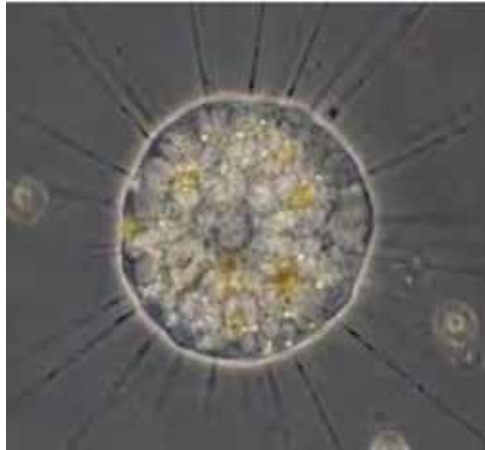


The Calculations of Nature

From the cell to the square

As Kazimir Malevich painted the black square, he sought “to free the art from the weight of the thing”. Through its formal radicalism, this picture helped shape modern art and stands emblematically for a culture that seeks spiritual immersion in dissolution from the tangible.



Nature: a single cell organism



Culture: the black square

Living pictures

My project wishes to research, how the “calculation” of nature can be translated into graphic form. In doing so it delivers pictures – icons of our time – and visual sequences – documents of contemporary history – of the processes of natural self-organisation, and observes in which ways do the aesthetics of the natural processes of digital algorithms for visual design differentiate.

With this confrontation I would like to question whether the processes of natural self-organisation can intervene in the narrative of the civilising artefact? Could both begin to describe a new history together?

Working process

Step One:

Choosing the biological material

- carrier material, agents, modes of interaction

possible candidates:

- Bacteriorhodopsin?
related paper:
<http://pubs.acs.org/doi/abs/10.1021/ja903066s>
- Paenibacillus vortex?
related papers:
<http://www.biomedcentral.com/1471-2164/11/710>
<http://www.biomedcentral.com/content/supplementary/1471-2164-11-710-s2.wmv>

Step two:

Image information

In accordance with the material:

Designing active and passive areas in the substate compliant with the image (density of the agents, presence or absence of activator/attractor)

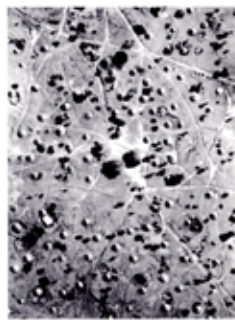
Logic of the image:

- a black/white image (active and/or reactive/passive) without grey levels
example (schematic):



Map of a movement area, a settlement area from above

example:

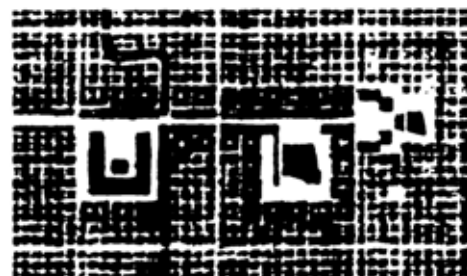


Scattered village between Lake Natron and Serengeti, Tanzania.
Eda Schaur,
Ungeplante Siedlungen, 1992

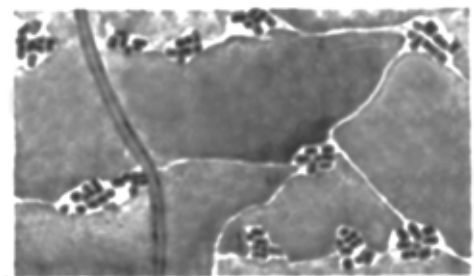


Non-regular geometry of the „ville spontanée“ against „ville créée“.
Spiro Kostof, The city shaped, 1991

example:

