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**Knowledge in the Arts**  
Life Sciences – Art - Media

Current debates on the relationship between Arts and Sciences, in particular the Life Sciences, have considered various aspects in their analysis [of the relationship between the two domains]. Still, the specific knowledge of the Arts with regard to the Life Sciences has hardly been studied. In my talk I am going to explore this knowledge in the arts, and I will do so by examining an example well-known to all of you and which I picked for that very reason—Eduardo Kac’s installation Genesis.

The comparison of artistic and scientific knowledge itself—*I argue*—presupposes a *specific* knowledge inherent in Art, and it also presumes that this knowledge is *irreducible* and *characteristic* for Art, so that the genuine and productive achievements of Art itself are in focus.

In this case—*I further argue*—generating similarities cannot be in the interest of such a comparison;—that is similarities in the sense of the frequently invoked connection between Art and Science, where analogies are created between different aesthetic aspects<sup>1</sup> such as the creativity inspiring both the artist and the scientist.

On the contrary, *it is my opinion* that—in contrast to such problematic positions—the discussion of the meaning of such a dialogue between Art and Science has to first focus on the work on and with the differences so that we can use these *differences productively*. So this is about recognizing different ways of knowing, and about the interplay of different perspectives and forms of cognition.

This then will allow us to answer the question as to the epistemic status of an artistic and experimental practice compared to that of scientific research, or as to what is the epistemic surplus<sup>2</sup> of the arts. Primarily then we have to establish the function of art *as art*

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<sup>1</sup> Cf. for example Kemp, Martin: *Bilderwissen. Die Anschaulichkeit naturwissenschaftlicher Phänomene*. Köln: 2003, as well as Gould, Stephen J.: “The Shape of Life.” *Art Journal: Contemporary Art and the Genetic Code*, 55.1/1996, p. 44-46.

<sup>2</sup> By no means must this surplus be confused with a concrete result, since the epistemological gain may also lie in the questioning, modification and complexification of examination concepts and structures, so that this may

with regard to science as different than as a mere *medium of reflection*. In order to discuss the knowledge in art let me to put forth a few assumptions:

Rather than centering on the work and on the result, this analysis focuses on instances of the genesis of the work, in a twofold manner:

*on the one hand*, as the space for such practices and (thought) experiments, as a realm between art and science. This means that the ways, actions, methods, and practices preceding the concrete results are of importance as well as media technologies and material procedures. The objective here is to emphasize the processes of art production.

However, *on the other hand* the instance of generation also emphasizes the significance of the traces intrinsic to images, talks, and procedures, and whose provenance, while largely ignored, positively informs the subjects of science. Therefore the focus lies on the origins of their respective dispositions, on the provisional status of their insights.

Moreover the image itself as a material result in the field of knowledge moves into the center of attention. Yet the concepts of art and the image relevant in this context assume a dual *function*: namely as something that has *always already* been *both* a material substrate *and* an imaginary image. In this sense then the image contains and controls ways of cognition and knowledge figures, implies a historical index as the historical trace of knowledge, which generates itself largely from the respective specific kind of figurative thought.

The image then is always already a condensation where past and present impressions coalesce into a knowledge figure.<sup>3</sup>

The epistemological gain resulting from the investigation of knowledge in the arts clearly lies in the *experimental interrogation* of *both* one's own artistic procedures *and* the scientific concepts and procedures cited heretofore. In so doing unelucidated and obscured interdependencies become evident, in other words: the zones of non-knowledge enclosed within knowledge, the blind spots and exclusions, the space for negation and the unconscious that all are counterparts to knowledge and give it its shape and depth.

Now let me discuss the Eduardo Kac's installation entitled Genesis:

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result in enhanced complexity and occasionally may have as a result that concrete results will be even more elusive.

<sup>3</sup> Just as Walter Benjamin stated: "The image is that wherein that which has been merges momentarily with that which is now into a constellation." (Benjamin, Walter. *Das Passagenwerk*. Vol. I ed. by Rolf Tiedemann, Frankfurt/Main: 1982, p. 576) Cf. as well Weigel, Sigrid. "Bilder als Hauptakteure..." *Interventionen: Ästhetik Erfahrung*, p. 198.

**(FIGURE 1) (FIGURE 2)**

The installation consists most of all of a synthetic gene, which Kac created by way of translating a verse from Genesis, i.e. the Biblical story of creation, into Morse code. In the next step this verse is transformed into DNA base pairs on the basis of a conversion principle specifically designed for this purpose.

**(FIGURE 3)**

The artificial gene thus produced is inserted into a colony of bacteria. The installation features a darkened room with a UV light box topped by a pedestal, on which the bacteria colony is presented in a Petri dish.

