The Nature of the Artificial

planning

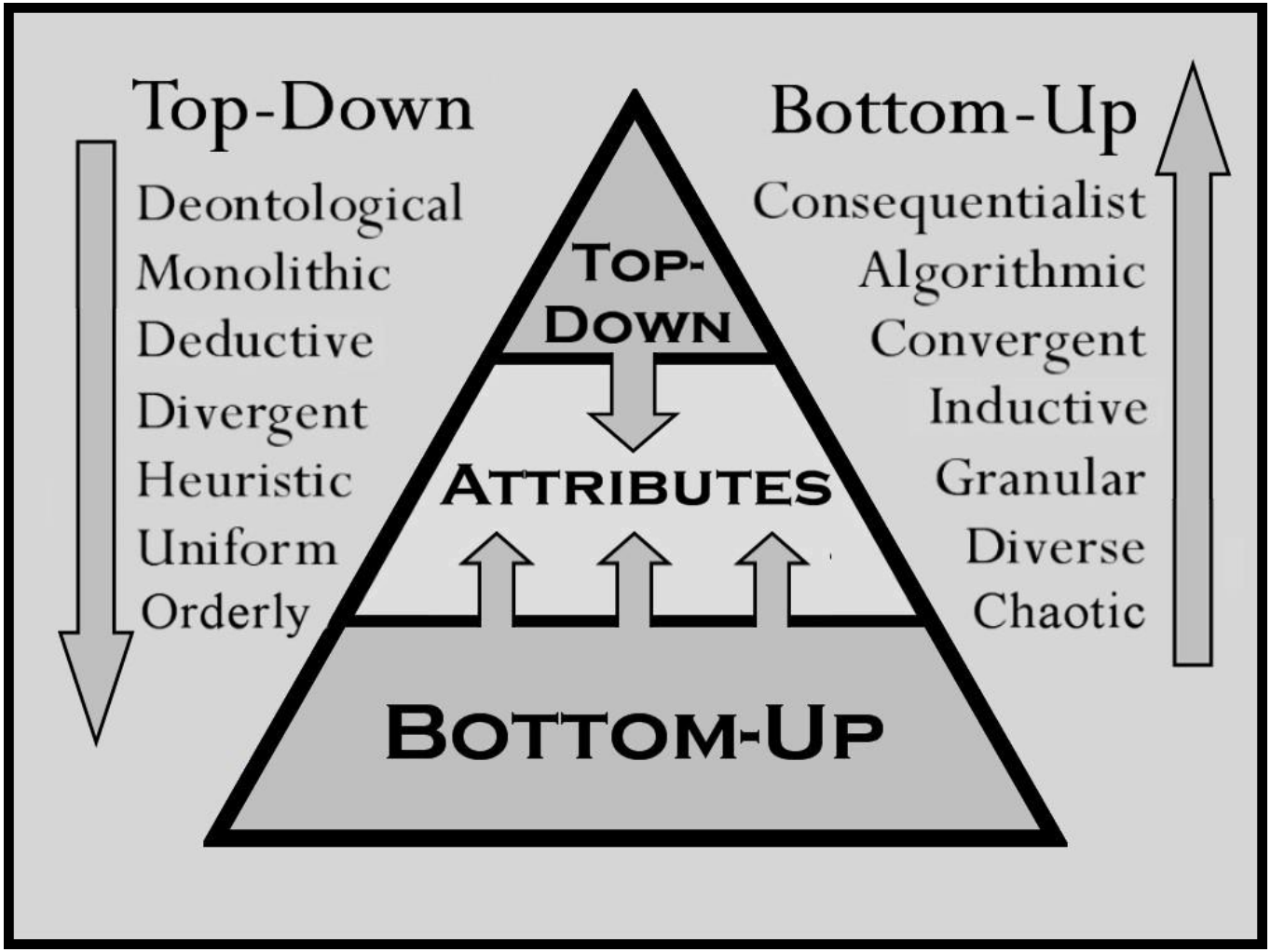
Grasshopper mandatory, scripting optional

Small Assignments at the beginning

Larger individual Project in the 2nd half

Intro + Dimension 1			22.03.2021
D1 cont. + Dimension 2		Assignment 1	29.03.2021
D2 cont. + Dimension 3	Python 1	Assignment 2	12.04.2021
D3 cont.	Python 2	Assignment 3	19.04.2021
Rules Based Systems	Python 3		26.04.2021
Analysis & Optimization	Python 4	Pick Topic	03.05.2021
	Python 5		10.05.2021
	Python 6		(17.05.2021)
		Mid Crit	07.06.2021
			14.06.2021
			21.06.2021
		Final Crit	28.06.2021

