Matematický model vtipu a smiechová kultúra IT

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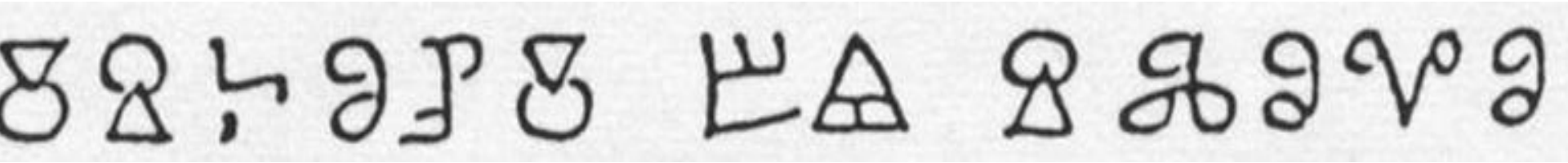
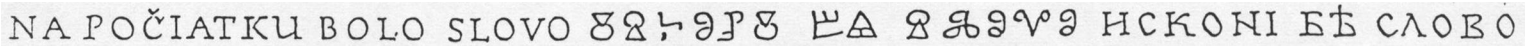
Týždeň vedy 2012, FMFI UK

Font Design in 9th Century

GLAHOLICA FONT DESIGN –

the oldest Slavonic alphabet, created by **St. Cyrilius/Constantinus** before **863**. He is thus the first known font designer in world history. Hlaholica celebrates its **1150th anniversary** in 2013. Unfortunately, we do not know neither the exact date nor the hour of the release.





Motivating Question(s) 1

- **How Glagolica was designed?**
- **What happened in the mind of an author?**
- **How would You proceed?**
- **What should happen in Your mind?**

- **41 letters/numbers, non-Greek sounds**

Motivating Question 2

- **This is a riddle:**
  there is no official institution having neither budget nor responsibility for this. On the other hand, it works perfectly and it represents significant part of web communication.
- **Hint: Everybody knows it personally and shares it nearly every day. And it is not spamming.**

- **What is it?**

Credits in this presentation

- **Sorry to say, we cannot credit all the images used here because they are part of internet folklore and thus their authors remain mostly anonymous. Whereever we know the author, we give full credits. All illustrations here were distributed as folklore, ie. for making people enjoying.**

Koestler, Paulos, Raskar…

- **Arthur KOESTLER *The Act of Creation*, 1964**
- **John Allen PAULOS *Mathematics and Humor***
- **Ramesh RASKAR *How to Invent, Idea Hexagon***

- **Ben SHNEIDERMAN "Web Science" is a term that refers to processing the information available on the web in similar terms to those applied to natural environment , 2007**
- **BLYTHE, M.A. et al. *Eds.* 2003*. Funology: From Usability to Enjoyment***

Koestler, Paulos, Raskar…

- *1905-1983

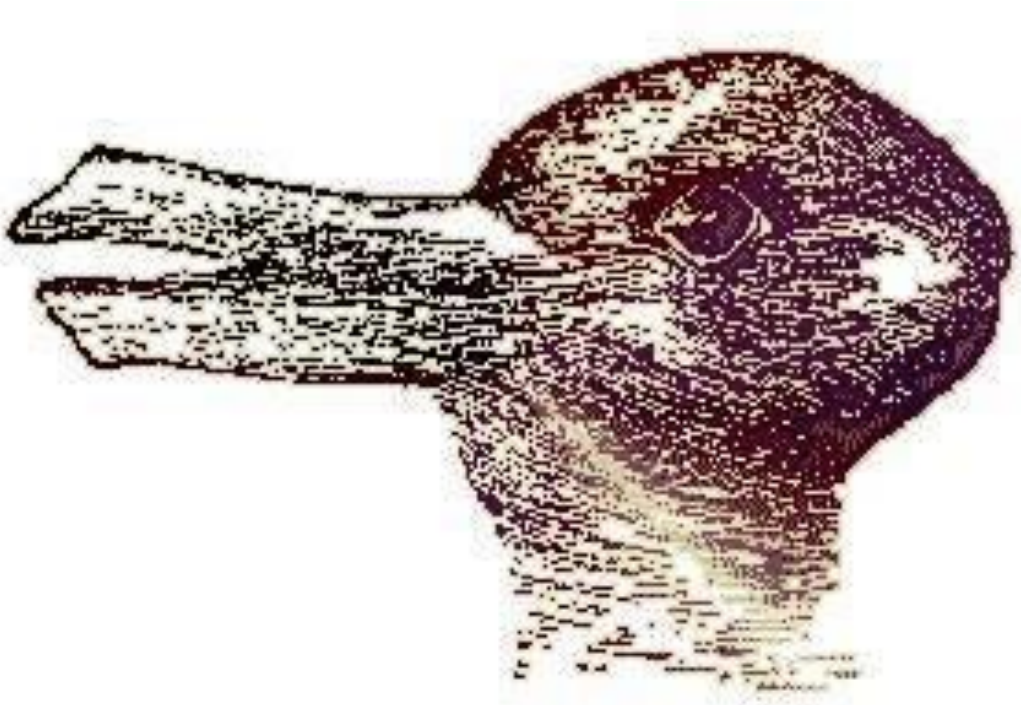
*1945

*MERL, MIT

Comment on the Next Slide

- **There are two different types of ambiguous images – ambiguous message and ambiguous observer...**
- **... enjoying our brain by parallelism (perception, game) or ambiguity (content)**
- **The first image has been analyzed in Vienna by Ludwig Wittgenstein and other famous philosophers**

A Rabbit… or a Duck?



A Rabbit…. Or A Duck?
hint: the duck is looking left, the rabbit is looking right

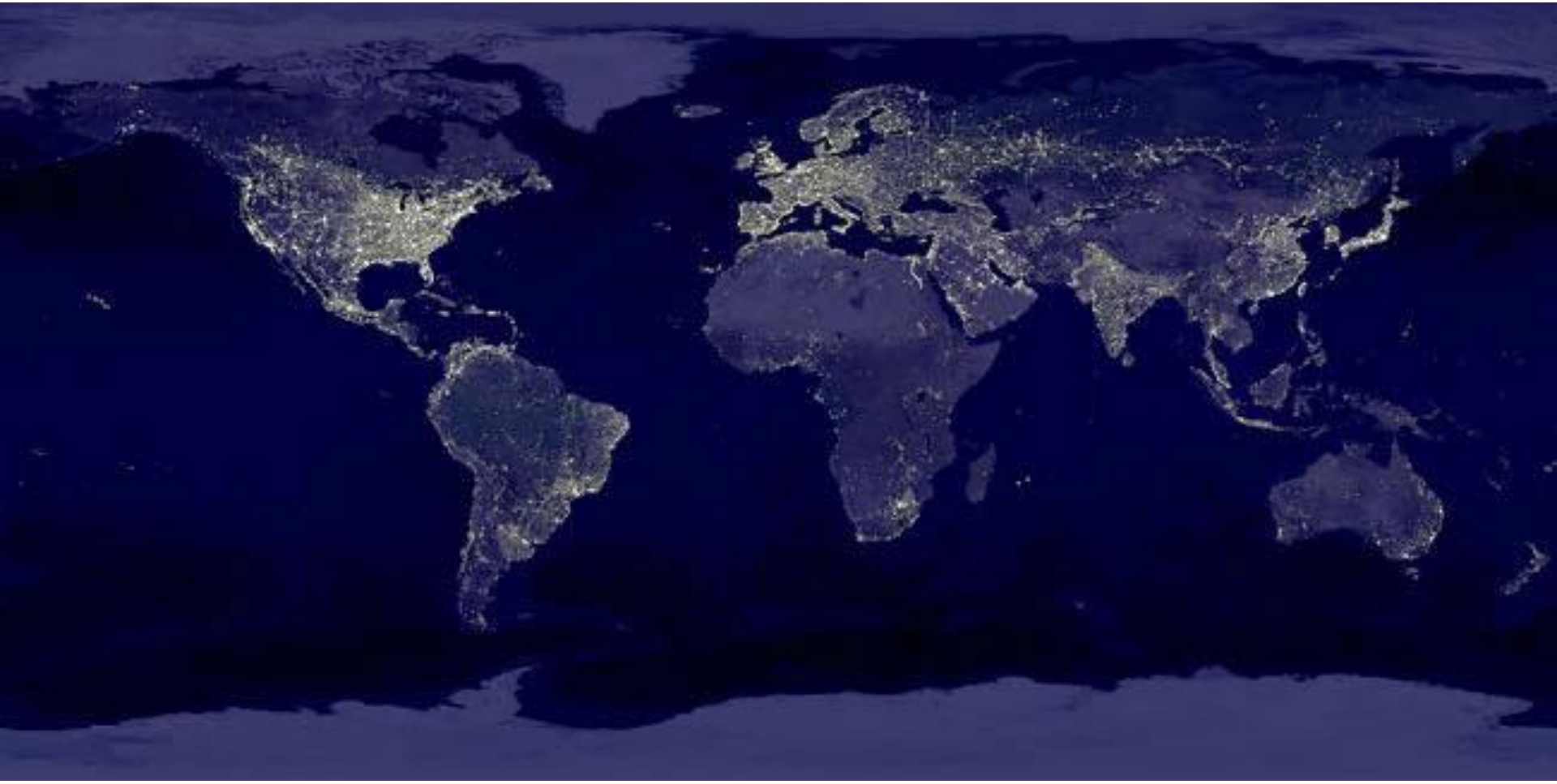
What is the weird shape?