**(FIGURE 4)**

Above the Petri dish we find the brackets of microscope lights and a micro video camera. The bacteria interact in reaction to the variable duration and intensity of the UV light, which is directly controlled by the viewers in the gallery or even by telepresence via the internet. This means that the interaction triggers a true biological mutation in the bacteria as the fluorescent protein within them reacts to the light.

**(FIGURE 5)**

The viewer can directly interfere with division and interaction processes and may control genetic procedures. The respective state of the bacteria colonies is projected in extreme enlargement and in real time onto a wall in the exhibition hall next to the sign of the genesis gene and to the Morse code sequence.

**(FIGURE 6)**

What is striking about this installation at once is the combination of the *genetic code* with the metaphor of the ‘Second Creation.’ Already at this level Kac refers to the original scene for any additional process of radical material forming.

DNA sequences—such as those used by Kac—represent the ‘novel of genetic genealogy,’ the ‘grammar of biology,’ the ‘Book of Life.’ Hence Molecular Genetics uses metaphors from the realm of language and writing to describe the basis of life and suggests the “readability of the organism.”<sup>4</sup> Eduardo Kac takes this talk about the book of life literally: He enters a phrase from the Bible into the laboratory in multiple translations—from the alphabet into the Morse alphabet into the DNA alphabet—whose result, read as a sequence,

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<sup>4</sup> Blumenberg, Hans. *Lesbarkeit der Welt*. Frankfurt/Main: 1981-

then provides the production design for the bacteria. Then Kac retranslates: from DNA back into letters, which results in partial shifts and distortions of the written sequence. The differences between the original phrase and the translation produced in this process show one thing very clearly: Most of the misunderstandings in discussions of gene technology are owed to the equivocal nature--between semantics and information theory--of the concept of code. Code should not be understood in a purely semantic sense or as a purely mathematical term. Rather code is a notation system for a combinatorial arrangement; its combination of letters and positions recreates an alphanumeric writing that historically preceded the separation of numbers and letters. This combinatory design then no longer serves only for representing, organizing and repeating knowledge, but rather it intervenes with the molecular structure as a material practice and recombines matter itself. While scientific discussions about the use and information content of decoded code get wrapped up in this double meaning, Eduardo Kac has found a subtle answer, - not in a definition or a concept but rather in the transformation of genetic code into different systems of representation and notation. Kac demonstrates that it is possible to manipulate the genetic code of a bacterium without being an author or creator. Code, in this installation, becomes a combinatory structure similar to the *Ars Combinatoria*, which preceded modern science. Hence the *combinatorial arrangement* of elements assumes a central function, and the difference between different phenomena depends on *what* is sorted and sorted out, *how* and *according to which criteria*.

**(FIGURE 7)**

While seemingly closely related to textual structures, in scientific practice, the decoding of the genome takes place most of all in images that appear to provide 'true' insights into the microstructures of life. In trying to be obvious, images in science rely on a conventional view of the image, one informed by the idea of visual representation, where a preexisting reality is subsequently reflected in images. Visual representations consist in a doubling, they are not meaningful in themselves but only in the content they reflect.

Even though the artificial nature of images is underscored through their use in science, these same images suggest once again precisely their immediate visibility and their obviousness. Thus one easily forgets that the images in science are the result of innumerable transformation processes, from interventions and decisions preceding their visibility, but one also forgets that seeing, interpreting, and knowing are inseparable from one another. However, the immediate visibility suggested by the scientific image causes its epistemic valence to shift once more: Rather than being generated, scientific images depict.

**(FIGURE 8)**

In Kac's installation the nature of the image changes, in particular that of the images projected onto the wall. These images show off the showing itself and are reminiscent of a specific purpose of the image that it lacks in science but that is suggested by the visual representation replacing it: indexicality.

This indexical imprint of reality found in the image evokes an ur-topos of the image: the image as imprint and trace. It is tied to reality in that it bears witness; that which it shows, exists. A scientific image may very well make reference to this original meaning of the image: the scientific image, too, is to bear witness; it is to show that an object is *exactly this way*. However: such perfect visual representation produces imageless images for they converge with perfect iconoclasm.<sup>5</sup>

The principle of material contact, which is at the root of any imprint, does not really bear witness of similarity. Any "empreinte"—and I quote Georges Didi-Huberman—is: “an open-ended experiment“ rather than positing a “technical hypothesis in order to see what will come of it.”<sup>6</sup> (End of quote)

**(FIGURE 9)**

The processual character of the imprint also points to *difference*, to openness to potential transformations; the production of replicas no longer relies on similarity but becomes a paradigm for change. For to create an imprint means to generate a network of material relationships only from which the object can emerge, but that also tie in with abstract relationships, myths, fantasies, proficiencies etc. Georges Didi-Huberman also states: “In this sense the imprint is at the same time a process and a paradigm: it unites within itself both meanings of the word „expérience“ –the scientific meaning as an ‘experiment’ and the meaning as ‘cognition of the world.’”<sup>7</sup>

**(FIGURE 10)**

The paradigm of change as a processual difference also applies to the digital image displayed: Kac shows its potentiality in a double sense: as not being an entity, and hence doing away with the habitual characteristics of the image, and rather highlighting a particular *state*. The principles of the evolutionary process Kac produces are of particular relevance for a theory of

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<sup>5</sup> Boehm, Gottfried. “Die Bilderfrage.” *Was ist ein Bild*. Ed. by Gottfried Boehm. München: 1994, p. 325–344.