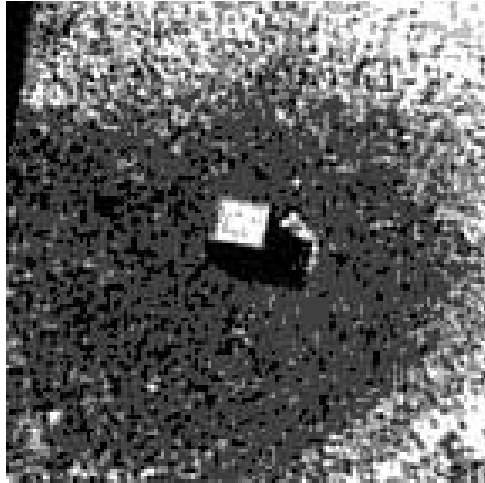


Pre-columbian Teotihuacán, religious
Spiro Kostof, The city shaped, 1991



Teotihuacán, here primordial settlement complex.

Possible motifs:



the attraction of the square



fleeing the square

Step three:

How can we gain insights by a coupling of patterns of selforganization and pictorial motifs?

- How are different „maps“ (barriers, obstacles, borders) of movement areas influencing patterns of selforganization of the biological agents
- one can experience, if there are significant differences between geometrical grids and organic round plans
(see settlement maps, here the outline of a city is compared to a map of a unplanned settlement in Afrika)

In an experimental working phase the behaviour of different agents interacting with different maps can be explored.

Outlook for further art works:

- Selforganization and image sequences:
Here we expose not only one pictorial motif to a selforganizing biological process, but sequences of images. Therefore we are dealing with two intermingling timelines:
the progression of the selforganization and the update of a realtime video image.

In earlier art works I applied these principles digitally:

In „598“ image sequences (sheep, gazing on a meadow) are accumulated with a differentiation filter in the video image.

The video shows the traces of the sheep, as the incoming video image is superimposed to older ones.

<https://vimeo.com/6513657#at=0>

<http://ursuladamm.de/598/>

Step four:

Image sequence

Not only one pictural image - but also a sequence of (real time) images can be influenced by biological agents anlaog to digital image processing with algorithms:

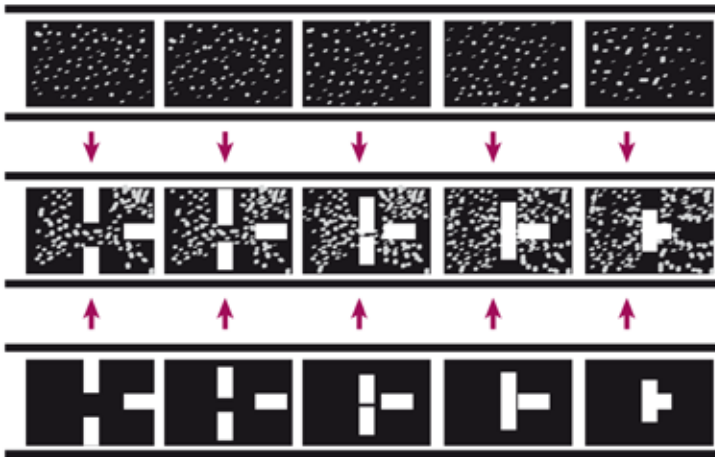


Image Sequence with selforganizing biological agents (schematic)

Interaction according to the biological agents

Image Sequence with selforganizing biological agents interacting with the pictural image (schematic)

Interaction according to the biological agents

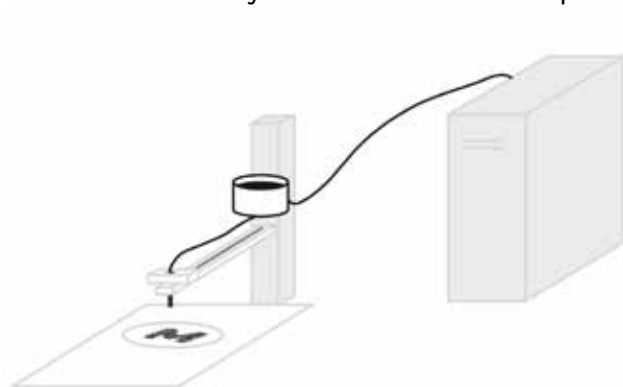
pictural image, motif (schematic)

Possible methods?

