Technology, Science and Art

a Tribute to Win Labuda on the Occasion of his 70th Birthday

Address held by Eckhard Schollmeyer* on the 28th of June 2008 in the Institute of the History of Medicine and Science, University of Lübeck, Germany

Introduction

1 - Professor Dr. Eckhard Schollmeyer, Lübeck, 2008

Dear guests, dear Ms Labuda, dear Mr Labuda,

Today we are celebrating your 70th birthday, and with my tribute I would like to honour your life's work.

In biblical number symbolism the number 70 is the result of the multiplication of the numbers 7 and 10. The 7 stands for "God's providence and wisdom". The 10 represents "All of this time and world". The number seventy thus represents "all according to God's wisdom and providence". According to Hebrew-Jewish tradition there are 70 nations (Genesis 10); correspondingly Jesus sent out 70 disciples (Luke 10:1). All the souls of the house of Jacob who came into Egypt, were threescore and ten, that is, there were seventy (Genesis 46:27). Moses called 70 elders (Numbers 11:16). The Sanhedrin comprised 70 council members plus the head of the council. For ancient oriental religions, such as in Babylon, numbers have a mystical significance: In Babylonian number symbolism 70 is the number of the completed cycle. [1]

I was granted the privilege of presenting a tribute illustrating your diverse accomplishments. In my address you will certainly wish that I go into your photographic, graphic and sculptural works and your essays on current topics in art. Also, you probably expect that I refer to your production of extraordinary sound documents. I also should go into your research on the mechanics of wiper-based cleaning and your other work regarding cleanroom technology issues. And finally, your entrepreneurial skill should not remain unmentioned, for without your economic success many of your achievements would probably not have been possible. How can such a connection be drawn? Or to express this in a better way: On which philosophical foundation can an observer like me understand this life's work? I hope that my approach in this tribute will do justice to your work.

First, I would like to refer to the philosopher Salomon Maimon (1753-1800): He strove to pursue philosophy as an intellectual unit combined with mathematics and science. Behind this we can also see a rupture with the interrelationship of mathematics and metaphysics avouched by university philosophy. Maimon was an adherent to the philosophy of Immanuel Kant (1724-1804), i.e. also his Critique of Metaphysics, and thus opposed the position of Moses Mendelssohn's (1729-1786) university philosophy. After Maimon's early death in 1800, this approach was not pursued further. Rather, accelerated by rapid progress in cognitive science, a specialisation of mathematics and scientific disciplines took place [2,3].

With that we come to the question of the essence of mathematics. Carl Friedrich Freiherr von Weizsäcker (1912-2007) outlines an answer to this in four ascending statements [4]:

1. Logic is the mathematics of truth and falsity,
2. Mathematics is the theory of structures,
3. Theory is the art of the true and the false,
4. Art is the perception of forms through the creation of forms.

A few explanatory remarks should make these statements, which are to be understood as parables, more comprehensible.

1. Logic – a branch of mathematics – is the theory of those structures which are determined by truth and falsity as conceptual pairs.
2. Structure is the fundamental concept of mathematics: Mathematics studies structures abstractly as structures. Physics, in contrast, describes (experimental) events with the aid of structures.

3. Theory – as special case of art – can be described according to Weizsäcker as the perception of those forms "which are limited by the condition that statements on them are possible which can be characterised as true or false and – in the ideal case – can be decided".

2 - Win Labuda "Evening Sound I", Picardy, 2006

4. Art here includes all traditional arts: music, the visual arts and literature. Here we must note the shift of emphasis from "perception" to "creation". So the concept of art also includes artisanship and technology [5].

According to the third proposition, theory thus falls under the concept of art. Finally, this thesis includes that knowledge is interpreted as successful action: Through the creation of forms, through an action, that is a process in time, we recognise forms. Hence, art is characterised by a double definition: The created art represents something different from what is perceived by this creation [6]. This statement poses a philosophical question: "Is representation a fundamental phenomenon of reality?"

With that we can describe the structure of the theses:

- Logic is a matter of mathematics,
- Mathematics is a theory,
- Theory is an art,
- Art is a perception.