- **Ambassadors by Hans Holbein, jr.**
- **16th century, 1497 –1543.**

Comment on the Next Slide

- **... enjoying of our brain by ambiguity...**
- **This is – according to Koestler – available in comic inspiration, Humor (eg. Rabbit/Duck) and in Science and Art (see the next couple of images)**
- **Koestler 1964 names this BISOCIATION, bridging of two contexts (opposed to association)**
- **BTW The same or more is provided by multiple windows on the screen**
- **The following 2 images are popular examples from Science and Art**

Earth in the Night



http://antwrp.gsfc.nasa.gov/apod/ap001127.html

Motivating ? Answer 1

- **This is a riddle: there is no official institution having neither budget nor responsibility for this. On the other hand, it works perfectly and it represents significant part of web communication.**

- **Hint: Everybody knows it personally and shares it nearly every day. And it is not spamming.**

- **What is it?**

Motivating ? Answer 2

- **What is it?**

- **The whole system of “institutions” for verbal and graphics folklore is named the alternative culture or LAUGHTER CULTURE (Bakhtin). Roughly speaking, it is the creative communication of interesting paradoxes.**

Motivating ? Answer 3

- **Having the answer, we can finish the presentation now.**

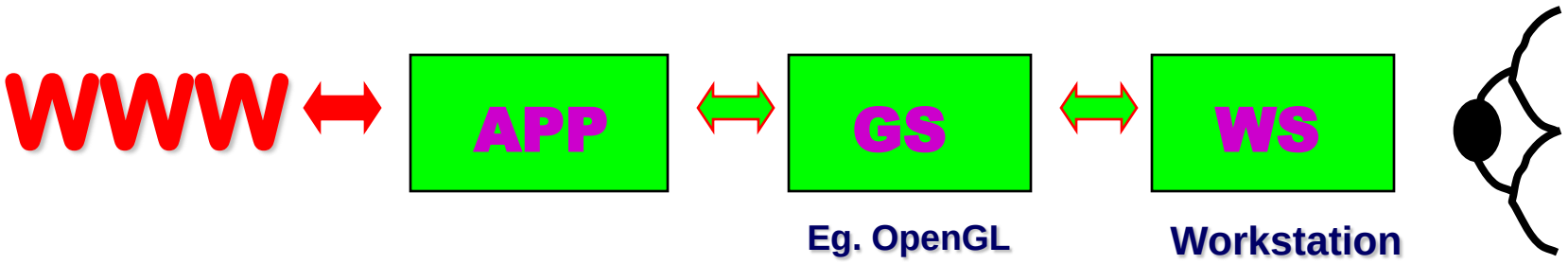
- **But if You wish…**

Mikhail Bakhtin

- *"It could be said (with certain reservations, of course) that a person of the Middle Ages lived, as it were, two lives: one that was the official life, monolithically serious and gloomy, subjugated to a strict hierarchical order, full of terror, dogmatism, reverence and piety; the other was the life of the carnival square, free and unrestricted, full of ambivalent laughter, blasphemy, the profanation of everything sacred, full of debasing and obscenities, familiar contact with everyone and everything. Both these lives were legitimate, but separated by strict temporal boundaries*."

Communication Interfaces

- Author - Application Programmer - GS Author - User

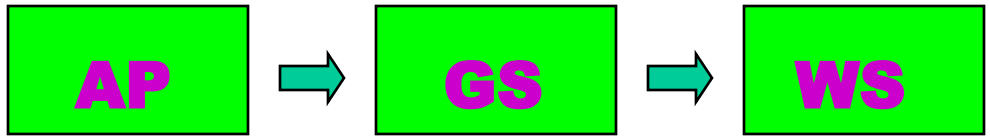


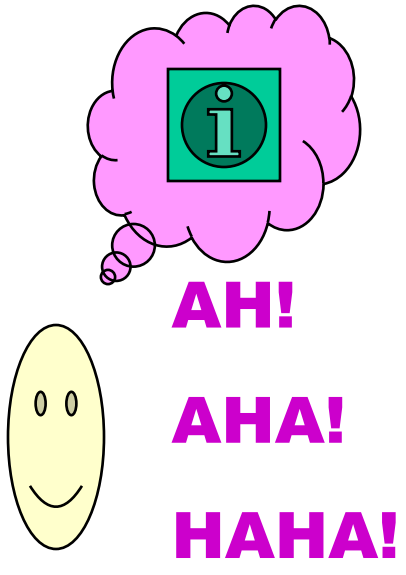
- What is interesting for users?

Ambiguity: Interesting UnLtd.