intro

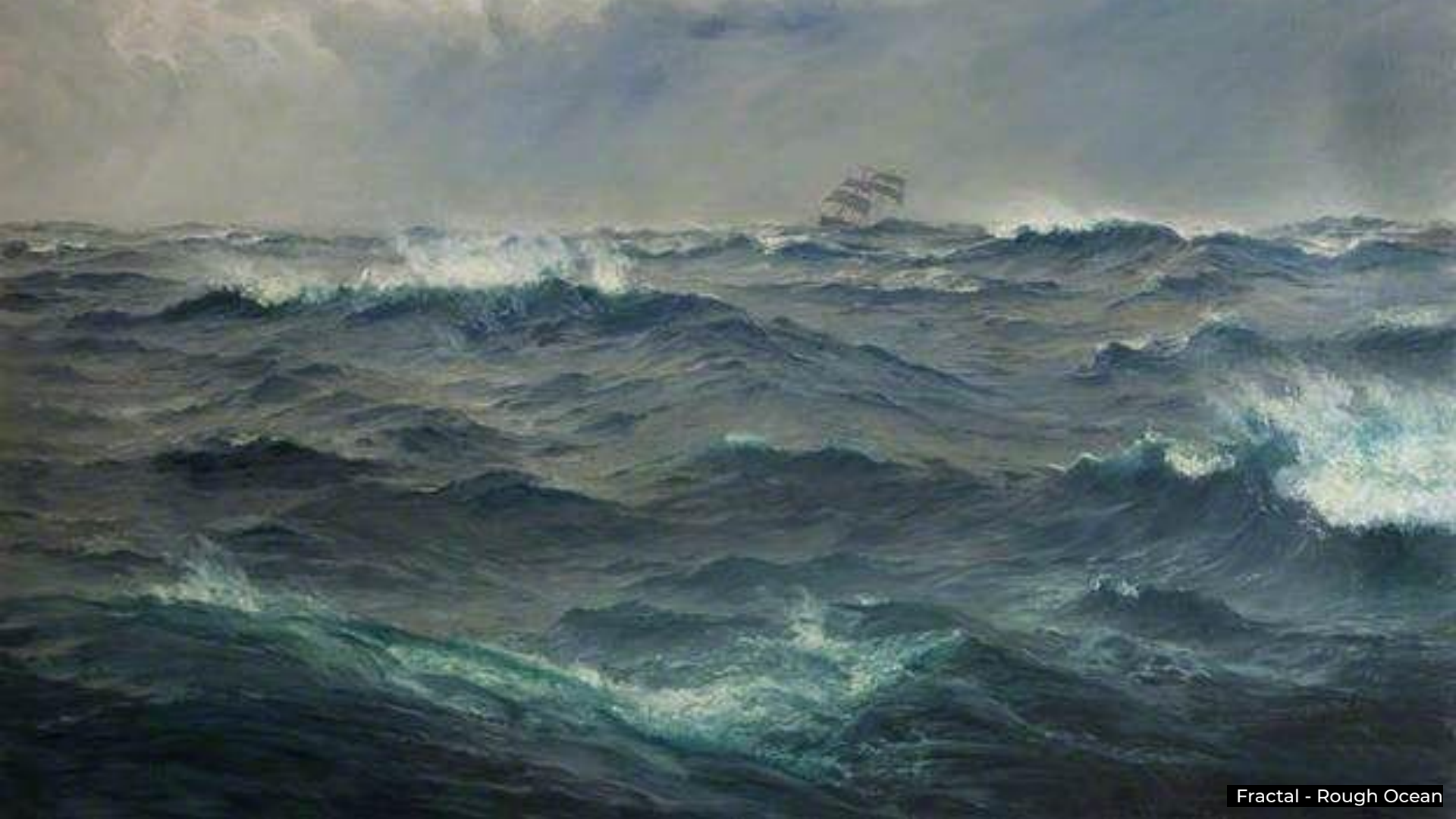

Top-Down
Deontological
Monolithic
Deductive
Divergent
Heuristic
Uniform
Orderly
Bottom-Up
Consequentialist
Algorithmic
Convergent
Inductive
Granular
Diverse
Chaotic
TOP-DOWN
ATTRIBUTES
BOTTOM-UP

Smooth shapes are very rare in the wild,
but extremely important in the ivory tower and the factory.