Thus we come to the central question: What is perceived?
Hidden in this question is also the question of the essence of art:
It is – according to Weizsäcker – the stylisation of form to a new form [7].

The photographic work

First, after these preliminary fundamental remarks, I shall attempt an approach to your photographic work. The photographic cycle "Journey to the Beginning of Time" is – in your words – an imaginary journey back to the time when the earth was in anticipation of its settlement by living

creatures. The individual stations of this journey allow the viewer to pause at selected positions which were significant for the development of mankind, to which you assign six pictorial stations. The time of progressing human history, of evolution, of cosmology is our direct experience of the world. With it is also understood the search for its beginning.

In the station “Beginning of Time“ three scenarios determine the pictorial content: first the elements sky, land and sea, next the horizon pictures, in which heaven and earth touch, and the great stone formations. These photographs suggest a seemingly low degree of complexity and allow the viewer associations with the four elements of the Greeks: fire, water air and earth. They represent the philosophical origin of today’s understanding of the structure of matter. The setting sun stands for fire and leads the viewer into the cosmos. With this metaphor he becomes aware that our world is highly complex. Your photograph “Evening Sound 1“ from 2006 is representative for this.

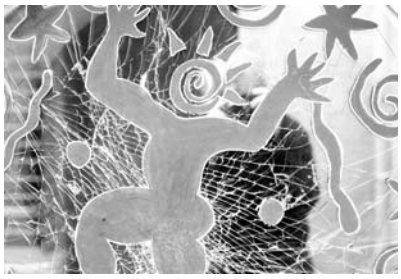
3 - Win Labuda “Shepherdess in Palestine“, Palestine, 1980

To understand the station “People Today“– or rather, my interpretation of it – I would like to briefly reflect on into the concept of “mythos“, which is opposed to what is meant as “logos“ [8]. “Mythos“ is the telling of fictitious stories, and “logos“ is the verifiable statement. Myths can be encountered everywhere: the biblical myth of creation or the “big bang” as myth of the origin of the world. Myths always reflect people’s spiritual state and the social conditions of their time. The myth reveals the relationship of things by telling a story. Precisely that is what each of your photographs is about: Myth – according to the philosopher Georg Picht [9] (1913-1982) – is for us lost in the depths; it only surfaces again in the form of art, for instance in your photographic work.

The station “People Today” portrays individuals within their respective cultural, social and political context. It shows the individuality, aura and dignity of the individual. The two photographs “Shepherdess in Palestine” and “Going to Prayer” are exemplary for this concern.

I will now discuss the photographs of the station “Pictures and Signs“: Towards the middle of the 10th century Shabbetai Donnolo wrote in the Sefer Hakhmoni (one of the oldest preserved commentaries to the Sefer Yetzirah, the Book of Creation, which is the oldest independent work handed down of the Kabbalah [10]): “During the 2000 years before creation, the Holy, blessed be He, was delighting in the secrets of the letters. He put them together, He made them circle, He combined them in a single sentence, He turned all 22 of them forward and backward. He compiled them to form complete sentences, half sentences, thirds of sentences. He reversed the sentences, united them, separated them and gave them a different form. He did the same with the single letters with the vowel punctuation as well. He counted their number until it was complete. These were the actions of the Holy, blessed be He, when He decided to create the world with His own word and by pronouncing His own great and awesome name.“ In this representation of God, who passes his time with letters in order to use them to create the universe, the most inward essence of the Old Testament idea of script is revealed with extraordinary power of suggestion. Without the development of signs, no script is possible: Without pictures and signs, no progress of civilisation is possible.

4 - Win Labuda “Going to Prayer“, Jerusalem, 1980



5 - Win Labuda “Dancing Venus“, Paris, 2000
6 - Win Labuda “Button Eye“, Paris, 1999
7 - Win Labuda “Homage to the Wild Ones“, Paris, 1999

The artistic-looking signs and drawings of the station “Pictures and Signs“, which were created by unknown “wall painters“ and similar graffiti artists and which you meticulously photographed, allow forms to be recognised, which interestingly are also known from the painting of the twentieth century. As representative for this station I have selected the photographs “Button Eye“, “Homage to the Wild Ones“ and “Dancing Venus“.

