**PHILOSOPHIES UNDERLYING SYSTEMS AND CYBERNETICS IN SEVERAL COUNTRIES**

Stuart A. Umpleby

President of the IASCYS Executive Committee

www.iascys.org

[umpleby@gmail.com](mailto:umpleby@gmail.com)

Department of Management

George Washington University

Washington, DC 20052

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in Several Countries

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INTRODUCTION

My background

This is my first presentation to this group, so probably I should introduce myself. Over the years I have attended several conferences in Vienna and Amsterdam, a conference many years ago in Namur, and occasionally conferences of RC51 on socio-cybernetics, the International Society for the Systems Sciences (ISSS) and the World Organization for Systems and Cybernetics (WOSC). My education was at the University of Illinois in Urbana-Champaign (UIUC). I was associated with the Biological Computer Laboratory where I met Ross Ashby, Heinz von Foerster, Humberto Maturana, Francisco Varela, Stafford Beer, Gordon Pask, and Lars Lofgren. Since the 1970s I have worked with the American Society for Cybernetics (ASC), attempting to bring about a scientific revolution in cybernetics and recently in science itself

The Mission of the Academy

The mission of the Academy is to acknowledge and honor the work of outstanding contributors to the fields of systems and cybernetics and to improve and strengthen the field through education, research and practice. Academicians contribute to encyclopedias, handbooks, websites, on-line discussion groups, and educational programs. Since being chosen as President of the Executive Committee I have sought to learn more about what is happening in the field. I have attended a wider range of conferences in order to learn:

What questions are being asked? What theories are being used? What philosophies are present or absent? What are the main agreements and disagreements in the field?

I have found different regions of the world define three stages in the development of systems and cybernetics. The regions are Europe and North America taken together, Russia and China. I think of the three stages as being concerned primarily with engineering cybernetics, with cognition and psychology, and with social systems. However, these three interests are described quite differently in the three regions.

Our field is different from the traditional fields in several ways. We work on several levels -- philosophy, theory, and practice. We seek to integrate knowledge in the traditional fields and in our own fields. We strive for the unification of science. We use ideas from one field to enrich thinking in other fields. For example, Warren McCulloch used knowledge from neurophysiology to resolve debates over epistemology.

Our work is guided by several purposes. Some values in our field.

The traditional disciplines focus primarily on testing theories and applying theories in practice. We strive to create more general theories and more fundamental concepts. We seek to aid communication among disciplines. Hence, our clients are often other academics.

CYBERNETICS IN EUROPE AND NORTH AMERICA

Second order cybernetics

* Two parts of cybernetics – theory and technology
* Since the 1970s theoretical work in cybernetics has advanced under the name “second order cybernetics”.
* An effort to shift attention from engineering applications to the biology of cognition
* Von Foerster’s students and friends began an effort to make a scientific revolution in cybernetics by promoting the idea of second order cybernetics

Including the observer

Based on his experiences with the Macy conferences in the late 1940s and early 1950s Heinz von Foerster wanted to include the observer within the domain of science.

This was a major departure from the prevailing view that the observer needed to be excluded from consideration in order to create objective descriptions

Beginning a scientific revolution

By the mid 1970s several neurophysiological experiments had shown that the brain does work for us that we are not aware of. Because brains are different due to training and experiences, the possibility of excluding the characteristics of the observer from observations was found to be not possible.

Features of second order science

Second order science adds additional dimensions to our conception of science thereby expanding the region susceptible to scientific investigations.

It offers ideas that contribute to quality control in science.

It includes subjects in the class of experimenters, and hence provides a way of investigating purposeful systems

Consequences of the philosophical differences

In my experience Europeans approach problems with a larger set of conceptual possibilities than do Americans

The philosophy of realism works well for the natural sciences but not as well for the social sciences

Wiener’s second industrial revolution, concerned with control and communication, requires a different philosophical foundation than the first industrial revolution, which was concerned with matter and energy

CYBERNETICS IN RUSSIA

Cybernetics in Russia

Vladimir Lefebvre’s theory of reflexive control has had many applications in Russia – in strategic thinking, in education, and in psychotherapy.

In the U.S. his theory of two systems of ethical cognition was a key to ending the Cold War.

Dmitry Novikov’s recent book on cybernetics cites many authors that I have not heard of previously.