- Communication

A
S
H

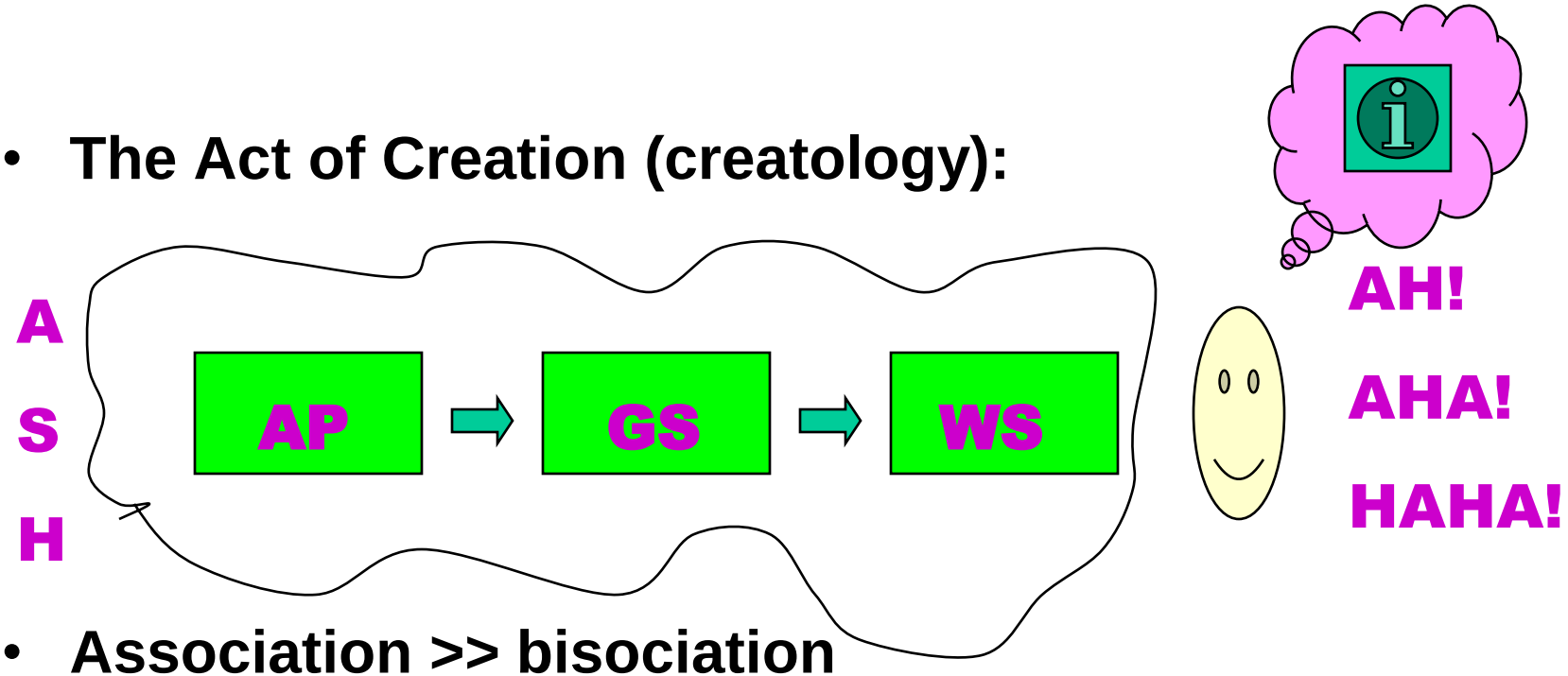




- Arthur KOESTLER, 1964 (1967):
- tides/Moon: Galileo??, electron/magnet…

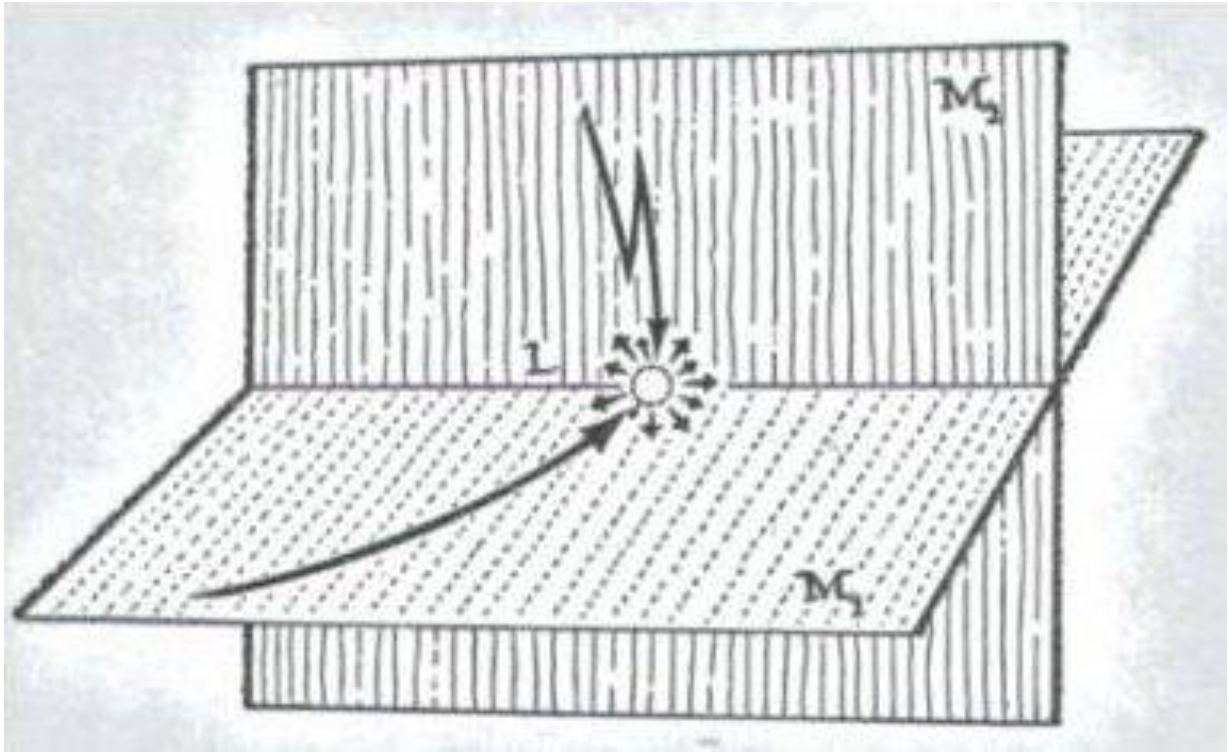
On Model of a Human Being

- **The Act of Creation (creatology):**



- **Association >> bisociation**
- **Arthur KOESTLER: no labyrinth, no mouse, just bisociating two contexts**

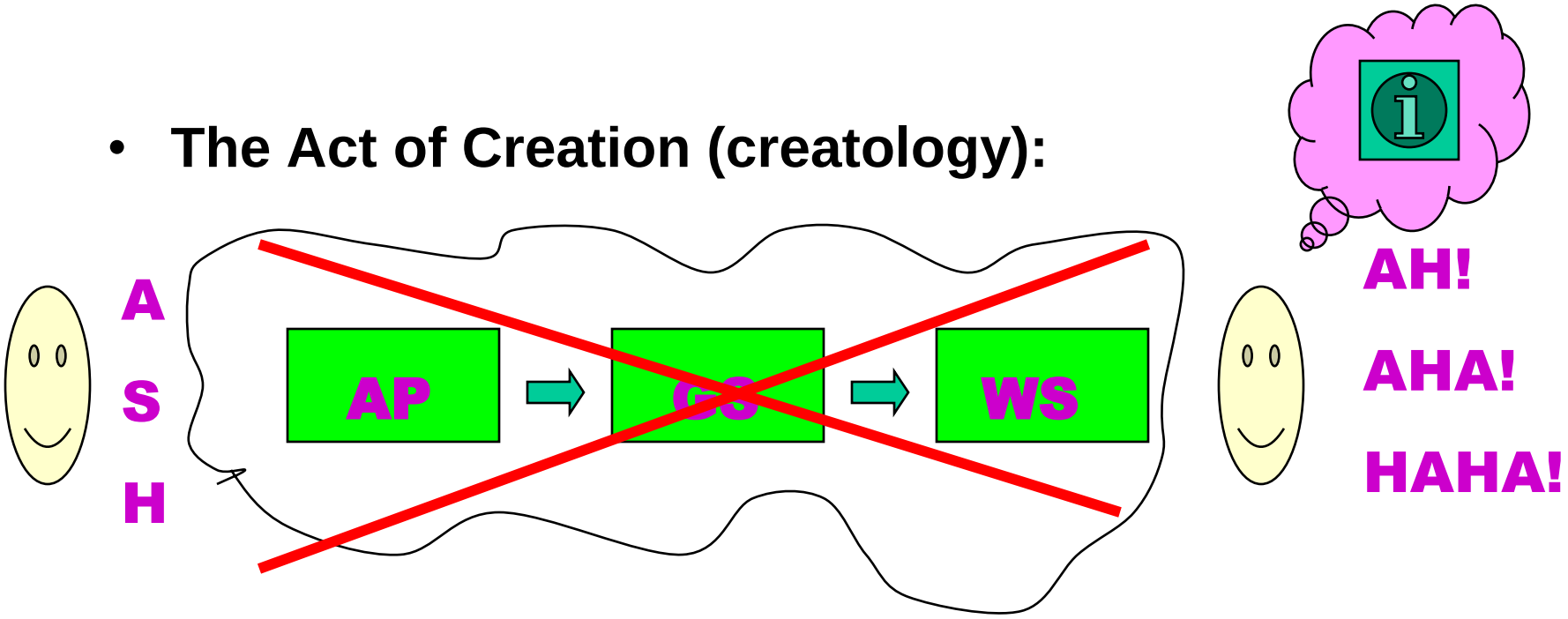
Two Planes



http://www.pragmaticshumour.net/makingsenseofhumour/1.3incongruity_theories.htm

Human – Human Interface

- **The Act of Creation (creatology):**



- **The same is interesting without web**
- **Art, scientific discovery, comic inspiration (Humor)**
- **Note that Humor is undefined like Set or Shape**

