

The Fundamentality of Exponentiality

Will *exponential knowledge automation* change the fundamentals of science?

Technological evolution is the continuation of biological evolution; the coming exponential knowledge automation of the next 2 decades will alter the fundamentals and methods of science towards the demands of the information age. 4th order cybernetics will direct this fundamental shift into applied scientific research of the interplay between matter and living matter, concerning the construction principles of nature and its origin. Human thought and will, i.e. consciousness, will be the decisive foundation stone of science and practice.

Fundamentals, methods, cybernetics, conscious thought, science, practice, oikos, health.

JEL: Z00, Z19

Stephen I. Ternyik

Social science economist (-1985)

StephenJehucal@web.de

The house, where we are living in today, is built by science as part of the economic production assembly line; we have changed the biotope into a technotope, technological evolution has become the continuation of our natural and social evolution. Our current phase of scientific events is a period of exponential knowledge automation (exponentiality), and the fundamentals of science are being touched by this selection pressure. We all feel that the foundation stones (fundamentality) of our house are moving, and we are losing rapidly solid ground. Such an exponential chain of connected accelerating events in human knowledge automation is, in mathematical terms, the operative turning of a quantity into a power, it is a sorcerer's apprenticeship. These tectonic movements of scientific fundamentals do indeed affect our further life in the house, and they may become a decisive matter of human survival, concerning an effective selection procedure. We will soon reach the exponential top of industrialization, when all human industrial labor of the 20th century will be fully automated; this also refers to the future role of scientific work and the research methods. Exponentiality is fundamental, for science and for human life.

The following shift (from/to) of scientific fundamentals will take place, in the next two decades:

Mechanisms-----→Organisms
Physical science-----→Life science
Matter-----→Living matter
Experiment-----→Computation
Body-----→Brain/Mind
Control-----→Communication
Knowledge-----→Expertise
Hierarchy-----→Complexity/Networks
Linearity-----→Cyclicity/Spirals
 $\frac{1}{2}$ D-----→ $\frac{3}{4}$ D

The emergence of a 4th order cybernetics is at the heart of this transformation and transition of scientific fundamentals; for the stabilization of the foundation stones, the house must be built on (classical/time-tested) wisdom, (human) understanding and (modern) knowledge in all its corners (Proverbs, 24:3,4). This is indeed a tall cognitive or intellectual order, but it will be commanded by the new technological production stage; the linear assembly line will become an intelligent assembly line. Education, economics, medicine and engineering will be at the front line of this 4th order learning processes. Such a shift of scientific fundamentals is much more than a pedagogical challenge, it is also a matter of social organization, order and macro-prudence, at the same time. Scientific creativity (ingenuity) and methodology (research methods) are the keys to open the door of the newly rebuilt house; otherwise, homelessness will occur. The universe is not run on profit, though an exact accounting system, and we should better become 'gardeners' than 'speculators'. As K. Popper and T. Kuhn have pointed to in their analyses of science research, we are always dealing with group dynamics and thinking, and a matrix change of fundamentals in science is a cognitive selection process; the outer pressure for scientific thinking is generated from the technological stage of the production sphere, where new questions of balance and sustainability arise, i.e. we are an active part of a historical chain in human problem-solving for our very survival and mutual development. The scientific method is a time-tested tool of human communication, but needs constant updating, in ethical and technical terms.

E-learning-methodology will catapult the educational sector via exponential knowledge automation into a new area of learning; all kinds of regurgitation can be automated, opening the doors for creative learning and high-quality assembly pedagogics (group learning). In the economic sciences, advanced computation will balance the antagonism of private and public wealth management, introducing a new role of money in the human society; new taxation models, a restoration of the economic commons and universal basic income will be tested gradually on practicality. Patient-oriented health care will replace the rigid disease-oriented approach in the medical profession; the artificial logic of diagnostic and prognostic tools will give the physician the possibility to focus on medical prevention. In engineering, we will see design and manufacturing on demand, getting away from the production of over-supply that must to be dumped into markets by propagandist advertising. Science and practice are not opposites, but (academic) theory is, i.e. the change of fundamentals in practical life and science is a matter of the social production sphere, where innovative technologies are the real game changer.

What is fundamental? The growth of the production forces is a fundamental result of applied science, but this exponential leap forward will also change the fundamentals and research methods of science itself. However, science cannot alter the age old civilizational problem (malady) of monopolies (land, money, taxation); this is a matter of public awareness (discourse communities), human macro-prudence (applied logic) and societal ethics (golden rule), i.e. the house (oikos) is built by science, but the people living in it can only stay healthy, if a practical ethics of mutual existential guarantees will be fixed legally. The ethics is now in our hands; the intersection of science (specific prediction) and prophecy (general prediction) is human action; only careful study can lead to responsible action, and all study needs learning partnerships, following the ancient saying: give me study partners or death. We are still very far from deciphering the mystery (laws) of harmony in the living world, but we seem to get soon closer to the hidden treasure of the house.

The coming fundamental shift in scientific methodology (ideas and methods) will close our knowledge gap between the interplay of matter and living matter, concerning the construction principles of nature and its origin. This will also lead to a better integration of the many non-conclusive knowledge particles of science (e.g. physical thermodynamics, biological evolution, mathematical information theory) into a higher working model of applied research. Human thought and will, i.e. consciousness as foundation stone, is the key to refigure the house (oikos), to live healthier lives and to perform a successful sorcerer's apprenticeship.

Links/Literature

<http://attainable-utopias.org/tiki/FourthOrderCybernetics>

[https://www.semanticscholar.org/paper/A-new-4th-order-cybernetics-and-sustainable-future-Bozicnik-](https://www.semanticscholar.org/paper/A-new-4th-order-cybernetics-and-sustainable-future-Bozicnik-Mulej/383633ba0b655d243ca9fa4f6983a08b4b35b5f5)

[Mulej/383633ba0b655d243ca9fa4f6983a08b4b35b5f5](https://www.semanticscholar.org/paper/A-new-4th-order-cybernetics-and-sustainable-future-Bozicnik-Mulej/383633ba0b655d243ca9fa4f6983a08b4b35b5f5)

http://www.cyborganthropology.com/4th_Wave_Cybernetics

<http://www.emeraldinsight.com/loi/K>

http://www.gisfi.org/pdf/19th_meeting/Bipin%20Kumar%20-%20Reliance%20Jio-IoT%20and%20Fourth%20Order%20Cybernetics%20v1.4.pdf

https://wiki.p2pfoundation.net/Fourth_Order_Cybernetics

<https://www.researchgate.net/project/EXPONENTIAL-KNOWLEDGE-AUTOMATION>

<https://www.smashwords.com/profile/view/sternyik>

http://uahost.uantwerpen.be/eume/index.php?option=com_comprofiler&task=userprofile&user=1714&Itemid=59

<https://www.thefreedictionary.com/fundamentals>