With the station “Home of the Gods“ the question arises: Why undertake artistic photography of edifices of megalithic culture? For me this modus operandi corresponds to thinking in the Western tradition: These photographs want to rescue the memory for the future. The archaic corresponds to Western as well as to Jewish thought: In many cultures, rites and stories again and again revive what has been handed down, i.e. contact between the present and primordial time is constantly maintained [11]. Photographic examples of this are your pictures “Stonehenge III“ and “Callanish Stone Circle I“.

The graphic and sculptural work

Your visual cycle “Line, Surface, Space and Time“ consists of these four series of the same name. The series “Time“ refers to one of the most important phenomena of philosophy and science. For this reason, I will introduce this chapter with two quotations:

Knowledge and Being are the same.
by Parmenides - and

Time reveals itself as the horizon of being.
by Heidegger.

If both philosophers are right, time manifests itself as horizon of knowledge [12]. Thus, three important questions are posed:

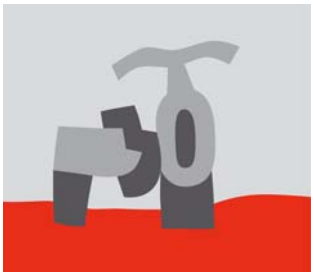
8 - Win Labuda “Stonehenge III“, England, 2002
9 - Win Labuda “Callanish Stone Circle I“, Isle of Lewis, Hebrides, 2004

What does being mean?
What does knowledge mean?
What does time mean?

I would like to go only briefly into the essence of time, into time as prerequisite of knowledge. The history of man and of the world takes place in time. In this moment we know the past in the form of facts and the future in the form of possibilities – in complete agreement with the statements of quantum mechanics, but in opposition to the philosopher Ludwig Wittgenstein [13] (1889-1951). In "Tractatus logico – philosophicus" he writes: "The world is everything that the case is."…While I say this, the "now" passes away unremittingly.

When one creates structures with mathematics, this creation is an action and thus a process in time. Thus, time is the basis of mathematics. The same considerations are also true for creating a work of art. Kant interprets the intuition of counting as intuition of the time structure [14]. Future is here the possibility of counting further. Precisely Kant's call to count is clear in the artistic series "Time". Please compare here the different time scale pictures.

To conclude my review of your artistic work I would like to go into the series "The Surface": I can only speculate about the motivations for this work. I see in them parallels to synectic thought in the sense of William

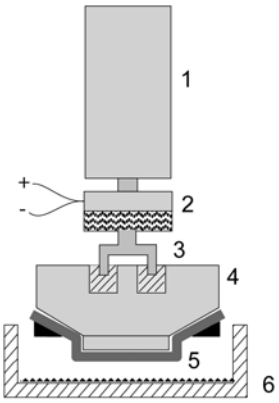


10 - Win Labuda "Time Scale 4", woodcut, 1998
11 - Win Labuda "Time Scale 8", woodcut, 1998
12 -Win Labuda "Terbel", pigment print, 2005

J.J. Gordon [15] (*1920). By that we understand a process to discover connections between two seemingly separate elements: We take things apart and put them back together to gain new insights into nature. Another approach to synectic thought is making the familiar seem foreign, in order to become acquainted with the unknown. The work of art "Terbel" in the series "The Surface" is representative for this way of thinking. The viewer may attempt, based on "Terbel" to isolate the individual elements of the representation and search for different connections among them. What familiar object here has already been alienated?

The technical-scientific work

In the following I will now go into your technical-scientific life work: Sir Karl Raimund Popper [16] (1902-1994) founded critical rationalism with his works on cognition theory and scientific theory. Popper postulated his basic idea on scientific theory in the work "Logic of Research". The basic principle of his approach is: With formal logic we cannot derive a general law from individual cases (induction problem), but rather we can only refute general statements.