Koestler, Paulos, Raskar…

- *1905-1983

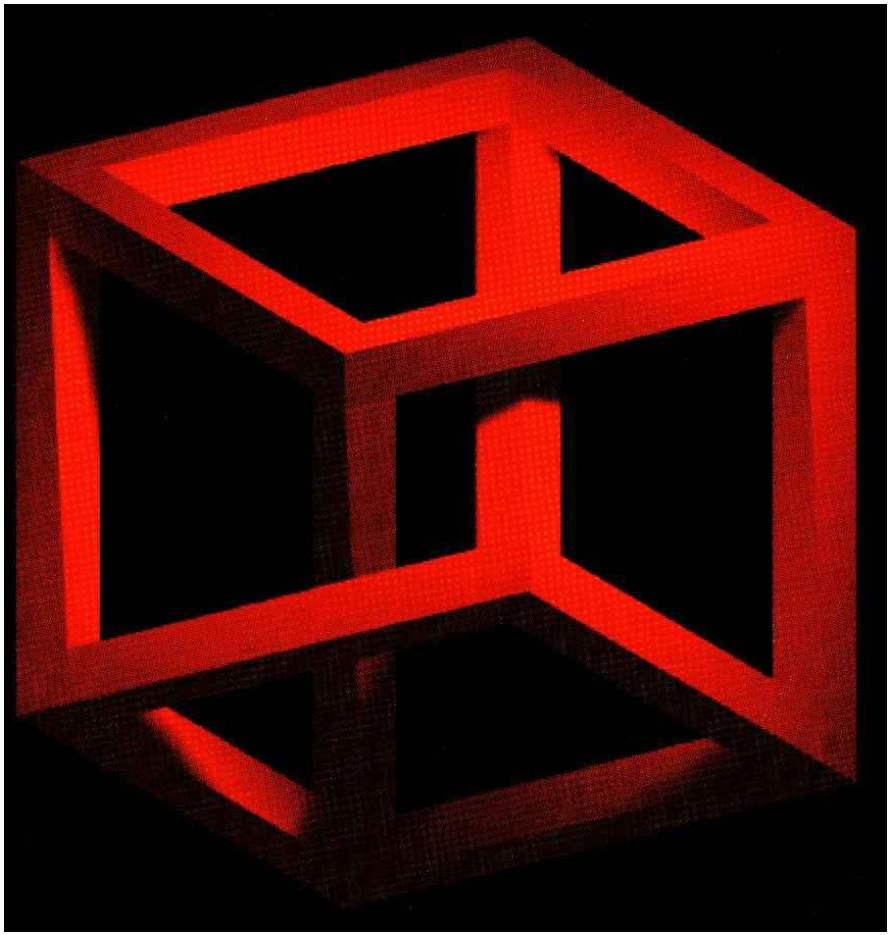
*1945

*MERL, MIT

Temporal Bisociation

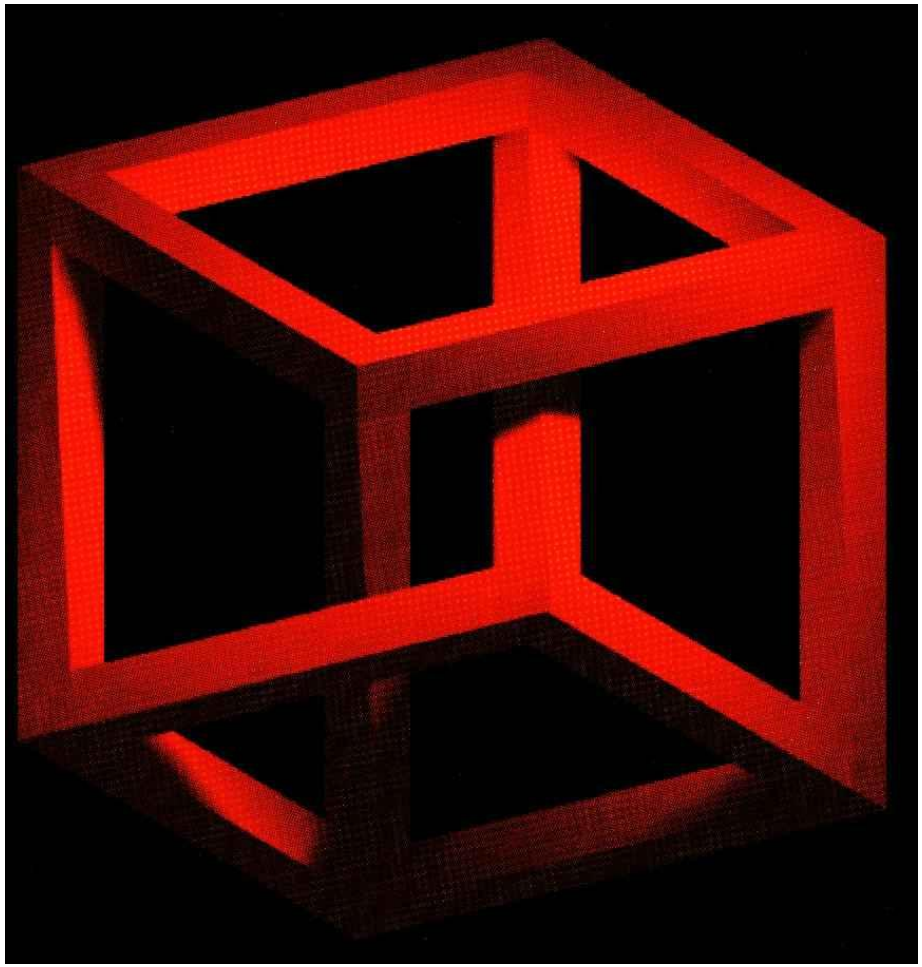
- **Another riddle today...**
- **Do You believe that the following 3D object exists?**

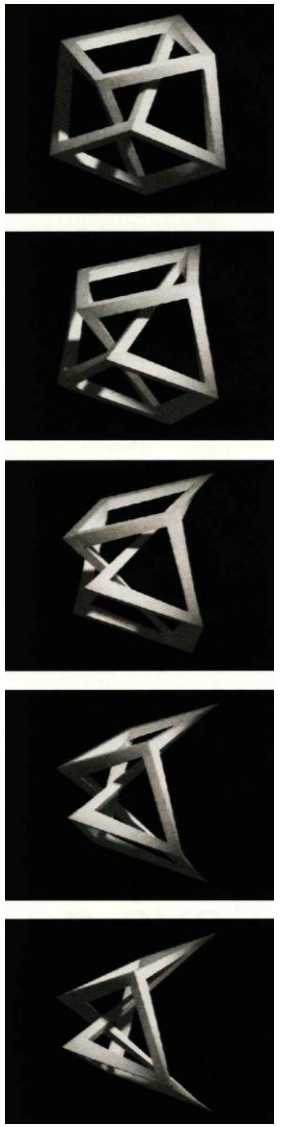
Does this exist ?



- ∃?

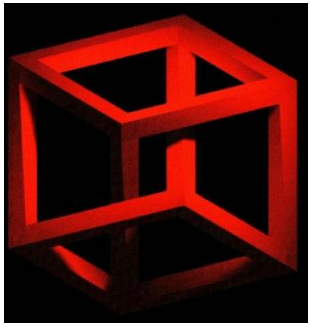
KUBOID by P. Eliáš

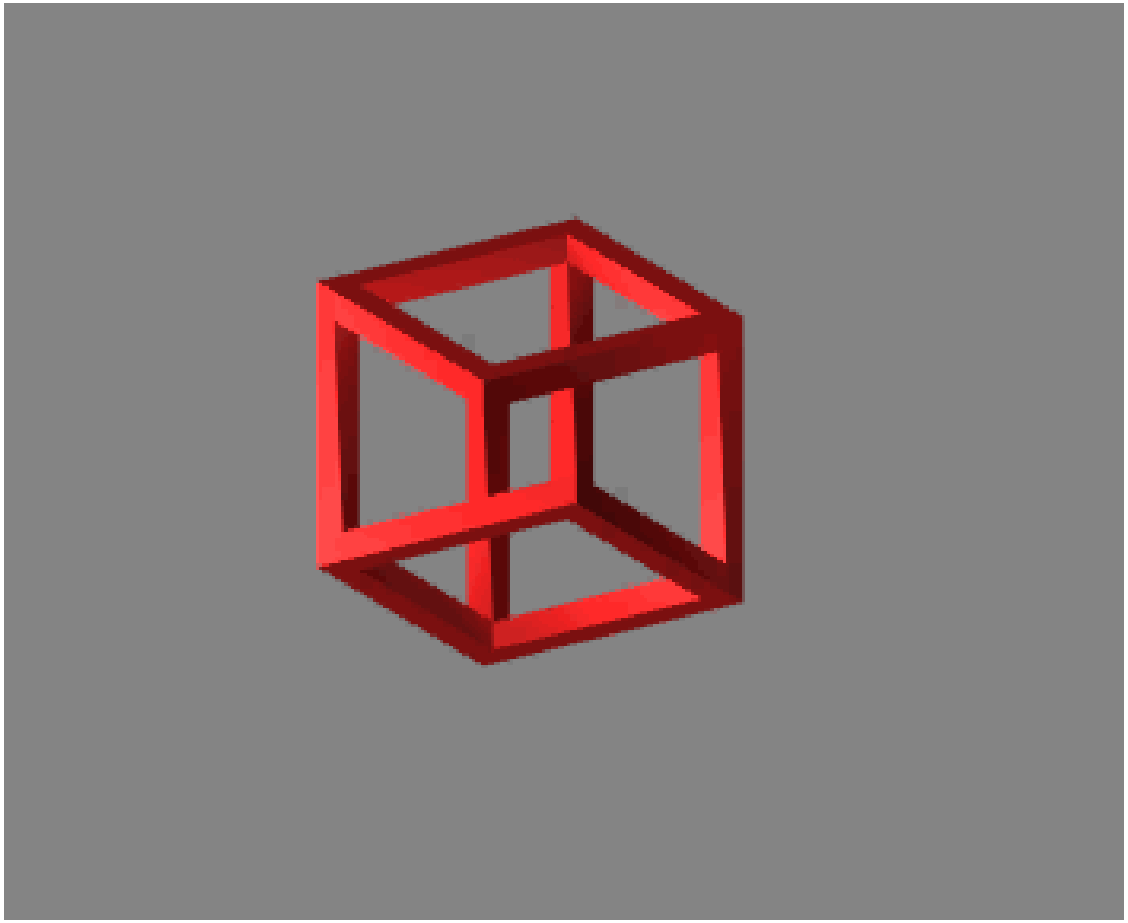




- ∃!