<sup>6</sup> Didi-Huberman, Georges. *Ähnlichkeit und Berührung. Archäologie, Anachronismus und Modernität des Abdrucks*. Köln: 1999, p. 17.

<sup>7</sup> Didi-Huberman, Georges. *Ähnlichkeit und Berührung. Archäologie, Anachronismus und Modernität des Abdrucks*. Köln: 1999, p. 17. As late as the 18<sup>th</sup> century experimental physics was an “experiential science.”

the image, in that the combination of binary and genetic codes, and hence of *digitality* itself, and of *genetic mutations* yields unforeseen, fleeting, and irreproducible images. The result is a *flexible form* of the image. Therefore the artist demonstrates that not only the visible is worth our attention, but rather the conditions and the construction of visibility. The transgenic work of art then is not a static formation, but rather a *site of action*.

In addition, the performative character of the work highlights the significance of the institutional context as well as the function of the public. If the image created in Kac's installation has the ability of constructing reality, this then relies on two factors: on how the represented object organizes itself and on how it reacts to outside interventions.

The space of the image as the site of the installation makes art physically accessible to the viewer. If art intends to reclaim a culture that steps onto the site of cognition, this very site is materialized and incarnated in this installation.<sup>8</sup>

In the artwork *Genesis* we find a knowledge figure, a basic figure of anthropology which may be viewed, in Hans Blumenberg's thought, as an "absolute metaphor": the topos of aliveness. According to the self-image of the sciences, scientific research deals with "life itself," which is observed, modified, manipulated, recombined, simulated or even first created and then represented in images and texts. But aliveness refers to a more fundamental analogy between Art and everything organic. The topos of the *artwork as a living being* enters into effect—far beyond the idea of animation through movement—in the already existing linkage between aesthetic and scientific life discourses. They are unaware of the fact that images have always been understood as something living, or at least as ideas originating from the realm of biological life processes. Images in the animate sense are like a living being that may be inhabited by a magic force uncontrollable by the viewer. The images have the capacity of being more than a flat visual representation, which implies the confirmation of existing knowledge and the promise of an increase in knowledge. Such images produce a contrast that may show off meaning in pure matter.<sup>9</sup> This was presumably the procedure by which the Greeks named the image a 'zoon,' something living. In Kac's *Genesis* this relationship breaks down when--on the installation walls--the artist amalgamates the discourse about life, a living image--namely the bacteria in the Petri dish--and the images of life in an installation and

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<sup>8</sup> Cf. Flach, Sabine. *Körper-Szenarien. Zum Verhältnis von Körper und Bild in Videoinstallationen*. München: 2003, as well as Weigel, Sigrid. "Bilder als Hauptakteure." *Interventionen*, p. 203.

<sup>9</sup> Boehm, Gottfried. "Die Bilderfrage." *Was ist ein Bild*. Ed. by Gottfried Boehm. München: 1994, p. 325–344. Here p. 332.

transforms them one into the other. If current research focuses on exploring and transforming the essence of living as the basis for everything natural, art activates existing concepts of the aliveness of aesthetic theory and connects them to evolutionary theories.

Art and Science can no longer be considered incommensurable systems. But this does not mean that the knowledge systems informing them are identical and therefore interchangeable.

In multiple ways Eduardo Kac's transgenic artwork *Genesis* is a site of action, on which artistic and scientific thinking are introduced into one another. Linkages occur between binary and genetic codes, between digital and biological data, between artistic and scientific metaphors and images as well as shifts of naturalness and artificiality that reveal the epistemic surplus of the arts. As I have demonstrated, this cannot be defined by establishing similarities; rather this is about *recognizing a non-convertible difference*.

Only under this assumption can the knowledge in the arts be shown in this interplay *and* used productively at the same time: It is by always entertaining a double perspective on historic traces but also on the methods of production, and in view of the conditions of knowledge creation, that the greatest potential of cultural knowledge reveals itself, a potential, in which art has always participated: by contributing to the ability of analyzing the manner in which knowledge is produced, the ability of contributing to the interrogation of individual knowledge items and phenomena as to their genesis (origin) and poiesis (creation) and placing them in different contexts.

Artistic practices such as the ones used in the installation *Genesis* may demonstrate that there are justified ways for discovering basic elements of the life sciences in the cultural or more precisely: *in the arts*.