1 fixed suspended electric motor
2 torque actuatorN/cm (for Mark II)
3 flexible coupling
4 rotor block
5 wiping agent - sample
6 tray with rough bottom

13 - Schematic diagram of the Labuda Rotation Wiping Simulators Mark I and Mark II

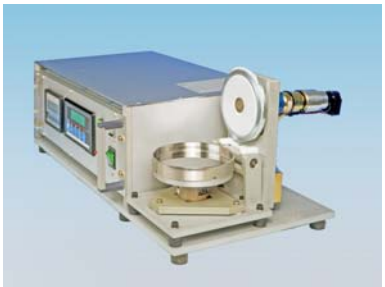
Popper's suggestion is as follows: The theses should be invented freely. Then the experiments will be carried out. If the theses are not confirmed in the experiment (falsified), they must be discarded. If, however, the theses are verified, they can – and not until then – be accepted in physics. Popper demands that the thesis be expanded to include the newly gained insights, that an expanded thesis be postulated – in contrast to the previous one – and once again submitted to experiment. With that science becomes a game. Whoever is not prepared, after a verification, to postulate a new thesis, in order to either have it undergo verification/ falsification, drops out of the game of science. From this we learn two important points:

1. The truth concept of science is based on the experiment. For this reason, experimentation has been elevated to the central action in science. Mathematics as axiomatic science recognises as true the consistency of axioms. Here the line of argumentation plays the central role.

2. There is an unequivocal deciding criterion for the falseness of a statement. With the aid of the principle of falsibility we get closer to the truth, without however being able to raise the claim to security: Individual experiments, even in any larger number, can only falsify a general law, but not verify it.

For a more profound understanding of Popper's ideas I dare to make an interpretation in the Jewish tradition, analogue to Martin Deppner [17]. The story of the creation is described as a creation out of nothingness. The God of the Hebrew Bible is a hidden god. He has only left traces of his existence behind him. This mystic idea of a God is thus an inherent paradox of a creation without a visible creator. God is seen as a hidden entity, which does not manifest Himself as essence of creation until He withdraws into Himself. It is this withdrawal into self, which – according to Gershom Scholem – creates space for the creation. It is thus an act which is preceded by negation. Deppner's conclusion is based on a connection of the idea of God withdrawing into Himself as configuration of a negation as prerequisite of creation. Thus the connection is made to the falsification of Popper. Let us remember: A falsification consists of the proof of immanent inconsistencies.

The medieval philosopher Moses Maimonides (1138-1204) advanced the view of a strict intellectual penetration of the Holy Scripture with the goal of contributing to the completion of a world left incomplete by creation. This basis on the scripture contains still another important step: simulation. Simulation means here the ability to comprehend reality as a model. It is thus to be understood as a paradigm for a world which has not yet been completed. Popper's logic thus requires action to construct further. The Jewish God allows us to simulate him. This simulation is of course only possible via what is accessible to us as humans – via the world. But there will never be a true image of God. What does Popper write about this? One can never be sure whether truth, i.e. verification, can be found. For that reason he does not demand proof of correctness, but the refutation, the falsification. Everyone who is engaged in the game of science, submits himself to the philosophy of Popper. A scientist should always be conscious that he never captures reality.



14 - Labuda Rotation Wiping Simulator Mark II

In order to manufacture high-quality products for cleaning-by-wiping procedures in the fabrication environment of high-tech industries, an

1 standard weight
2 wiper sample
4 support plate with defined contamination
5 support plate in cleaned state
7 take-up motor and pull cord
3,6 resting plates in cleaned state

15 - Schematic diagram: Labuda Linear Wiping Simulator Mark I

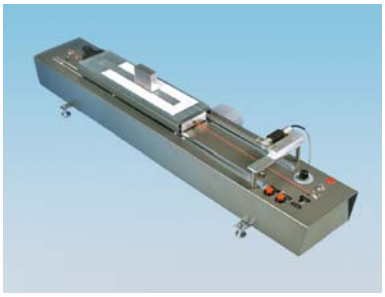
excellent understanding is needed of both the procedure itself and the cleaning materials used. When you, Mr Labuda, began to concern yourself with these issues, the extent of knowledge on this subject was very limited. There were no meaningful experimental methods at that time. As a consequence you began developing your own testing techniques in order to draw scientifically substantiated conclusions about wiper-based cleaning procedures. In the end you founded the company Clear & Clean Werk für Reintechnik GmbH. Today a number of testing techniques and measuring devices are available which you developed. The results gained with them allow conclusions about the procedure of cleaning by wiping and on the efficiency of the used cleaning materials.

