade Tower attack in New York was at the United Nations Educational, Scientific and Cultural Organization (UNESCO) in Paris in 2005 with the aim of investigating ways to apply communication technologies and information systems to solve the global challenges of terrorism, poverty, unemployment, nuclear proliferation and energy resources.

It has not been the role of the International S.T.E.P.S. Foundation (STEPS) to implement the findings of each OM. Instead, STEPS has sought to stimulate and invite the most powerful international organizations, like the World Bank and the United Nations, to do so.

In this respect, and in the spirit of its founder, Epimenidis Haidemenakis, we are currently seeking more ways to implement these recommendations (see Section VI). We invite our readers and seek their input to find channels to share and actively engage this

information in their sphere of influence however large or small that may be.

To our friend and colleague Epimenidis Haidemenakis, a great visionary and true humanitarian, a person devoted to bringing great minds together to create solutions for The Peoples of the World to Learn to Live Together, we dedicate this book in awe of the trail that he has blazed so brightly. We pledge ourselves to carry on the work of the Olympiads of the Mind with the spirit of excellence in diversity, variability and compassion that Epi initiated and has so aptly demonstrated throughout his life.

Konny Light, JD, Corporate Secretary
J. A. Scott Kelso, Ph.D. Hon. MRIA,
Chairman and President
International S.T.E.P.S. Foundation and the
Olympiads of the Mind

Preface

This volume consists of a number of papers presented at the Eighth and Ninth Olympiads of the Mind (OM) hosted by the US National Academies of Science and Engineering in Washington, DC, in November 2007 and at the Orthodox Academy of Crete in Chania, Crete, in September 2017. Although separated in time by a period of 10 years, the two meetings shared a common goal. On the one hand, the title of the Washington meeting was "Brain Research: Improving Global Harmony"; on the other hand, the Crete meeting was called "Learning to Live Together." The present volume "Learning To Live Together: Promoting Social Harmony" thus represents a merger of both themes.

On such matters as global harmony and learning to live together, separation in time does not mean "outdated." As is quite clear from current events, the issue of how we can learn to live together in the face of division and conflict is not going away anytime soon. It has, one might say, a certain staying power. Though it lies at the very heart of our existence, humans, it seems, have not yet found a way to deal with it. What hope, then, that we humans can learn to live together with machines—or they with us?

Both the 8th and 9th Olympiads featured distinguished international scholars, including government and corporate representatives, leading researchers and academics from multiple disciplines, and Nobel Laureates—all committed to understanding the role and impact of science, technology, economics, and politics on human beings and society at large, with the aim of improving the human condition and achieving greater cooperation among people. The six sections of the current volume embrace issues of the environment, sustainability, and security; of diversity and how to achieve integration and peace among people in a fractured world; of healing and understanding ourselves, including the important role of brain research; of how to overcome poverty and inequality and how to improve education at all levels; and of how new technologies and tools can be used for common benefit, their drawbacks, and potential uses, from the smallest scales in nature to how we conduct financial transactions. The culmination of the book is a call to action, to join what one might call the "OM Movement"—bringing the best minds in the

world together to create solutions to world issues so that we can all live together in harmony.

It must be said that the Olympiads of the Mind are a testament to the kind of creative richness and coordination that can emerge when heterogeneity (of people, the fields they represent, and the places they come from) is combined with open, engaged exchange. They are a forceful demonstration of the processes that, at least under some circumstances, enable human beings from very different backgrounds and cultures to work together to move us forward. Much more about the mission, vision, and history of the OMs is to be found in the dedication of this book to the extraordinary human being who had the insight and the drive to make them happen, Epimenidis Haidemenakis. His are difficult shoes to fill.

It remains now to thank all the contributors to this volume and all the staff and volunteers in Washington, DC, and Chania, Crete, who made these "meetings of the minds" not only possible, but such an enjoyable experience. The setup and smooth running of events relied on the skills and dedication of folks like Dr. Jill Harrington in Washington; Calli Cavros, Manolis (Lakis) Planas, Yannis Marinakis, Mirela Manos, and Leah Petroski in Crete; and Amruta Dadhe in Atlanta, Georgia (USA). IT support was gratefully provided by Vasileios Mavrikios. On behalf of The Olympiads of the Mind and the S.T.E.P.S Foundation, we thank you with all our heart.