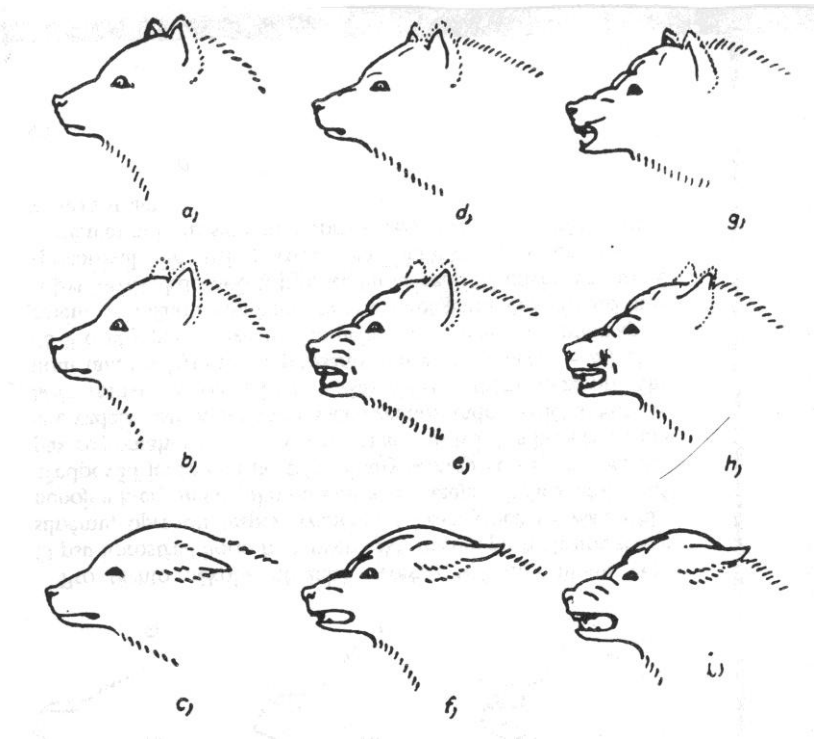
KUBOID by P. Eliáš





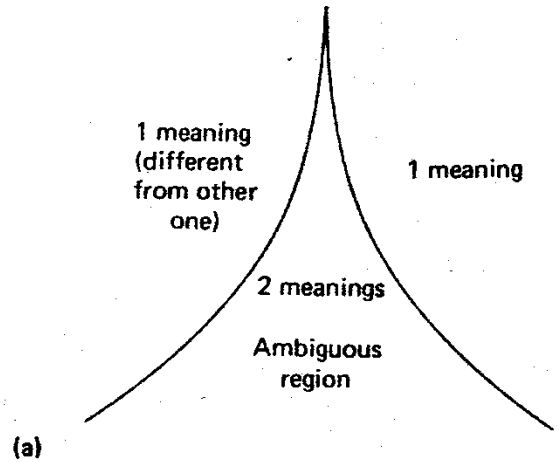
- http://www.dunako.com/pavol/cuboid/

Emotional Ambiguity

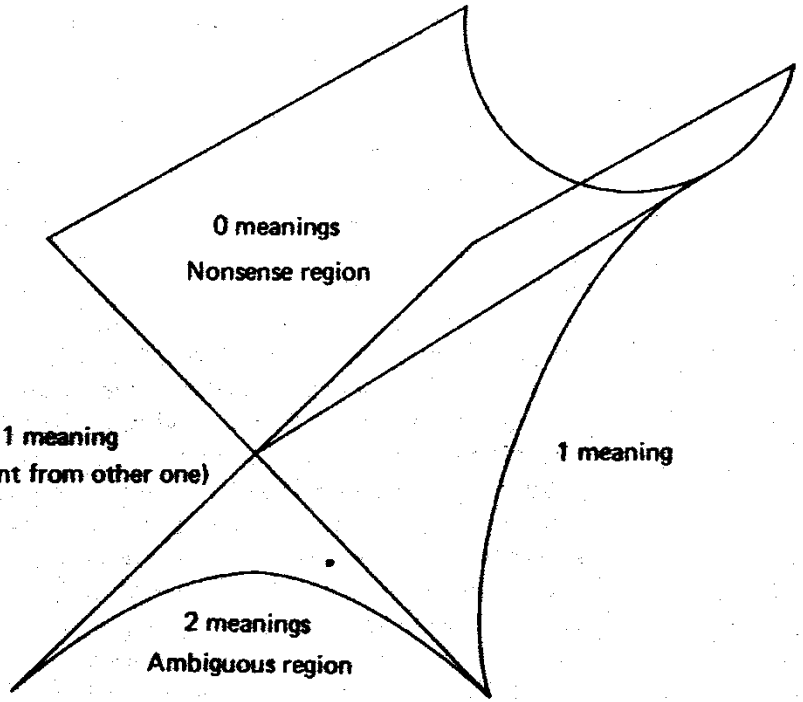
- 

Ambiguous

- **… and a Great Parliament of Emotions**
- **Konrad LORENZ, Das sogenannte Böse. 1963.**

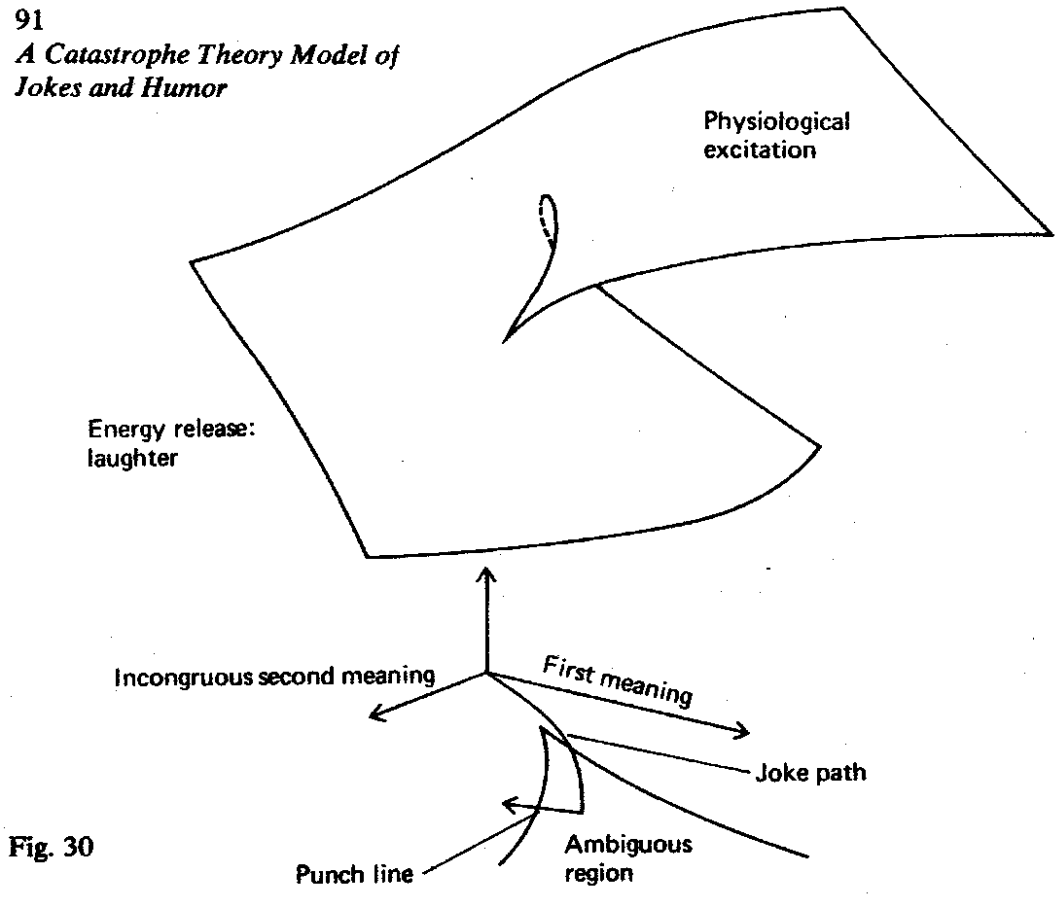

1 meaning
(different
from other
one)
1 meaning
2 meanings
Ambiguous
region

(a)


0 meanings
Nonsense region
1 meaning
(different from other one)
1 meaning
2 meanings
Ambiguous region

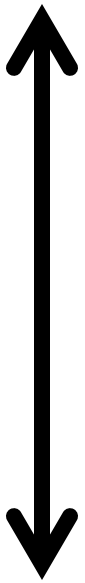
(b)

Model of Joke (2 meanings)



- A catastrophe theory model of joke by J. A. Paulos

Where is the Ambiguity? (Very Individual)



?

Motivating Q/A(s) 3

- **How Glagolica was designed? Using Bisociation.**
- **What happened in the mind of an author? Bisociation.**
- **How would You proceed? Bisociating.**
- **What should happen in Your mind? Bisociations.**

- **41 letters/numbers, non-Greek sounds, two planes: Greek alphabet + design idea (triangle and circle)**

- **Triangle ~ Holy Trinity, Circle ~ Infinity**

Sign Systems… Semiotics/Peirce

- Semiotics:
- Icon
- Index
- Symbol
- Signal

http://www.pixar.com/shorts/gg/
Copyright © Pixar Animation Studios

- All 4 kinds of sign representation available in Geri's Game sound: iconic noise, indexed voice, symbolic raven's cry and signalized game opening (the sound with the first move)

Semiotics (Peirce)