One of the most important of your test methods is measuring the abrasion of the wiper during use with the Labuda Rotation Wiping Simulator, which makes it possible to simulate and evaluate the particulate abrasion of a cleaning wiper under defined conditions. Knowing about abrasion is of great importance: Products that will be used in the cleanroom should be as free as possible from any particle release.

The effectiveness of removing contaminants from a surface can be measured and determined with the Labuda Linear Wiping Simulators Mark I and II. Mark I not only enables determining, how a contamination is removed from a surface, but also to what extent this contamination is transmitted during the cleaning process to other areas.

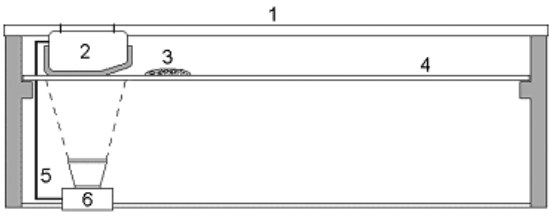
The Labuda Wiping Simulator Mark II also enables tracking the absorption of contamination by cleaning wipers visually. By comparing the different products with it, important information can be gained that is useful for the development of improved cleaning products.

The importance of the time needed to clean is underestimated by many people – knowing this is especially important in high-wage countries. Cleaning must take place efficiently and this includes the duration of the cleaning procedure and also the cleaning result. The Timeport – Test Station, one of your newest developments, makes it possible to determine the average time needed for cleaning by wiping depending on the construction of the cleaning wiper used.



16 - Labuda –Linear Wiping Simulator Mark I

With your work, Mr Labuda, you have made a valuable contribution to research into the mechanics of cleaning by wiping. For this work you have received much acclaim. I also see in this work an acknowledgment of Edward Paley, who in 1973 gave you a new life perspective. Edward Paley had the vision that from then on the structures of the electronics industry would become smaller and smaller, but that the pollutants present in nature, such as dust and pollen would of course stay the same size. This size difference, i.e. the necessity of special cleaning wipers and the scientific elucidation of the procedure of cleaning by wiping has become the guiding idea of your company. You translated this guiding idea – as physics demands – into problems of measuring technology.



1 pneumatic linear motor (bidirectional)
2 standard weight with wiper sample
3 test fluid (possibly dyed)
4 exchangeable test plate (possibly transparent)
5 mechanical entrainer for camera
6 video camera on glider system

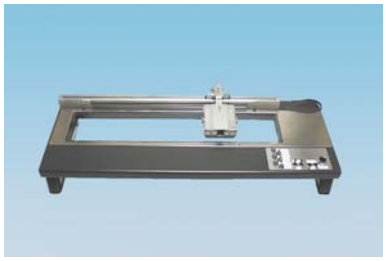
17 - Schematic diagram: Labuda Linear Wiping Simulator Mark II

Conclusion

Let me make a reference to Salomon Maimon. In his autobiography he writes: "The highest purpose of man is the realisation of truth." The paths leading to this realisation are different for each person. You, Mr Labuda, used the means of art and physical experiments. All of us who pursue our path of life must adhere to this superior principle of philosophy. Philosophy is the Socratic question: Did I understand what I said? Only by questioning what has been said – whether it be a work of art of a scientific experiment – can we generate answers that lead us further.
In concluding my tribute allow me to say few personal words:
According to Carl Friedrich Freiherr von Weizsäcker, European culture has brought forth three key emphases [18]:

- Theory, first as mathematics and philosophy, today as science,
- Practice, as moral attitude according to principles, as social action, as transformation of the world and
- Art.