I am very grateful to my physicist colleagues at The Center for Complex Systems and Brain Sciences, Armin Fuchs and Roxana Stefanescu, for helping organize the varied, individualistic styles and contents of the papers into a (relatively) common format; to Jane Buck for her willingness to edit one or two of the papers; and finally, to Tom Ditzinger of Springer, who immediately embraced the idea of a book project, harmonized the individual chapters, and sped up the production process, I am forever grateful. Dear Epi, this book is for you.

Boca Raton, USA
Derry, UK
January 2018

J. A. Scott Kelso

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Dr. Epimenidis Haidemenakis' Speech for the 9th Olympiad of the Mind

I am delighted to welcome you all here to the 9th Olympiad of the Mind (OM), with the theme of "Learning to Live Together," and thrilled to see such a special group of speakers and audience in attendance. I would like to welcome His Eminence Amphilochios, Bishop of Kissamos and Selinon, Representative of the Ecumenical Patriarchate of Constantinople as well as Dr. Kostas Zorbas, General Director of the Orthodox Academy of Crete. I would also like to make a reference to the late Archbishop Eirinaios, who created this conference centre and who was a good friend and a doer, not just a listener.

I represent the S.T.E.P.S. Foundation, which is a not-for-profit and tax-exempt educational and scientific corporation. Its function is to organize international forums dealing with the hard sciences, the life sciences, and the behavioral sciences.

Central to the philosophy of the OM is the concept that relies on the interdependence and synergy of five individual pillars of life, namely: science, technology, economics, politics, and society. By definition, S.T.E.P.S. begins with the inherent and inevitable human curiosity for scientific research. In turn, technology, or the application of science, has a direct impact on the economy, which itself to a great extent influences the flow of politics. In unison, these five elements are of paramount importance in affecting our lives and thus have distinct consequences on our society.

Tragic events such as the terrorist attacks on September 11, 2001, have shown to the world how the inequalities between industrialized and developing nations are not without serious consequence. While the civilization we now live in might rightly be described as the Communication Civilization, we also see an upsurge in war, injustice, and an ever-increasing gap between developed and developing nations. International relations are issues of security, energy resources, and territorial claims. The aggressive methods used to combat such problems are often counterproductive and expensive. Moreover, at the heart of many of the challenges faced by the world lies a lack of communication and understanding. The great technological advances of our Communication Civilization are not being optimally applied to solving its problems.

From the moment life appeared on this planet, humanity has tried to create a functional and humane society in which people can live together in harmony. But all those billions of years have gone by, and with today's easy solutions and convenient life, we still have not found a formula to live by peacefully. Learning to live together seems to be a very difficult thing, if not impossible. Humanity is trying to better itself and learn to live together, but during this process, we seem to have lost focus. Instead of learning to live in peace, we are learning how one nation can dominate the other.

That thought led me to our theme "learning to live together" (LTLT). That being said, I cannot hide from you that I feel more pessimistic than any other time we have discussed this. While the civilization we now live in might rightly be described as the Communication Civilization, we also see an upsurge in war, injustice, and the ever-increasing gap between developed and developing nations. Added to that, terrorism has increased through the last few years, and instead of learning to live together, we seem to be learning how to kill each other.

World War II is a vivid example of that. During that terrible war, the Soviet Union mourned on average nine dead every minute: every hour, 507 dead, and every day, 1400 dead. Unimaginable material destruction took place as well. Over 1700 cities, over 70,000 villages, thousands of hospitals, schools, libraries turned to dust on the ground of the USSR by the Nazis. And the killings go on. The casualties in the Japanese cities, as a result of the atomic bombings, were grave. Within the first two to four months following the bombings, the acute effects of it had killed about 146,000 people in Hiroshima and 80,000 in Nagasaki. Roughly, half of the deaths in each city occurred on the first day. The third example of humanity learning only to kill each other is the terror happening at our doorstep, in some Mediterranean countries, Iran, North Korea, and so on.