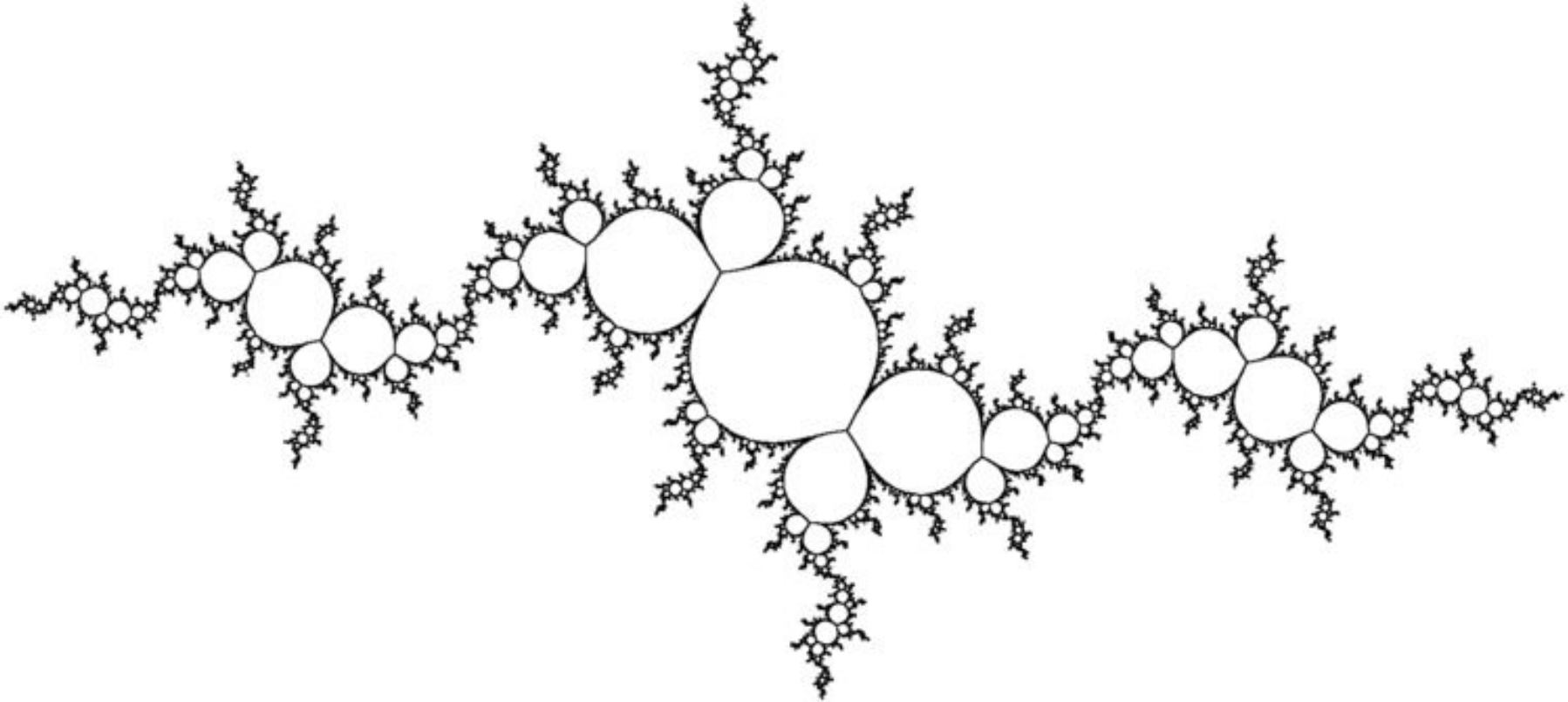
Natural Objects = Fractal-like
Artificial = Smooth

