

10th Villa Lanna Meeting on “Science, or Else?”

The annual Villa Lanna Meetings on “Science, or Else?” are organized by the Academy of Sciences of the Czech Republic and the Collegium Helveticum, an institute supported by both the Swiss Federal Institute of Technology in Zurich (ETH) and the University of Zurich. They bring together scientist from different fields of research to discuss general aspects of science, the position of science in society and its consequences to humanity. This year, already the 10th meeting was held in Prague from 11th to 12th January. Its topic ran “Reproducibility – Arts, Science and Living Nature”.

The terms reproducibility and reproduction are closely linked. Very frequently, they are referred to in the same breath, since there is no reproducibility without the reproduction of an entity or an action. Both appear in a varying context of science, art, media and living nature. Therefore, it is not surprising that both notions and their connection to different disciplines emerged during the talks and discussions of the meeting. In the following diverse aspects of reproduction and reproducibility shall be delineated by reporting how the contributors of the meeting approached the topic based on their discipline and background.

Reproducibility in Natural Sciences

Reproducibility is the *conditio sine qua non* in establishing scientific knowledge: it underlines, especially in natural sciences, the defensibility of a hypothesis linked to an experiment or a concept. However, the use of the term reproducibility is of conventional nature. As Vladimir Pliska (Collegium Helveticum, ETH & University of Zürich (CH)) pointed out in his talk, reproducibility requires a clear-cut definition of features of the “original” to be reproduced in further “copies”. One has to keep in mind that the selection of such salient features in a plethora of parameters is subjective. The current methodology treats the neglected features as “random effects”; statistical methods were developed to handle the problem – again conventionally – under such circumstances. Pliska demonstrated how the exclusion of circumstantial parameters can lead to questionable conclusions: A recently published German study about the prevalence of infant leukemia in the outskirt of nuclear power plants has lead to unwanted political consequences.

Reproducibility – in a broader sense – is also in many respects of interest for mathematicians. Some of them were presented in the meeting. Petr Kurka (Center for Theoretical Study, Prague (CTS)) treated the concepts of definability and asymmetry in the context of relational structures. Jaroslav Nesetril (UK Prague), on the other hand, presented examples of dual notions between mathematics and arts, and possibilities of their formal treatment. Undoubtedly, symmetry on molecular level is highly interesting. Reinhard Nesper (ETH Zürich) showed astonishing examples of the symmetry of molecules and their transition.

Constant quality of products, standards, repetitiveness of procedures etc. is a burning problem of reproducibility in our industrial world. The manufacturing of medicinal products is a vivid example: exact mixture and solubility has to be guaranteed even at a speed of 1200 tablets per second, as it is in the case of Aspirin. Gerd Folkers (CH)

traced the story of the Pharmacopoeia that regulates reproducibility by convention, from the preparation of the medieval “Theriak” to nowadays.

Original – Copy – Unique Objects d’Art

In fine arts, reproducibility refers to the possibility to reproduce, copy or replicate an art object. It can also be a concept to produce the object, for example a painting, a sculpture or a photograph, as a series. Hans Danuser, renowned Swiss artist, plays in his artwork with reproducibility and repetition. In his talk at Villa Lanna he illustrated the creative development of his artwork from photo series taken at hidden, restricted places (e.g. Los Alamos, gold foundry in the US) to recent photo series such as FROST. On the basis of his FROZEN EMBRYO SERIES I–III, that can be seen at the Metropolitan Museum New York, Danuser posed the question, whether a reproduction can be an original and thus a unique object d’art.

Andy Warhol carried the idea of producing art series to the extremes when he started not only to make art of mass-produced items, but to mass produce the art itself in the 1960ies. By minimizing the role of his own hand in the production of his artwork, he shifted from being an artist to being a machine. The topic of the machine in art appeared in a slightly different context in the talk of Martin Boyer (CH). He presented the installations of the Belgian artist Wim Delvoye who creates *Cloaca* machines that imitate the human digestive system by converting food to feces. Although it can be objected, that the machine is not a *correct* simulation of the human digestive system it can still be regarded as a provoking reproduction of the human being: it annihilates very efficiently immense amounts of food and energy, leaving behind an inane product. The presented example raised couloirs discussions about the limits of such “artistic” experiments.

A remarkable connection between natural science and decorative art was shown by Lada Hubatova-Vackova (CTS). She argued that in the 19th century the reproduction of natural forms and their transcription into regular geometric forms not only fulfilled the function of formal ornamentation, but also contributed to scientific investigations of the laws of nature. The interface of art and science was also highlighted by Denisa Kera (Czech Academy of Sciences). She addressed the question whether reproducibility of art serves the same function as in the case of science. Kera exemplified how Czech artists in the “Artists in Labs” project used scientific methods in their recent works. Furthermore, she raised the question if art in the age of mechanical, technical and increasingly digital reproducibility still is an issue of the masses.

How architecture underwent a paradigmatic shift in the first half of the 20th century with the emergence of mechanical reproducibility was presented by Cyril Riha (CTS). Since then, architecture is no longer only a question of aesthetics, but also of social, economical and ecological sustainability.

Literary Reproduction

The prominent question whether a reproduction must be considered as an original also came up in Lucie Dolezalova’s contribution. Dolezalova (CTS) depicted how the nature of reproduction in medieval manuscript culture is completely different from

today's print techniques. The copying process led to the appearance of new original works when a particular scribe, or a group of scribes, introduced improvements, corrections and mistakes into the text. Whether this freedom of reproduction, at medieval times a matter of course, changes the identity of a text is today critically questioned.

In the context of literary reproduction Johannes Fehr (CH) analyzed the process of oral tradition. His talk gave fascinating insights into the tradition of rhapsodes in Albania, differences between Pierre Menard' and Miguel de Cervantes' *Don Quixote*, and the concept of the *Poesie-Automat* of Hans Magnus Enzensberger.

Correct Copying as a Matter of Life and Death

The beginning of life is a complex and elusive field of research. Marek Vacha (CTS) alluded to the limitations we have in gaining knowledge about the origin of life and thus of reproduction. Clearly, copying cycles are pivotal in living nature, since one of the conditions for life is propagation. Hereby, the correct copying of the genetic code is essential. Copying mistakes can lead to mutated cells, cell death and in the long run to extinction of the organism. Amrei Wittwer (CH) depicted different death mechanisms of the cell, such as apoptosis, necrosis and autophagy, as ways of nature to induce death by design or unorganized dying. But nature also provides for an alternative draft, as Elvan Kut (CH) pointed out. The human immunodeficiency virus (HIV) owes its survival to mistakes in reproduction. An extremely high rate of copying mistakes leads to constant mutation. With this rapid evolutionary transformation the virus escapes the immune system and antiviral drugs.

The Reproduction of the Meeting

The diverse contributions of the 10th Villa Lanna meeting on reproducibility clearly showed that the process of reproducing provides a lot of impulses for thought. The replication of an original into a copy has always an inherent creative potential. After all, it is a question of convention that determines whether a copy is regarded as authentic as the original in question.

For further reading, all contributions ranging from art, language and history to mathematics, chemistry, biology and pharmaceuticals will be published in the proceedings of the 10th Villa Lanna meeting, as they have been in the past two years.ⁱ

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ⁱ PROMISES OF SCIENCE

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