But we must fight this endless war with our best weapons, knowledge, ideas, and communication. Communication is vital to human beings; without it, a full and rich life, both exterior and interior, is unimaginable. It allows us to learn from others and work powerfully in teams, which is the only way people can actually learn to live in peace.

In terms of ideas, I was thinking about what could my contribution be in this OM, and I finally found it! It is women! If we manage to bring women's presence more into politics and seriously increase the number of women who possess political power, then we would be improving life and creating a more peaceful world.

Women give birth to life and have a natural inclination to protect and care for others. Therefore, they do not consider war as a possible solution, since by definition war is mainly destruction. Also, using the same argument, women would support the idea of formulating new legislation that protects the weak and poor and brings equality into existence. In addition, they are more likely to reason and be willing to explore compromise as well as seek and respect other people's opinions.

If capable women get placed in critical policy-making positions, they would be able to improve life as we know it and balance some dominating and aggressive aspects of men.

Throughout the years, men have shown that they are not capable of preserving life or improving it. Even in the world we live in today, with colossal technological breakthroughs and solutions that are supposed to make our lives easier, our leaders seem to not grasp the apparent fact that war should not be the solution to any problem and that every single war is taking us centuries back.

Thus, learning to live together seems an impossibility to me at times. Unless our political leaders take new kinds of measures, we will all end up with that feeling of pessimism that I know most of us have.

But, this is not the only time that mankind has faced such fragile situations, so, I hope, by the 10th OM, by using diplomacy and smart thinking, the bloodshed will be reduced and we will be looking at the future with more hope. And we will have created an International Committee of the Olympiads of the Mind (ICOM).

I will finish my speech with a nice phrase that we learned in high school in Latin class, "Dum Spiro, Spero" = "While I breathe, I hope."

Ladies and Gentlemen,

I thank you.

Part I
The State of the World

Global Response to Global Problem

Yuan T. Lee

In 1982 when the Erice Statement was written to address the real danger of nuclear war, the fear was that technology would be used not by the culture of love, but the culture of hatred to kill and destroy. These dangers of mass destructions are still very much with us today with more countries and groups trying to acquire nuclear weapons.

However, I would argue that the greatest danger we face today is of a different kind. I'm talking, of course, about climate change. The Erice Statement speaks of mankind having, for the first time in history, the military power to destroy the world. But we also, for the first time, have the power to change our environment to the point where it cannot support life anymore. And that power is not only military. With climate change, it is not enough that we stop using technology for *the culture of hatred*. Sometimes, technology for *the culture of love* can be a part of the problem.

I would like to take us back in time, to the beginning of the story of human development. I wonder how many people today can remember a time, when nobody could question that humanity was a part of nature. We used to depend on the Sun for almost everything. Photosynthesis converted solar energy and made so much possible: food to nourish us; materials to build shelter; clothes to warm us. Mankind had a relatively small footprint on the environment. Actually, I experienced this kind of lifestyle 72 years ago. I was just a boy, about 8 years old. World War II had spread to Taiwan, so I went to live in the mountains to avoid the danger of daily bombing of the cities by US airplane. We depended almost completely on the

The author is former President of Academia Sinica, Taiwan. He was awarded the Nobel Prize in Chemistry in 1986 (along with Dudley Herschbach and John Polanyi) for his work on understanding the dynamics of chemical reactions.

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J. A. S. Kelso (ed.), *Learning To Live Together: Promoting Social Harmony*,
https://doi.org/10.1007/978-3-319-90659-1_1

nature around us. And to this day, I remember it as one of the happiest times of my life.

But starting about 250 years ago, something happened. The industrial revolution began in England, and then spread to Germany, France, and the United States. We also discovered that there were these black stuff in the ground that contained huge amounts of energy. And everything changed. It seemed like humanity was breaking free of nature's limits.

Our technology advanced rapidly. It began with the steam engine, the weaving machine, and the internal combustion engine, and continued with the elevator, telegraph, atomic energy, etc. Advances in chemistry allowed us to synthesize materials that never existed before: nylon, polyester, carbon fiber… we invented robots and sent them deep into the oceans and into space. By exploiting fossil fuels, we dissociated ourselves from dependence on the sun. Now, human development was no longer limited by the pace of photosynthesis and the amount of biomass. And so it took off, along with the human population.