Benoit Mandelbrot


Smooth - Polished
Concrete


Fractal - Rough Ocean

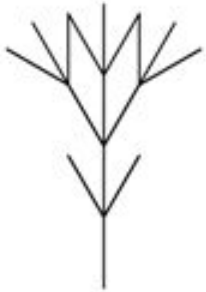

Fractal - Hillshade Map



Julia Set

1

2



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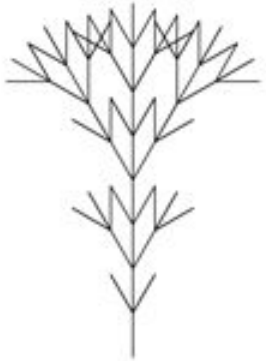
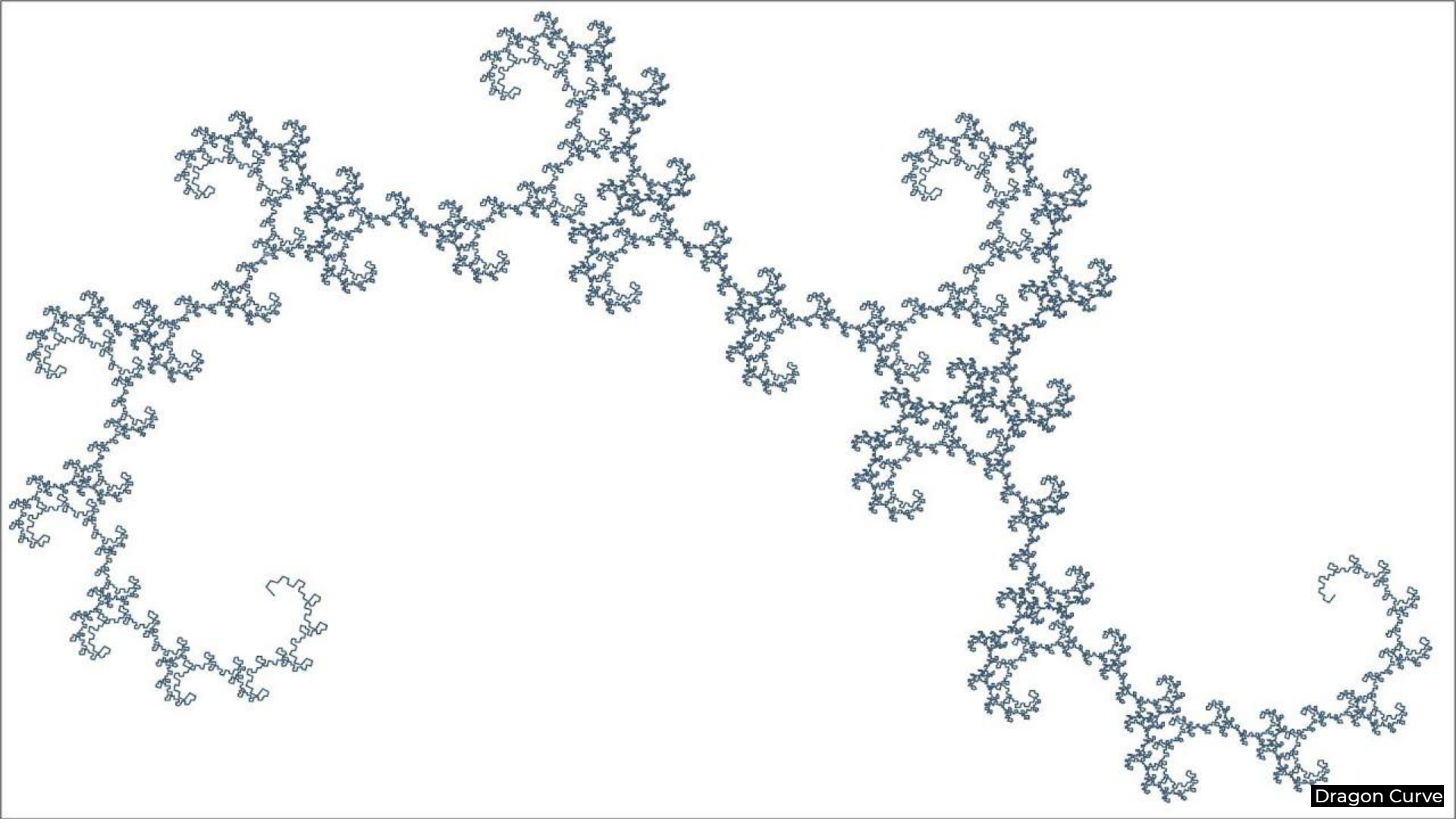
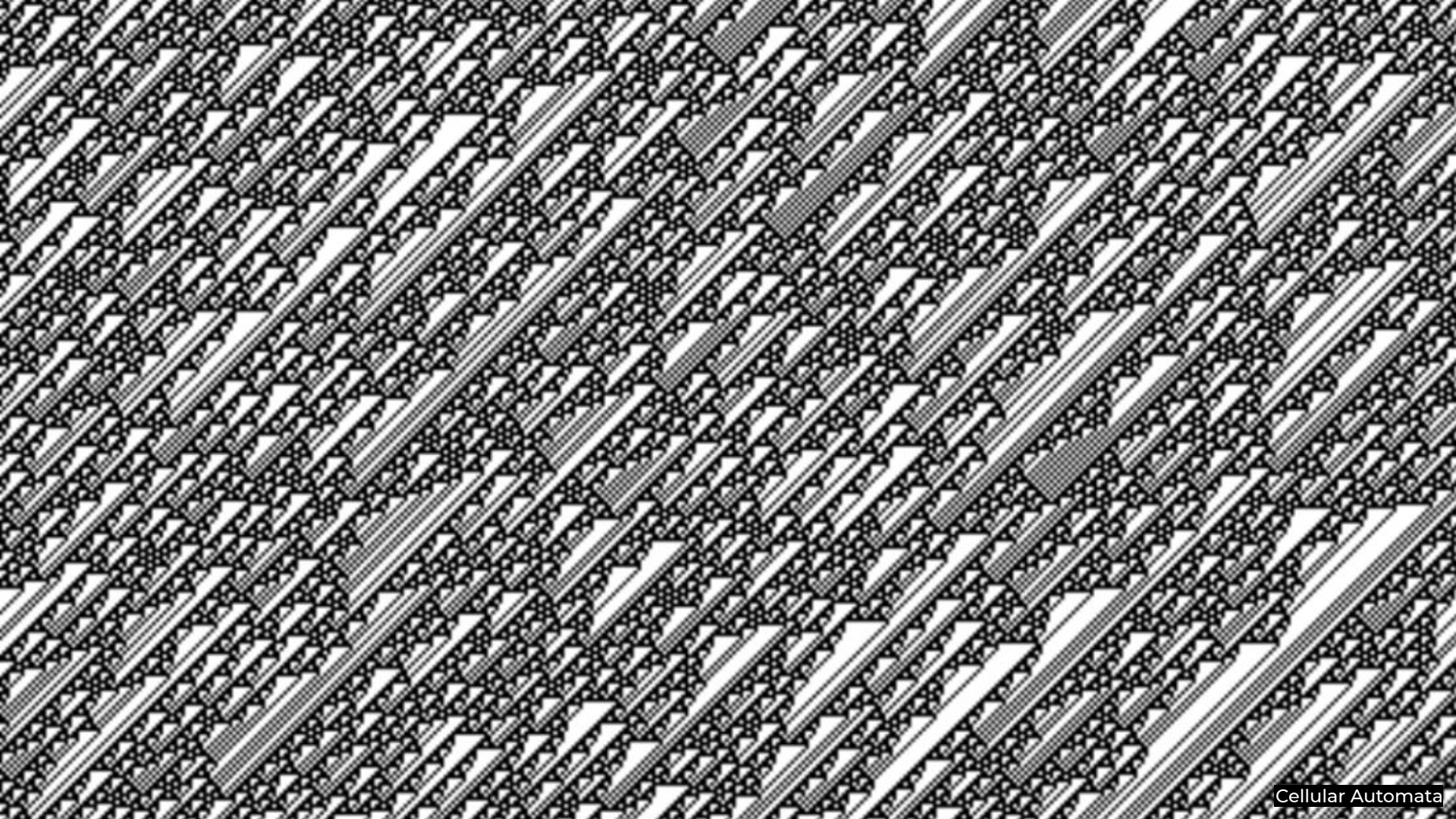