Vladimir Lepskiy and his colleagues in the Institute of Philosophy of the Russian Academy of Sciences (RAS) are developing the idea of “third order cybernetics”

Third order cybernetics in Russia

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| --- | --- | --- | --- | --- |
| PHILOSOPHICAL LEVEL | | METHODOLOGICAL LEVEL | | THEORETICAL LEVEL |
| Type of scientific rationality | Philosophical approach | Paradigms or models | Scientific approach | Areas of knowledge |
| Classical | Positivism | Subject - Object | Activity approach  Monodisciplinary approach | Cybernetics |
| Non - classical | Philosophical constructivism | Subject - Subject | Subject-activity approach  Interdisciplinary approach | Second order cybernetics |
| Post - non - classical | Humanistic interpretation of philosophical constructivism | Subject - Meta-Subject  Self-developing reflexive-active environments | Subject-focused approach  Transdisciplinary approach | Third order cybernetics (post-non-classical cybernetics of self-developing reflexive-active environments) |

In Russia first order cybernetics refers to what is observed. Second order cybernetics refers to the observer and methods and techniques of observation, but there is no mention of the biology of cognition. Third order cybernetics focuses on social concerns, particularly the meta system at any level. The philosophers referred to are recent or contemporary Russian philosophers – Aleksej Leontiev, Sergei Rubinshteyn, George Shchedrovitsky, Vyacheslav Stepin, Vladimir Vernadsky, Lev Vygotsky

The meta subject refers to the social context. Social systems exist on many levels -- micro, meso and macro levels. Examples of systems at the micro level are individuals, families, and work teams. Systems at the meso level are business organizations and cities. Systems at the macro level are nations and the world. Theorists in both traditional disciplines and systems and cybernetics have written about the micro and meso levels. At the macro level Russian theorists focus on recent Russian authors.

For scholars in the US and Europe to find the key authors at the macro level one must go farther back in time. In the 17th century people were trying to figure out how to create self-governing societies. The task was to build a reflexive society, one in which people were both rulers and ruled. Eventually the goal became to go beyond the king and the Pope. Both still exist but have diminished power.

Society as a reflexive system

The macro level is the most reflexive level.

There are many feedback loops in a large social system. There are many challenges – how to resolve internal conflicts, how to defend the society against interference from outside, how to create an innovative society and how to achieve steady social progress.

Leading theorists were

Thomas Hobbes (1588 – 1679) and John Locke (1632-1704) in England;

Voltaire (1694 – 1778) and Jean-Jacques Rousseau (1712 – 1778) in France and

Edmund Burke (1729 – 1797) in Ireland.

Two goals of self-government

Acemoglu and Robinson in their book *Why Nations Fail* suggest that nations must learn how to do two things. Assemble enough power to achieve social purposes.

Limit the power of the executive so that the rights of individuals are not compromised

Organizational structures

A federal system – local, state and national governments

Branches of government – legislative, executive, and judicial branches

The branches were independent and could check abuse of power by another branch

Other institutions – free press, business organizations, labor unions, public education, non-governmental organizations

Principles of government

Majority rule and minority rights

Right to private property

Limits on the power of government, trial by jury, right to a lawyer

Religious liberty

Freedom of speech

Secular authority replaced religious authority

The state -- the citizenry as a whole -- could regulate both religion and the economy

A common point of view

During the Cold War there were two points of view – capitalism and communism.

These ideologies gave meaning and purpose to life and provided organizing principles. An alternative, more general point of view is what Karl Popper called “piecemeal social engineering” and what Donald T. Campbell called an “experimenting society”.

Third order cybernetics

If third order cybernetics is seen as a theory of experimentation and reform in social systems, it will connect the earlier work in cybernetics with political reform and the evolution of society.

This is a major addition to cybernetics and to the unification of science.

SYSTEMS AND CYBERNETICS IN CHINA

(Based on a presentation by Jifa Gu)

Philosophy, theory and practice in China. Since my knowledge of China is quite limited, this presentation is taken directly from a presentation by Jifa Gu, who is a vice president of the Academy. Because of its emphasis on development and its Belt and Road initiative, China is very interested in systems engineering.

China is a very old civilization with a different philosophy than has been developed in the West. China has made tremendous progress in recent decades in lifting millions of people out of poverty. As an indication of the scale of construction activity in China, about as much concrete has been poured in China in the 21st century as the US poured in the 20th century. Not only has China constructed many buildings, roads and bridges, it has also educated the managers of these projects.