- **Unfortunately, semiotics seems to be poor for ambiguities**

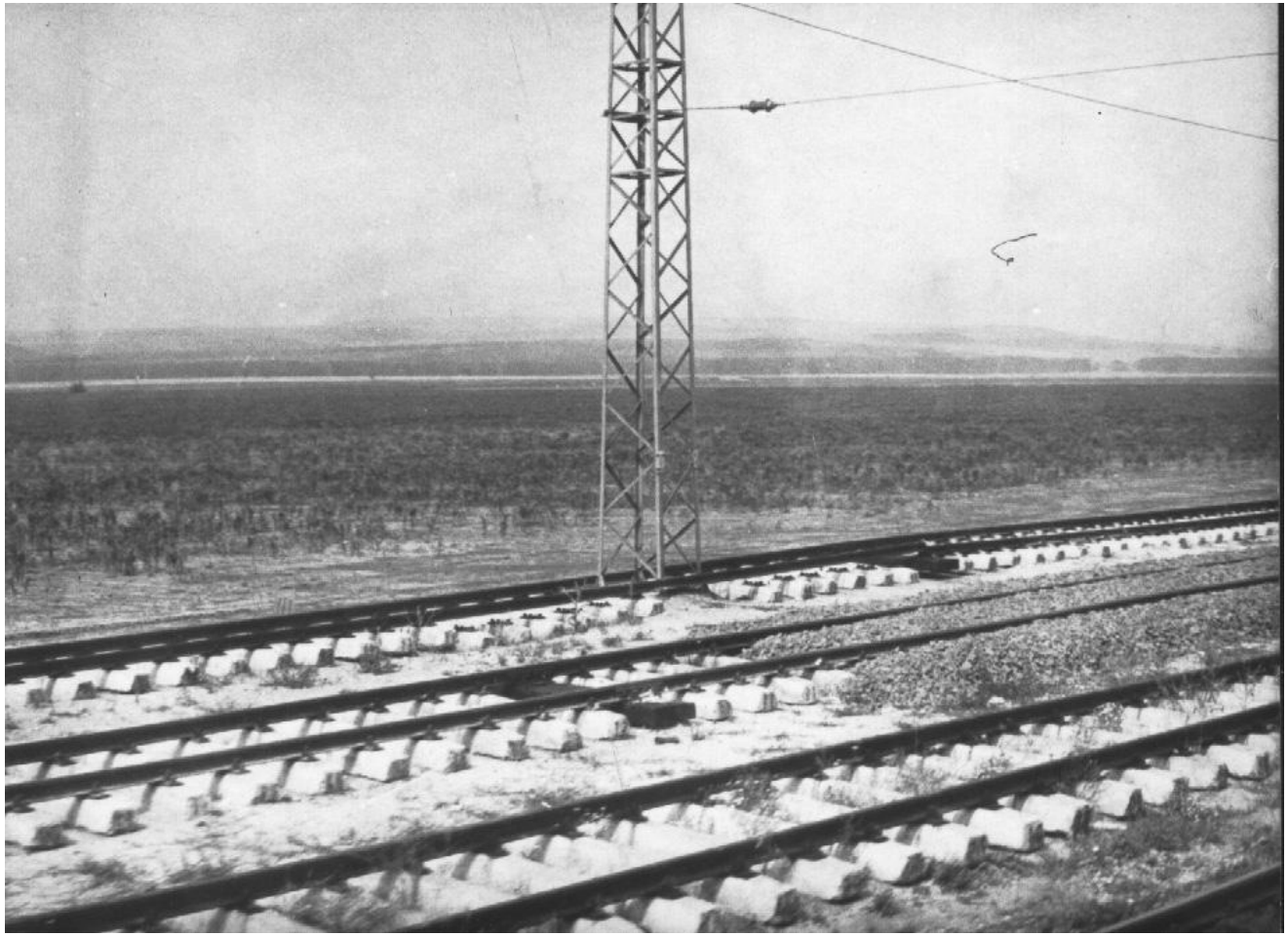
you cannot control
what you cannot measure

DeMarco, 1982

Parallel Use of Space in Graz…

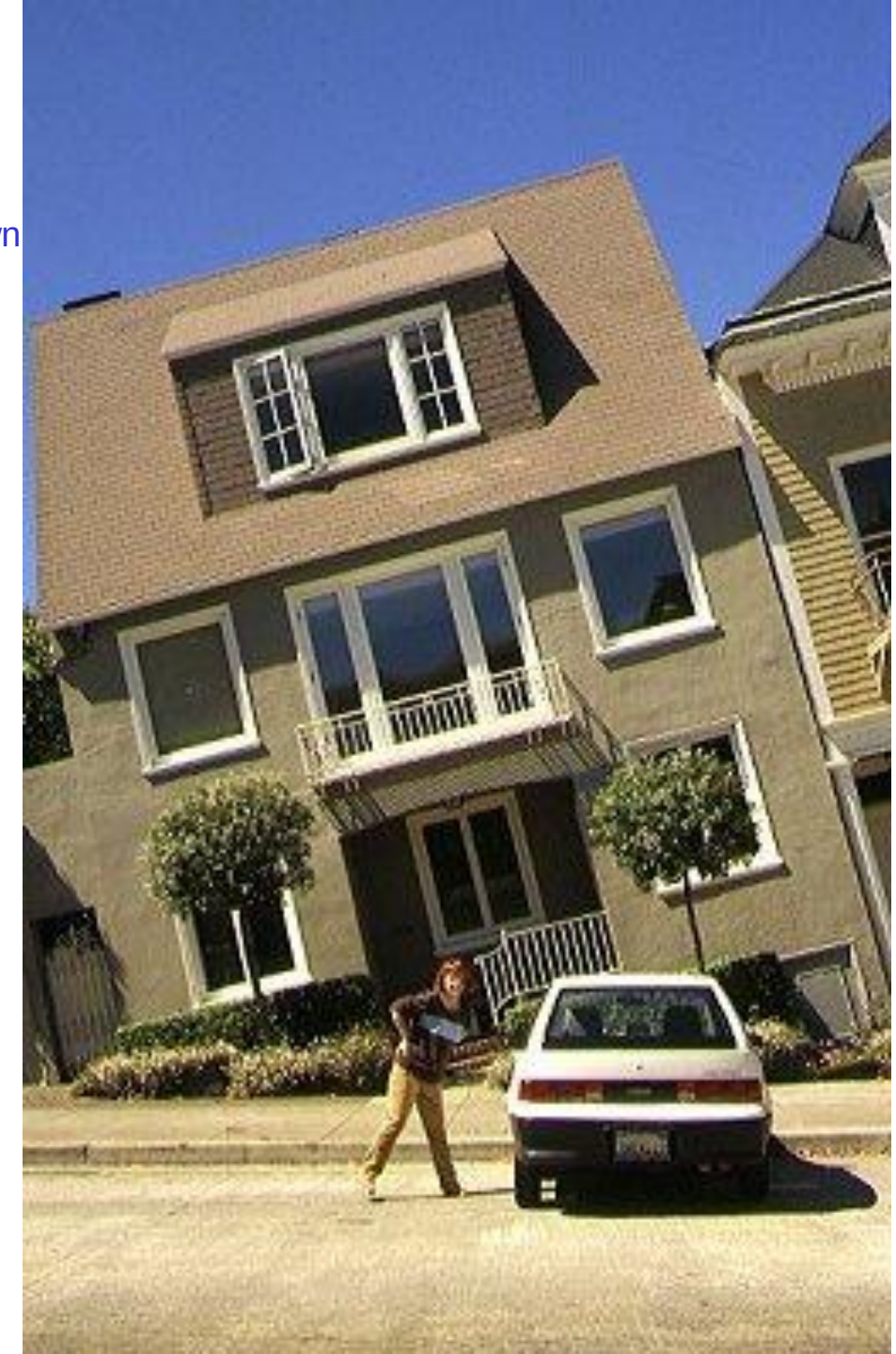
- Real world photo by A. F., Graz 2001

Parallel Space, Transsylvania



- Real world photo by L. Lazar

Author Unknown

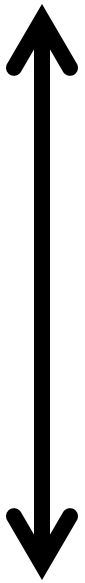


Bratislava – Grass/Hay & Basketball

Bratislava – Open Windows

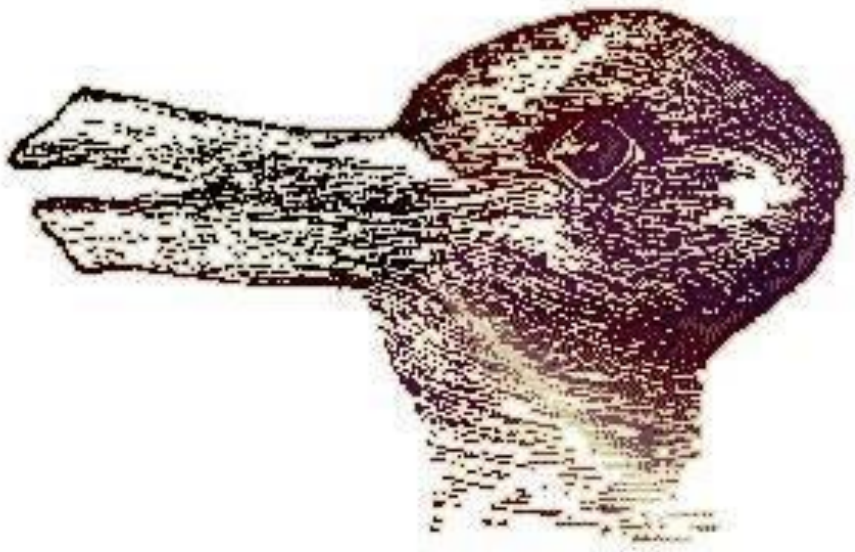
Bratislava Prepared for Deep Snow

Where is the Ambiguity? (Very Individual)



?