4

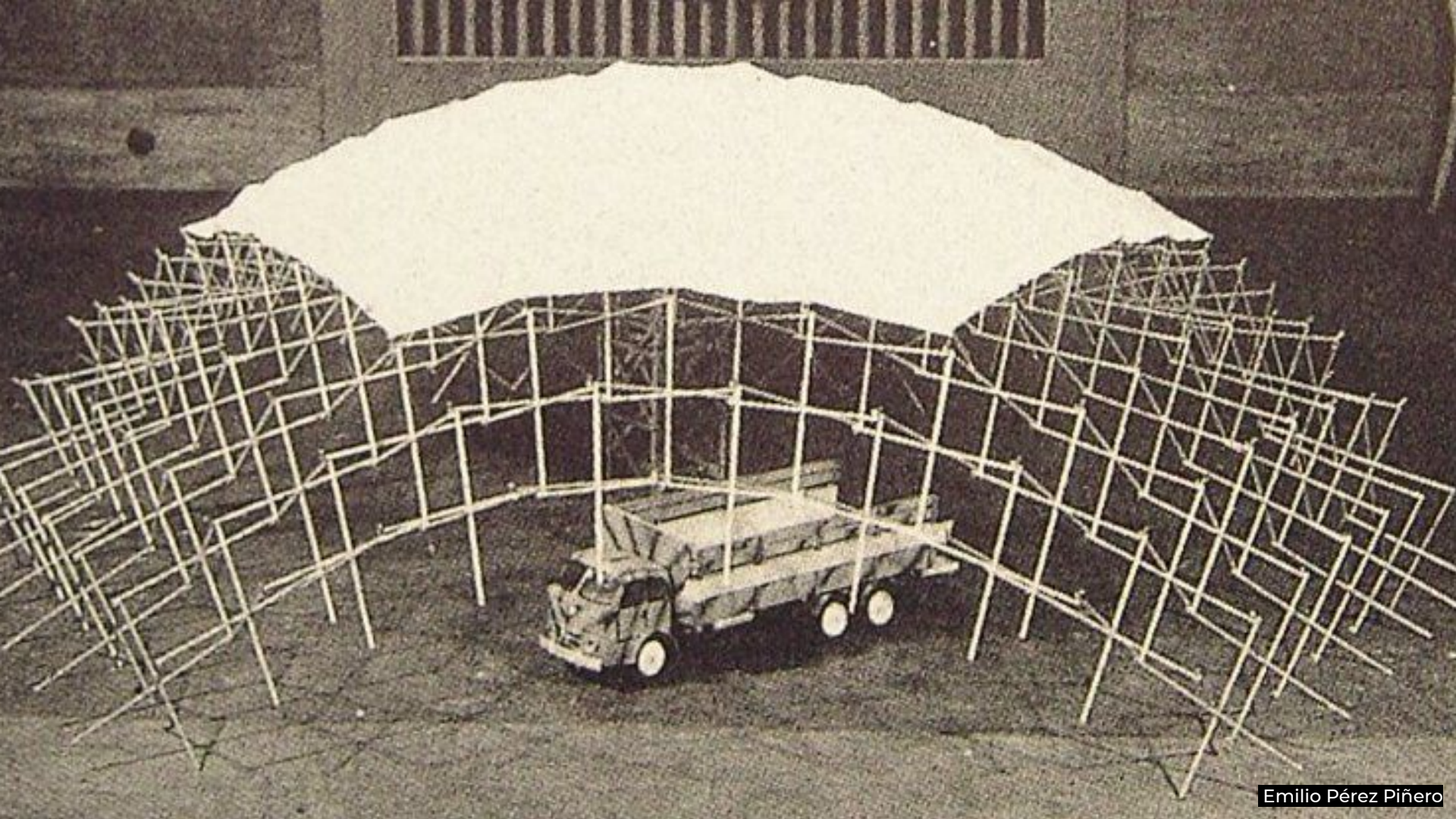
Lindenmayer System


Dragon Curve


Cellular Automata


Differential Growth


Michael Hansmeyer and Benjamin Dillenburger

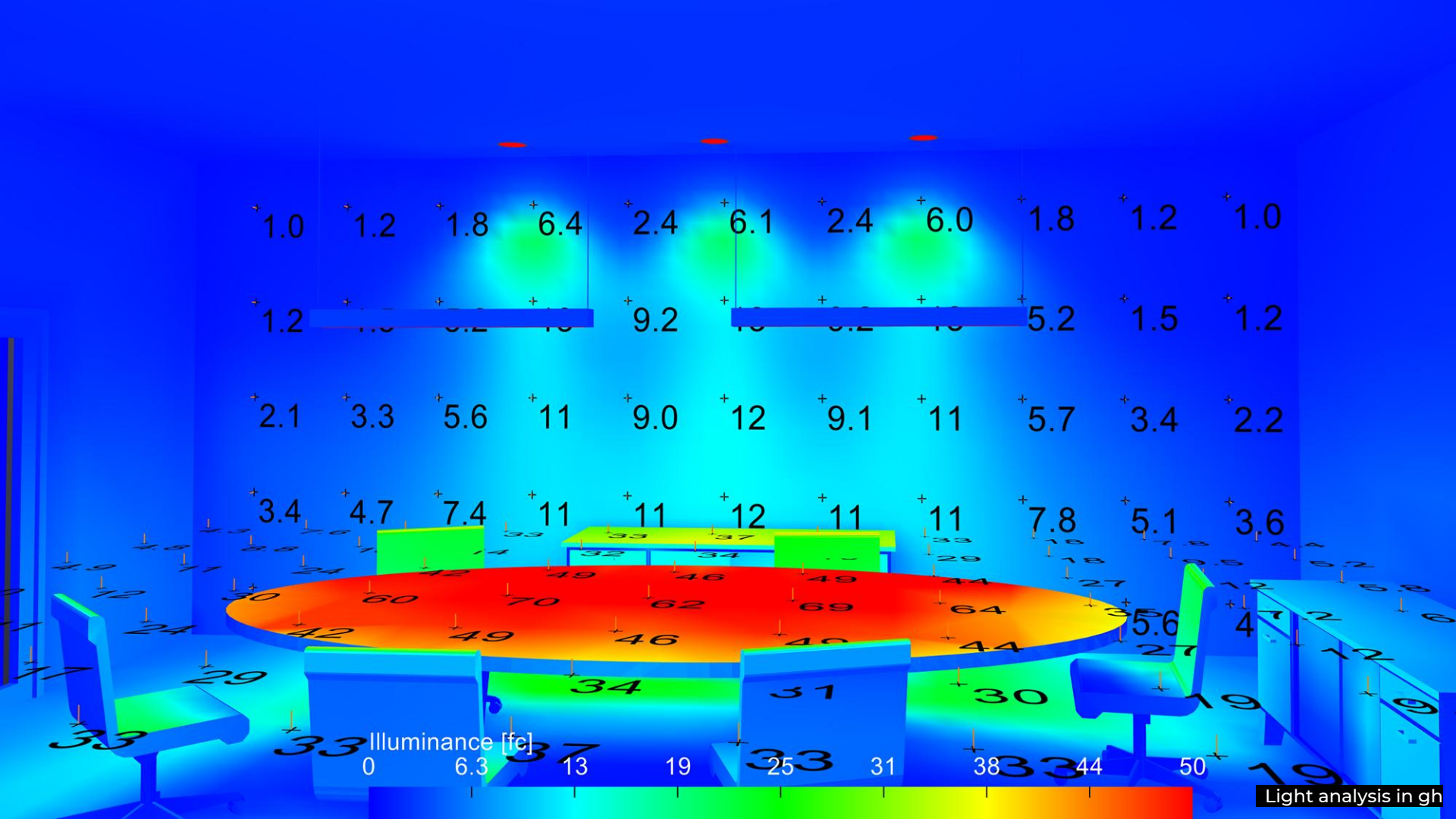

Emilio Pérez Piñero


ICD Landesgartenschau


GKR Robotic Brick Laying


Positive Negative

BRG Droneport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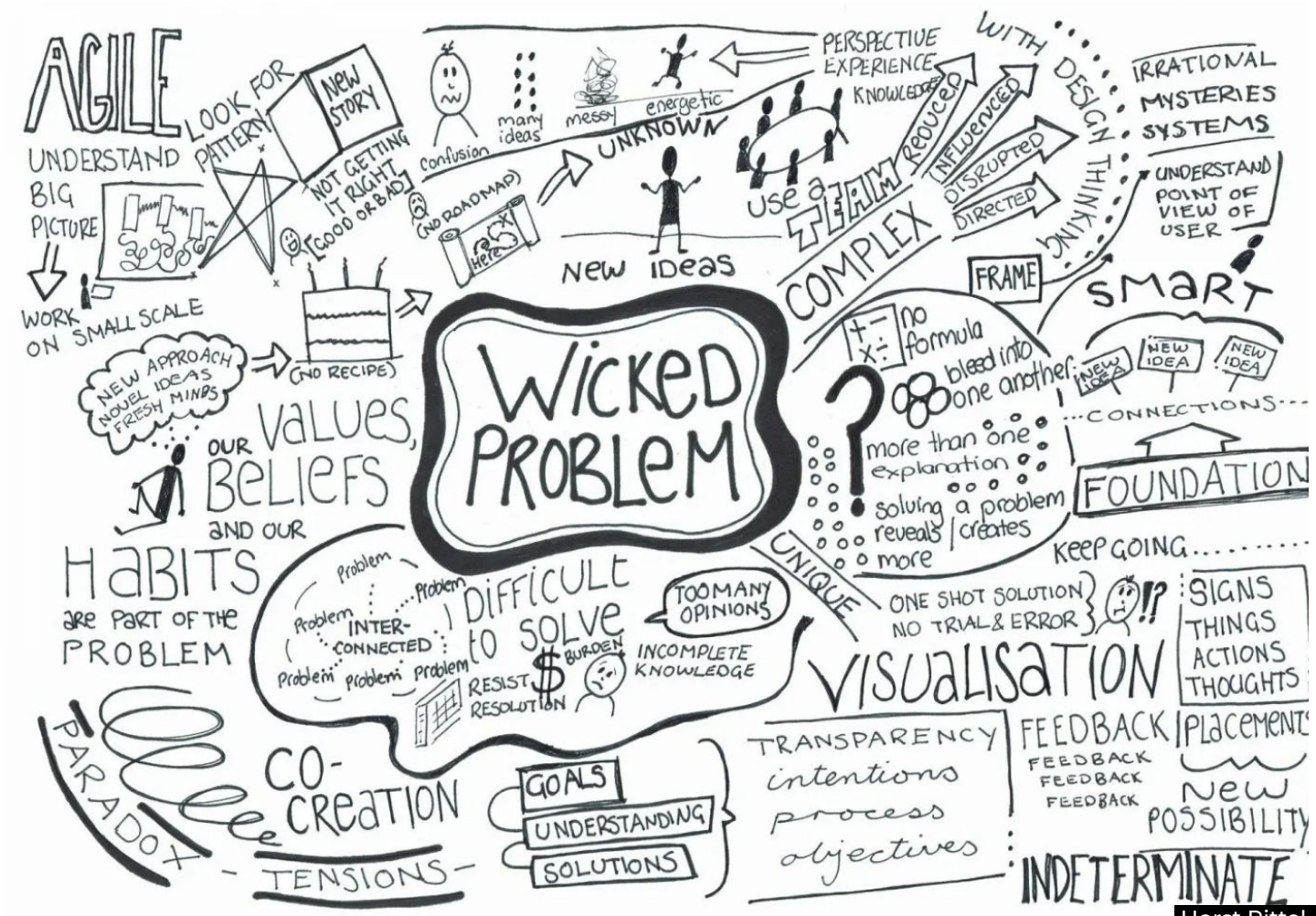
1.2 9.2 5.2 1.5 1.2
2.1 3.3 5.6 11 9.0 12 9.1 11 5.7 3.4 2.2
3.4 4.7 7.4 11 11 12 11 11 7.8 5.1 3.6
Illuminance [fc]
0 6.3 13 19 25 31 38 44 50
Light analysis in gh



Horst Rittel - Wicked Problems

tools

Rhino

Grasshopper

python

Rhino

+

1. Great at Designing complex shapes
2. Very smooth models because of splines and nurbs

0

3. Has some mesh capabilities but is not great at it
4. Not the best tool for working on 2d drawings
5. Doesn’t work well with image (raster data)

-

6. Not great at collaboration - file structure doesn’t allow for it
7. Difficult to iterate design variations

grasshopper

+

1. Takes advantage of the modeling nurbs/spline capabilities of rhino
2. Allows you to iterate through very many different design variations
3. Because of your more direct access to the different geometry types, you can do more, more easily than you would be able to in Rhino

0

4. Has interfaces for interacting with many different types of data and other software (excel, revit, archicad, images)

-

5. Still not great at allowing collaboration, hard to merge gh scripts
6. Interface is very different and not as hands on as Rhino

scripting

\+

1. Very low level control, maximum freedom
2. It is very easy to share code through tools like GIT
3. Iteration and recursion become a breeze, both very hard to pull off in gh

0

4. Scripting allows you to integrate many different other libraries in your code. Sadly enough, ghPython can only use rhino libraries, without hacks