Systems engineering in China

The Chinese approach to systems engineering is called the Wuli-Shili-Renli (WSR) Approach. It has three parts:

Wu – refers to objective existence

Shi – is about subjective modeling

Ren – describes human relations

These three constitute a differentiated whole

The WSR method has been developed within the Oriental context influenced by its philosophical, cultural, sociopolitical and economic features.

China has a philosophy of harmony.

Chinese philosophy is characterized by its belief in harmony and holism.

The three major ancient Chinese philosophical traditions (Taoism, Buddhism, and Confucianism) all emphasize harmony. Opposites are seen as being parts of a whole. There is a desire to unify Yin and Yang. Yin refers to something negative, lunar, or feminine. Yang refers to something positive, solar, or masculine. There is also a desire to unify Zhi and Xing, knowing and doing.

In terms of differences between East and West the Chinese focus primarily on social relationships, in families, organizations, and societies. Western thinking focuses more on relations between humankind and the material world, on the world and our descriptions of the world.

Oriental culture at the very start of a project is concerned with moral considerations.

As a result the East extends greater respect to the “common good” and/ or “group benefit”.

Regarding systems engineering in China, in the 1970s and 1980s Chinese scholars used system engineering methods from the West (e.g., A.D. Hall III).

Several case studies were done, on regional development, global climate change, evaluation problems and water resources management. These early studies emphasized Wuli (machines, substance) and Shili (analytic methods, simulations). In the 1990s Renli was added by Gu and Zhu to create a systems approach.

A problem had been found with the early methods. A survey showed that the positive results of the early studies were not acknowledged by leaders in Beijing. There was a difference between mid level and top level opinions. Gu and Zhu realized they had to understand the desires of leaders first, then try to communicate with them.

In China there is a belief that ideas are developed through action. The Chinese believe that human beings simultaneously understand and create the world. Human conceptions, intentions, and actions cannot be properly investigated if separated from their surroundings or from one another. Morality, knowledge, and actions of human beings are mutually supportive and cannot be artificially isolated from one another.

CONCLUSIONS

Interests vs. theoretical issues

In the US the three stages – engineering cybernetics, biological cybernetics and social cybernetics are areas of interest influenced largely by the interests of the people who were active in ASC at the time. In Russia the three stages can be traced to changes in the interests of philosophers. In China the three phases resulted from efforts to solve practical problems.

We can reach some preliminary conclusions about the three regions.

The US and the European Union are not as similar as they think. People in the US and Europe think they are using the same theories and methods and that these theories and methods grew out of a common history. However, in the realm of philosophy there is a major difference. in epistemologies – realism in the US and a range of epistemologies in Europe. Scholars in the US are much less familiar with the work of European philosophers than are European scholars. In Europe high school students spend two years on the history of philosophy. They study the major European philosophers and are expected to know the basic points of view of each. American students might encounter philosophy in college, depending on what they study, but this is not required. In Europe the history of philosophy provided the ideas that Europeans used to free themselves from repressive regimes. Hence, European scholars have a high regard for philosophy.

Combining American pragmatism with European interest in theories and philosophies leads to a large number of conceptual possibilities. For example, Wiener’s second industrial revolution with its emphasis on control and communication requires a philosophical background which is different from that of the first industrial revolution with its emphasis on matter and energy relations.

In the fields of systems science and cybernetics some subfields emphasize philosophy while others emphasize mathematics. For example, operations research, system dynamics, artificial intelligence and complexity all place a high value on inventing and using mathematical methods. These branches of systems and cybernetics have been less interested in theories and philosophies.

Why is philosophy important? Philosophy makes explicit underlying assumptions, so they can be compared and questioned. Our beliefs, values, and assumptions are present whether we are aware of them or not. By studying philosophy we discover alternatives to beliefs we had not questioned. An important example is the difference between ontology and epistemology. Ontology describes what exists. Epistemology is concerned with how we know what exists. In the US systems scientists and other academics are often not familiar with the term epistemology and very few have heard of the leading European philosophers who have contributed to the literature on the variety of epistemologies. They assume that different people, when conducting an experiment will see different things. Efforts by cyberneticians to introduce systems scientists to additional philosophical perspectives were met with opposition in the 1970s to the 2000s. In recent years there has been a willingness by some system scientists to consider philosophies other than Realism. Familiarity with a wider range of philosophies has made some scientists more open to alternative points of view.