Where is the Ambiguity?

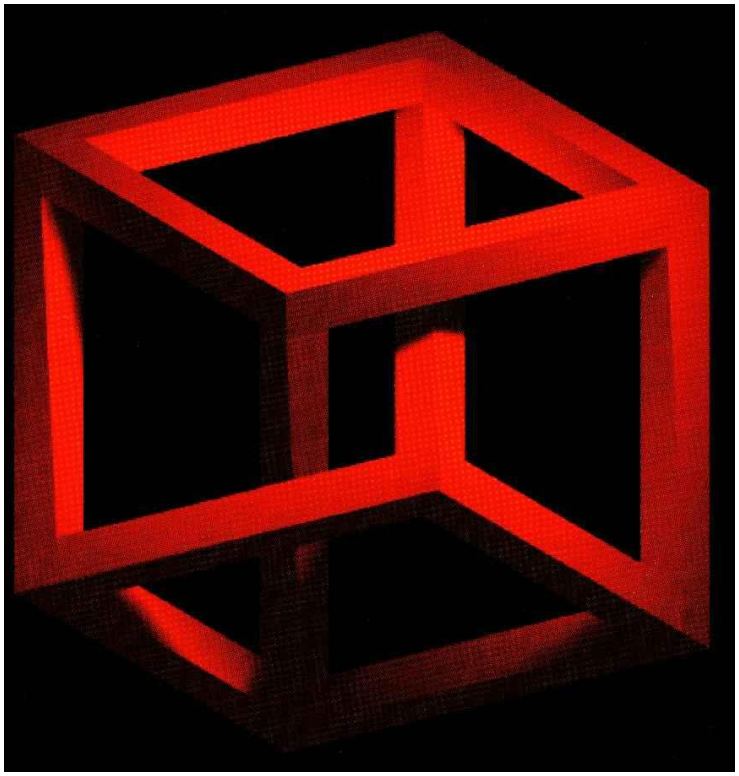


A Rabbit.... Or A Duck?
hint: the duck is looking left, the rabbit is looking right

Where is the Ambiguity?

- **Ambassadors by H. Holbein, jr.**

Pavol Elias gives the construction of existing paradoxical 3D objects by cutting them into unambiguous parts



- **Here seem to be two unambiguous parts**

Humor Theory ???

- **Aristotle (lost part)… Minsky – 2 brains**
- **Weapon of the week ones... + + + CREATIVITY**