Carrier Material with image

Candidates:

- yeast with bacteriorhodopsin?



Nanoprinter to manufacture the image carrier?

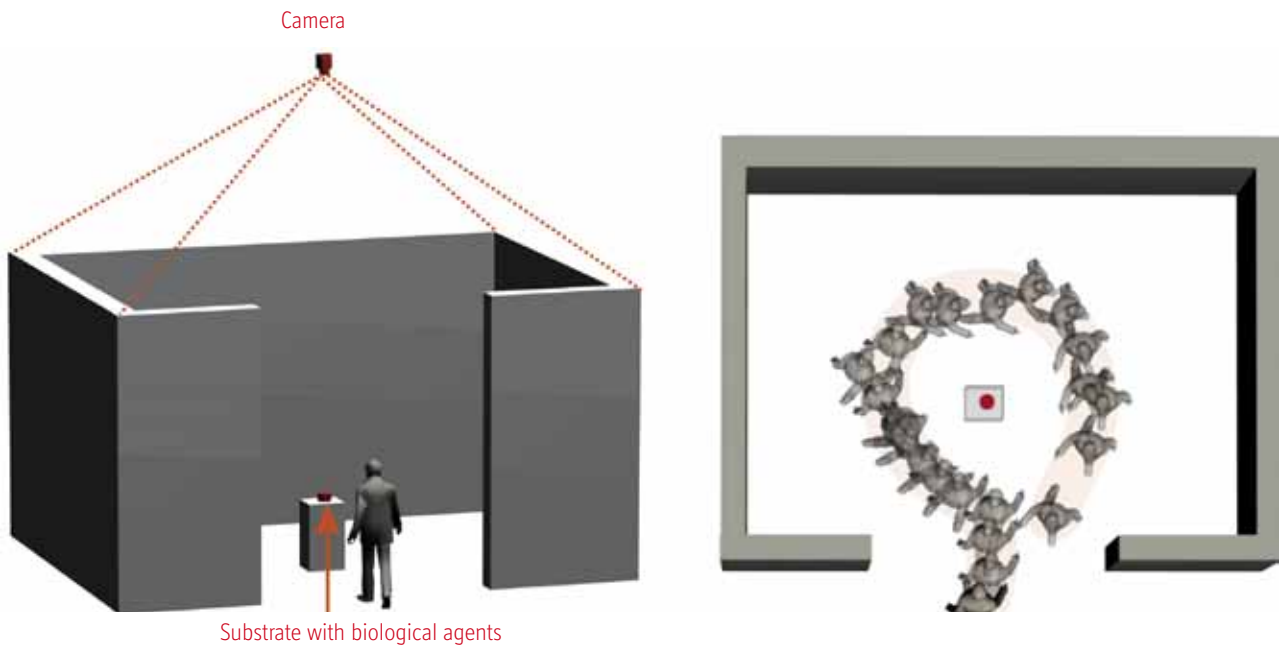


Laserprojector to exposure/activate the substrate?

Step five:

A setting for an exhibition

An image sequence (video footage) generated by a surveillance camera



Video of the substrate, presented to the visitor
(remote from a laboratory, real time or prerecorded)

Grey frame: Object in substrate, according spacial situation
Track of visitor (light pink): is repeatedly printed or exposed to
light according to the local situation

What has been done?

bacillus circulans experiments:

- adding ONPG to the agar for blue bacteria
- preparing different specimen for bright field microscopy

what shall be done in the near future:

- construction of barriers and „arenas“ for bacteria (-> bacteria game!)

Question: where can I get „nanoprint“ or „micro-objects“ in a size in the rage of a bacterium (10 -50 μm)

- looking for a method of reversible staining!

The next steps:

- Paenibacillus vortex is ordered - a strain where extensive information is available incl. genome sequencing (Eshel Ben Jacob), possible common experiments?
- research on methods for the „micro-objects“
- Contact to Victor Erokhin (Bacteriorhodopsin)
- Search for a feasible method to use bacteriorhodopsin for a reversible lightsensitive process