Unfortunately, everything has side effects; and this story of human progress is no exception. With low-cost mass production after WWII, high technology has democratized. But it has also individualized. Personal laptop, smart phone, iPad, cars, and flat-screen TVs… In industrial societies, it is not unusual to see families where every member has a personal version of each. And new versions come out all the time, so having the old versions was not cool anymore, and you had to buy the newest ones.

What has grown alongside technology is a culture of mass-consumption for individuals. When companies invent and develop new gadgets, their dream is not that every community would have one. Their dream is that every family, every person would have one.

Growth in consumption and GDP has become *the* goal, and Brazil, China, India, Russia and almost everyone else have joined the quest. Young people everywhere now grow up with the dream of one day living like an well-to-do American… Having their own houses, their own sports cars, many televisions, and the latest electronics. And the dream is coming true for more people than ever before.

But unfortunately, and I think most of us here know it, this particular story of human progress is unlikely to have a happy ending. More and more individual consumption in a world of 7.3 billion people–going to 9.7 billion by 2050–will be a disaster.

Even the basic math doesn't work. The Global Footprint Network estimates that we are consuming 40% more resources than the Earth can produce–and 440% more if all of us lived like Americans. We are already losing species at about 1,000 times the natural rate. In 2011, the WMO declared 2010 the warmest year on record, but the record was broken again and again and last year 2016 was the warmest year ever, and recent scientific studies by many institutions suggest the world may get 4–5 degrees warmer in this century, if we keep business as usual. Extreme weather is getting stronger and happening more often everywhere.

What is scary is that all of this is happening with today's human ecological footprint. To believe that everything will be fine would be the most naïve wishful thinking. Nature is already warning us.

We can only come to one conclusion: the model of development started by the rich countries and adopted by the developing nations is not the right one. Individual consumerism is not the best use of technology. If we wish to remain on this Earth for centuries to come, then we have to find other ways to develop and improve people's lives. The rich countries are already "over-developed." The developing countries, or "not-yet-over-developed" countries, cannot follow them. They have to find better ways.

I firmly believe that we can find ways of development that are both better and more sustainable. I say "ways," not "way", for many reasons. For one, every place is different, and calls for development that's appropriate to it. An Indian way of development would be different from a Moroccan way of development; and how you develop in Crete would be likely be a little different from how you develop in Taiwan. It is extremely important for us to accede to the fact that human society has been over loading the earth system over the last half a century and we need to reexamine what "Development" really mean.

The difficult problem of climate change we are facing today is a global problem and so it needs a global solution. Neither a single country nor scientists can solve this problem alone. The earth does not care which community in which country puts out how much CO_2. It cares about the total amount of greenhouse gases, from all humanity. In December 2015, 195 political leaders from all over the world came to Paris to attend the COP21. The final agreement to limit the global temperature rise to 1.5–2.0°C is a historical great awakening. For accomplishing this goal, they also agreed that it is necessary for human society to decarbonize and to become carbon neutral in the second half of this century. Although agreement reached in COP21 is not a binding one, every Country is supposed to follow their committed plans.

Obviously, we will also need better global institutions. Nation state based international organizations are often mired with the dilemma between "collaboration" and "competition". Scientists believe that if we instill sufficient funding for research related to energy transformation, storage and transportation, it is likely that we can accomplish carbon neutrality by the middle of this century. By 2050, it is likely that the worsening global warming will bring frequent serious extreme weather events, that humanity would finally realize that the real danger of human survival is not the invasion of enemies across their national boarder. It is the climate change which we are causing it ourselves. Apparently, the 2% of global GDP which we have been spending on defense worldwide should be spent on research for the energy transformation. We should learn to defend ourselves from the "real enemy".

I do believe that for the global sustainability, we have to follow the following pathways,

(A) Global response to global problem.
(B) Back to nature, back to sunshine.
(C) Live better for less.
(D) Control population explosion.
(E) Improve equality around the world.