I will now attempt to establish a connection to the beginning of my tribute, to the prophecy of Babylonian number symbolism. The cycle of man begins with his birth. The subsumption of an individual is based on his actions, his verifiable achievements. At the age of 70 years a retrospective review can be made. I hope I was successful in showing that we today – on the basis of our European culture – celebrate your 70th birthday with the completion of a cycle. [18]:

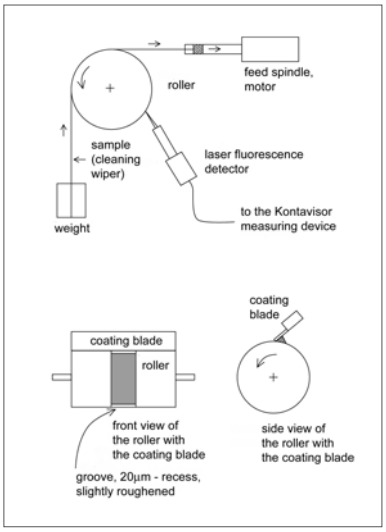


18 - Labuda Linear Wiping Simulator Mark II

References:

[1] [Numerology]
[2] http://de.wikipedia.org/wiki/Salomon_Maimon
[3] Daniel Tyradellis and Michal S. Friedlander:
10 + 5 = Gott. Die Macht der Zeichen. [10 + 5 = God. The Power of Signs]
DuMont Literatur und Kunst-Verlag, 2004, p. 55, 59.
[4] Carl Friedrich von Weizsäcker:
Zeit und Wissen [Time and Knowledge].
Carl Hauser Verlag, Munich, Vienna, 1992, p. 174.
[5] in [4], p. 241
[6] in [4], p. 259
[7] in [4], p. 446
[8] in [4], p. 429
[9] Georg Picht: Vorlesungen und Schriften [Lectures and Essays]
Kunst und Mythos [Art and Myth].
Klett-Cotta, Stuttgart, 1986.
Marko Kleiber
"Kunst und Mythos" bei Georg Picht: Ihre Bedeutung für die Frage des Menschen nach Wahrheit und Wirklichkeit[Art and Myth in

Picht's Work – Their Significance for Man's Quest for Truth and Reality],
Verlag Dr. Kovac, 1996
[10] in [3], p. 89.
[11] Roman Bezjak and Martin R. Deppner,
"Jüdisches" Fotografische Betrachtungen der Gegenwart in Deutschland [Jewish Topics. Photographic Observations in Contemporary Germany].
Nicolaische Verlagsbuchhandlung GmbH, Berlin, 2006, p. 35.
Hans Günter Golinski and Sepp Hiekisch-Picard:
Das Recht des Bildes. Jüdische Perspektiven in der modernen Kunst [The Rights of the Image. Jewish Perspectives in Modern Art].
Museum Bochum, Künstler, Autoren und Verlag, 2003, p. 8.
[12] in [4], p. 27.
[13] Ludwig Wittgenstein:
Logisch-philosophische Abhandlung, Tractatus logico-philosophicus [Logical-Philosophical Treatise].
Kritische Edition [Critical Edition].
Frankfurt am Main, 1998.
[14] in [4], p. 149.
[15] Williams J.J. Gordon:
Synectics.
Harper & Raw, 1961.
[16] Karl R. Popper:
Logik der Forschung [Logic of Scientific Discovery].
Mohr Siebeck, 10th edition, 2001.
[17] Martin Deppner:
Kreativitätstechniken – "Die Erinnerung für die Zukunft retten [Creativity Techniques – Saving Memory for the Future]."
Lecture on the occasion of the annual meeting of the Research Board of Trustees of the Textile Association in Dresden on November 14, 2006.
[18] in [4], p. 422.



19 - Schematic diagram of the cleaning time test device TIMEPORT

* Professor Dr. Eckhard Schollmeyer teaches physical chemistry at the University of Duisburg-Essen. He is also executive director and member of the board of directors of the North-West German Institute for Textile Research (*DTNW*) in Krefeld, Germany.

Translation: Carol Oberschmidt

20 - Cleaning time test device TIMEPORT