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5. With great freedom comes great complexity
6. Highly abstract, takes some time to getting used to

1D
Lines, Splines & Spirals

1. Numbers (integers vs floats/reel numbers)
2. Domains (min & max values of data)
3. Points & Vectors
4. Lines
5. Polylines
6. Splines / Nurbs-curves
7. Sampling curves: Divide Curve (Tangent & Normal)

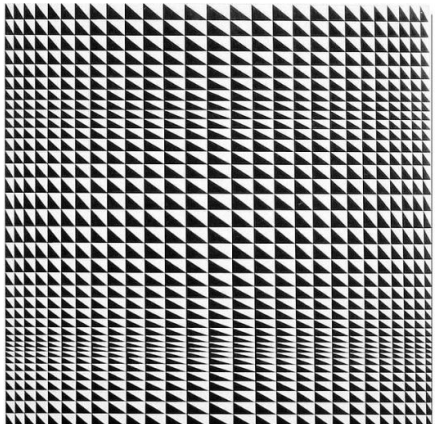
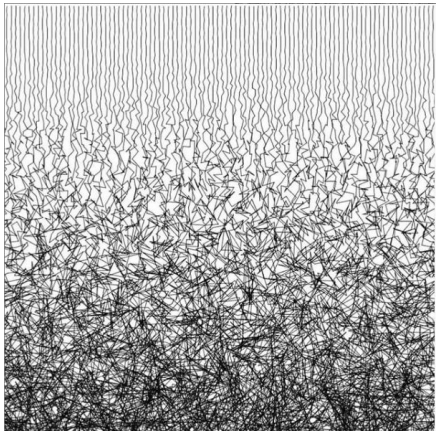
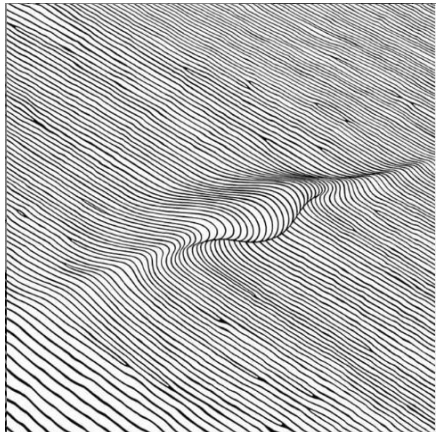
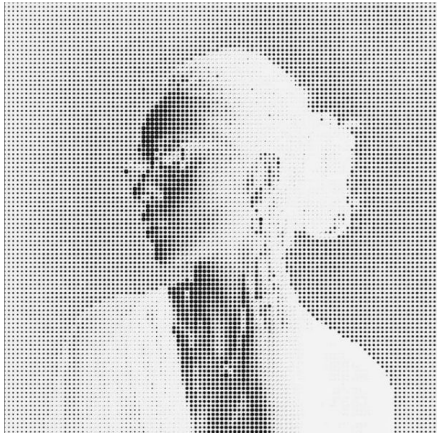
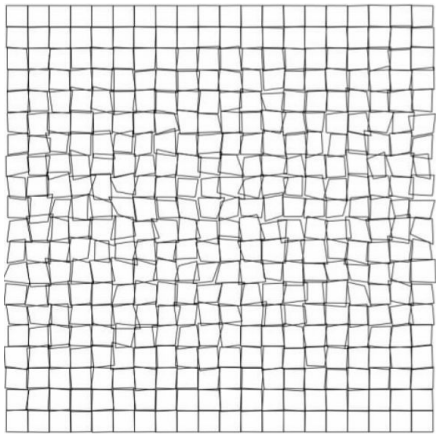
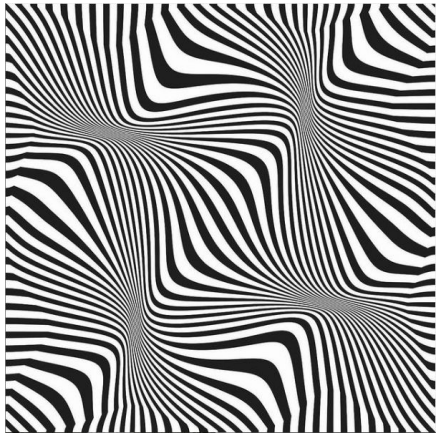
8. Lists
9. Grafting & Flattening (list to list of lists & LoL to single list)
10. Series
11. Retrieving data out of lists: List item & Sifting
12. Removing invalid data (Clean Tree)

13. Basic Transformations - scaling, translations, rotations
14. Distances
15. Input based bumping
16. Functions (expressions)

Assignment 1

Apply some of the point oriented design logics to generate some interesting line-art.

Any questions:
jonas.vandenbulcke@gmail.com

https://www.instagram.com/in.white.rooms_/

next week

1. Colors
2. Renderstyles

3. T-parameters on curves
4. 2D Rectangles
5. 2D Boolean operations
6. Offsetting
7. Randomness
8. Iteration (Random Walk)

2D
Surfaces, Meshes & Images