We do not have much time left. Unless we learn to connect humanity as one global unit, connect knowledge to action immediately, survival and prosperity of humanity will be extremely difficult.

Some Security Issues of Living on Planet Earth

Yannis A. Phillis

Civilization is a very recent event in Earth's existence. It became a reality, among others, through a combination of Darwinian individual and group competition. Narratives of both types of competition can be found in myths and stories in various sources including the Bible. If the time span from the appearance of the Earth 4.6 billion years ago to the present is equivalent to one year, then the Genus *Homo* which is 2 million years old appeared at 20:00 h, December 31. *Homo sapiens* (60,000 yrs ago), appeared 7 min before midnight and civilization (10,000 yrs ago), just 69 s before midnight.

This recent event of civilization afforded us enormous progress in such areas as life expectancy, economic prosperity, arts, science, and civic comfort, to name but a few. Today civilization has become global in that humanity is interlinked in complex ways. Economic troubles on national scales tend to have global repercussions, international trade has the potential of benefitting and, sometimes, harming everyone, greenhouse gases (GHG) emissions in one place affect climate everywhere, viruses and bacteria travel fast from country to country.

Civilization itself is like a thin skin, which, when torn, reveals the primeval human animal. Take away basic food and water security or infuse a sense of national or tribal encirclement by enemies or convince people of their national or religious superiority and you've created out of educated people with fancy degrees monsters and cannibals—the latter sometimes literally as was witnessed in, for example, WWII and SE Asia in the 1940s. ISIS is a case in point presently but not the only one.

Civilization and progress rely on the economy that, in turn, relies heavily on environmental services. But the economy creates externalities such as climate change, species extinction, disruption of natural cycles, large scale pollution and the list goes on.

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J. A. S. Kelso (ed.), *Learning To Live Together: Promoting Social Harmony*,
https://doi.org/10.1007/978-3-319-90659-1_2

The economy is central in creating utility and progress. Its main vehicle is what is called the free market. Absolutely free markets and Pareto optimal equilibria exist only in idealized economics courses and fantasies of the ultra rich. An absolutely free market would wreak havoc on the environment and the livelihoods of billions of humans.

It becomes clear, therefore, that to live more or less harmoniously on planet Earth, we need to rethink several aspects of our civilization and define a rather sustainable course. My modest proposal touches upon one major issue, climate change, which, of course, is only part of a long list of possibilities.

We urgently need to take immediate and drastic GHG abatement measures to prevent possible irreversible catastrophes in the near future. We are already experiencing more frequent droughts and extreme weather phenomena and the reappearance of long forgotten diseases. I shall analyze specific policies for all the countries based on my group's research.

Civilization according to the Dictionary of the Academy of Athens is "The body of moral, intellectual, material and technical achievements of a society." It is characterized mainly by: writing, urbanization, the existence of social hierarchies and the domination over and separation from nature. Civilizations rise and fall. Some reasons of collapse according to Jared Diamond (2011) are: environmental catastrophes (cutting of forests, soil erosion, etc.); climate change; resources dependence on remote places; internal or external conflict; no reaction to social and environmental problems.

In the past several advanced civilizations collapsed because humans destroyed their social and environmental base. Well-known examples of great civilizations that collapsed in the past include the Minoan, the Mycenaean, the Sumerian, the Babylonian, the Roman, the Mayan and numerous other civilizations (Motesharrei et al. 2014). One might wonder if we have not taken a similar path today because of climate change.

The Climate Predicament

Climate change is one of the most urgent problems facing the earth. Its facets are multiple: environmental, economic, and social, and its consequences could become dire if drastic and concerted action is not taken immediately. Climate change is already exerting a host of stresses on the environment and the society that will intensify with time. In the face of this reality, humanity has done little to avert possible catastrophes. Puzzling as this behavior might appear at first, it can be partially explained by behavioral economics and psychology (Grigoroudis et al. 2016). However, human climate inaction is often attributed to a degree to plain economics. We stand to lose economically more than we gain. Is this true?

Models that estimate the costs of climate change have been amply criticized on various grounds. An oft cited criticism is that they underestimate the costs of