The Design of Everyday Things: by Donald A. Norman, 1988

Koestler, Paulos, Raskar…

- *1905-1983

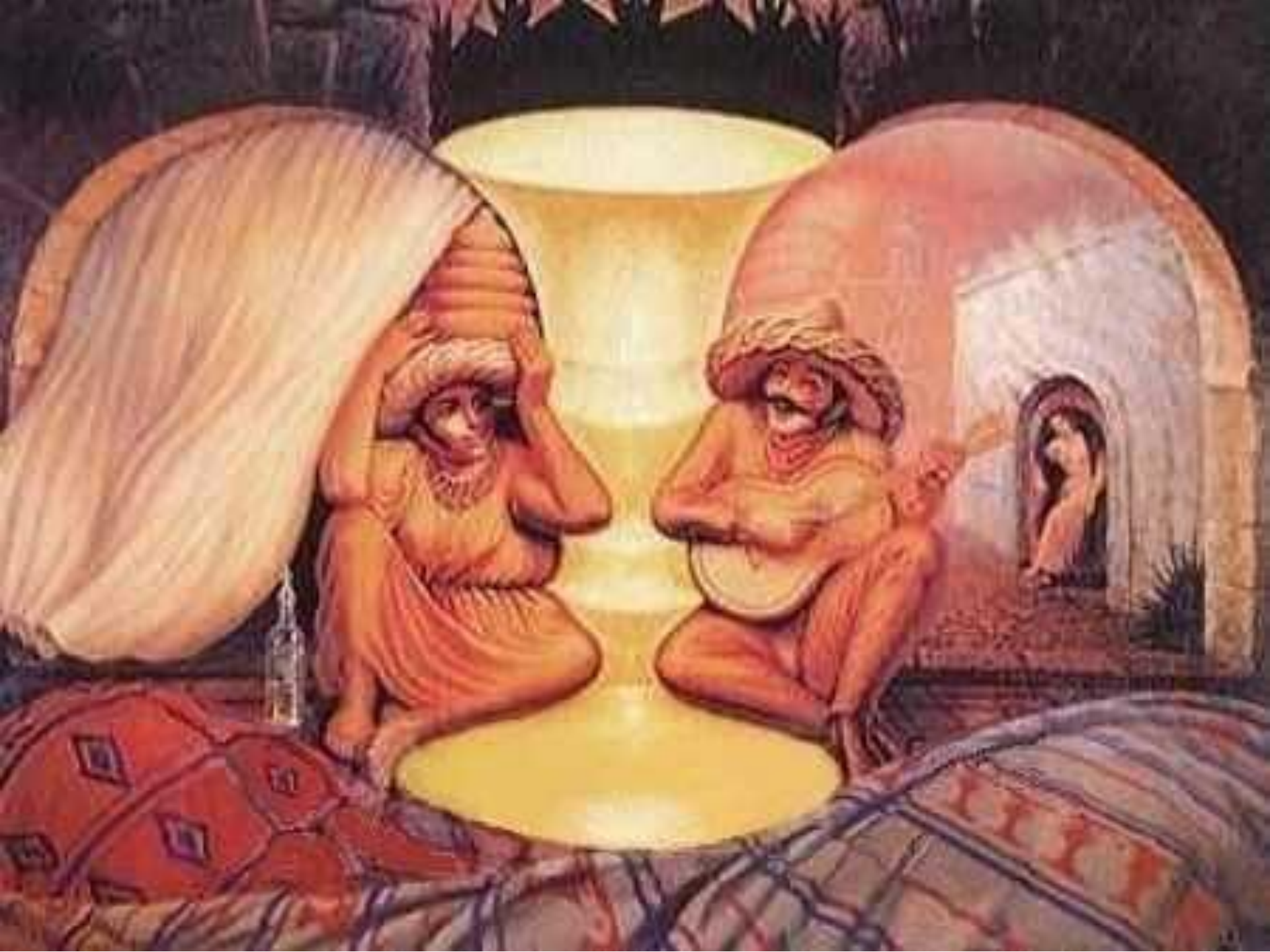
*1945

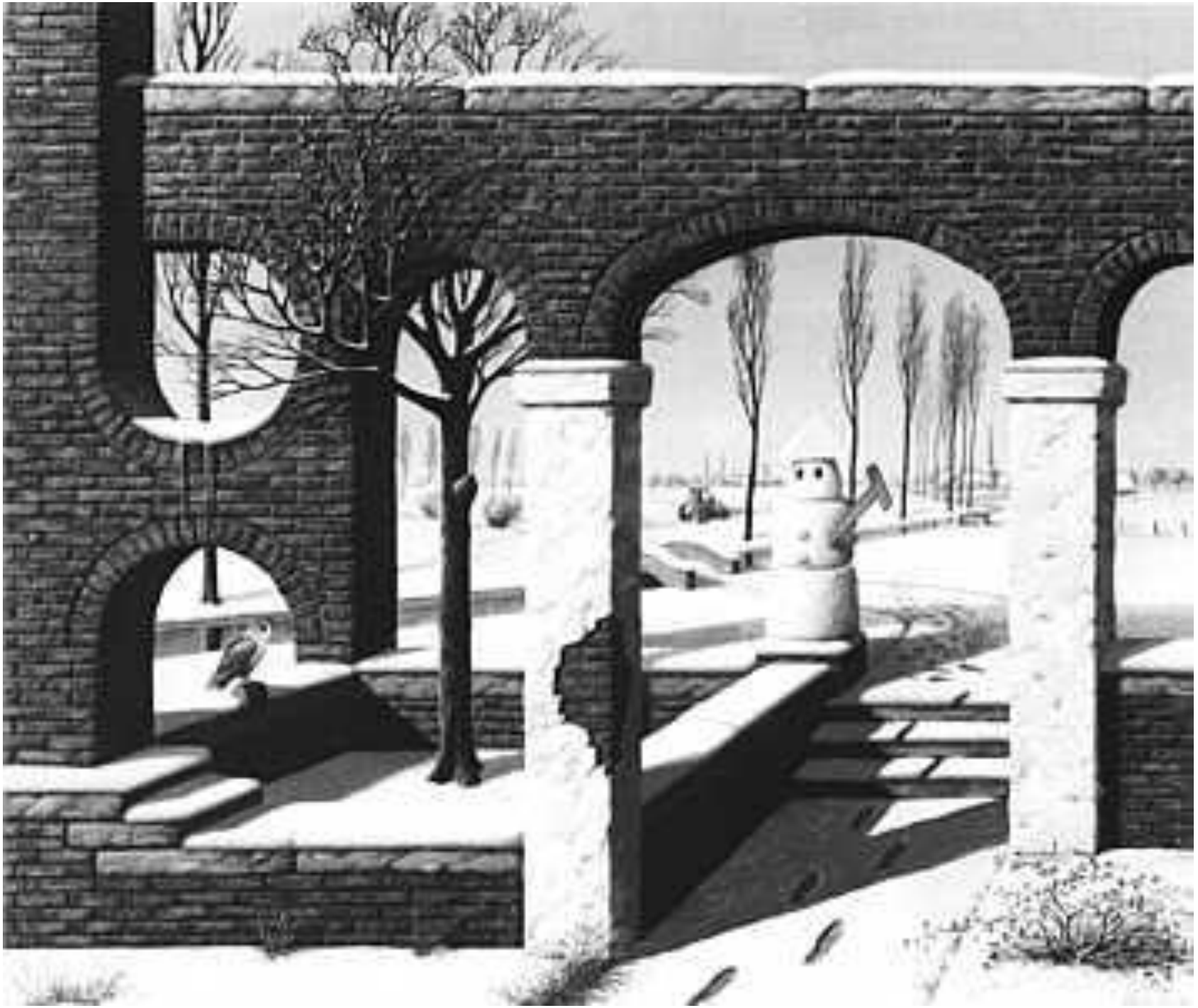
*MERL, MIT

Visual Bisociation Training

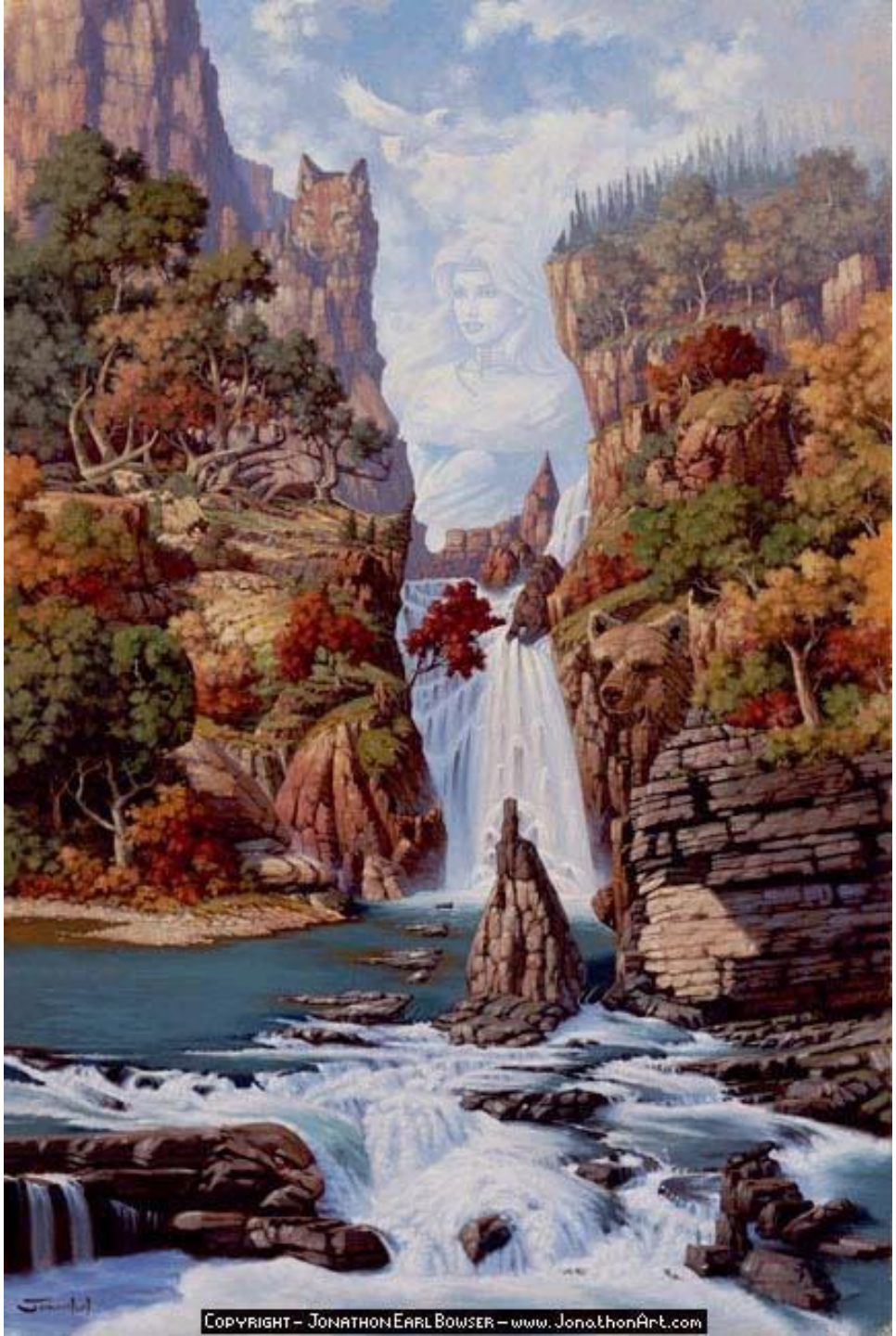
- **Polish text – Attention, the dog is good, but it has very weak nerves..**

UWAGA
DOBRY
PIES
-ALE MA SŁABE NERWY

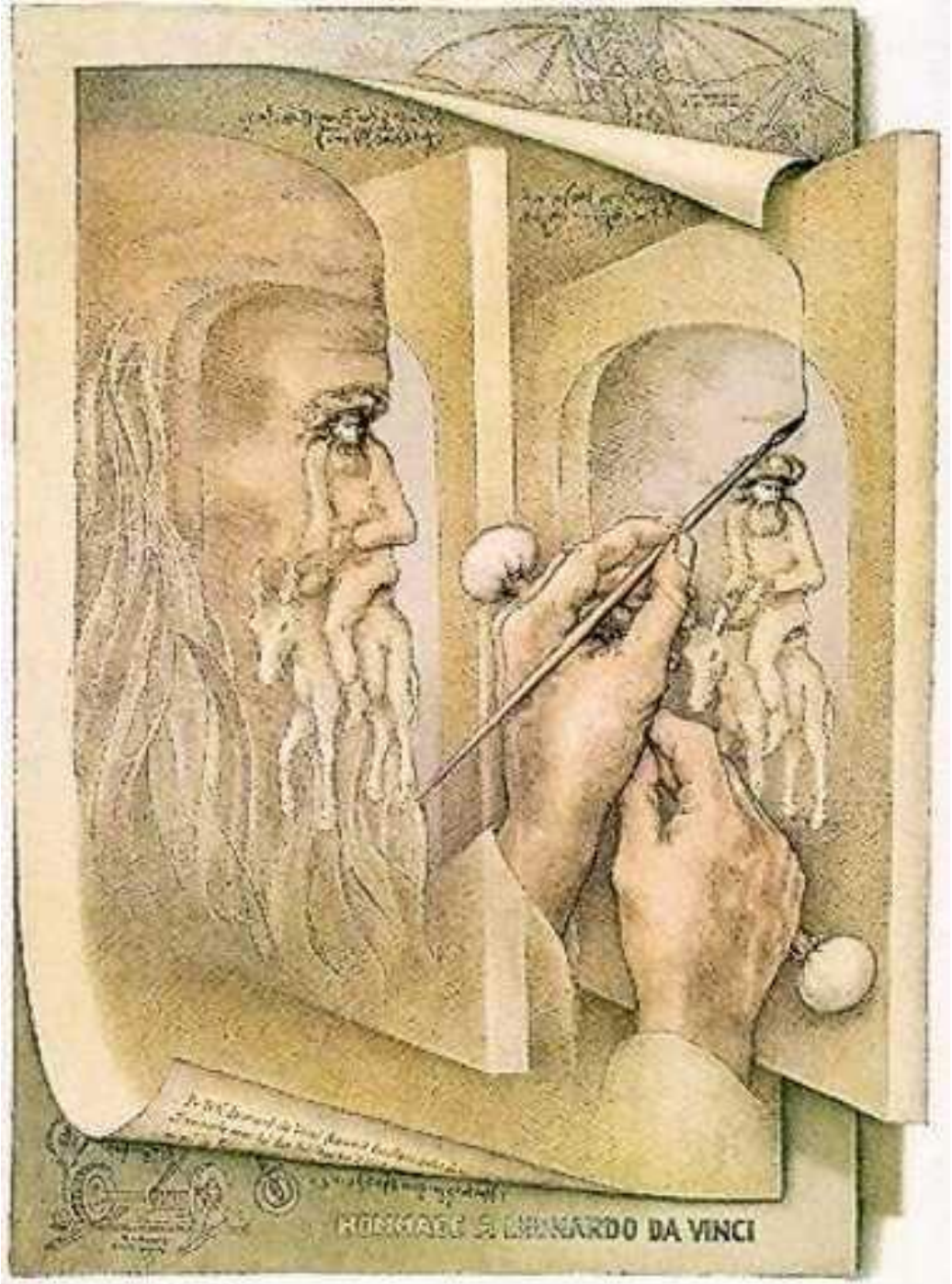




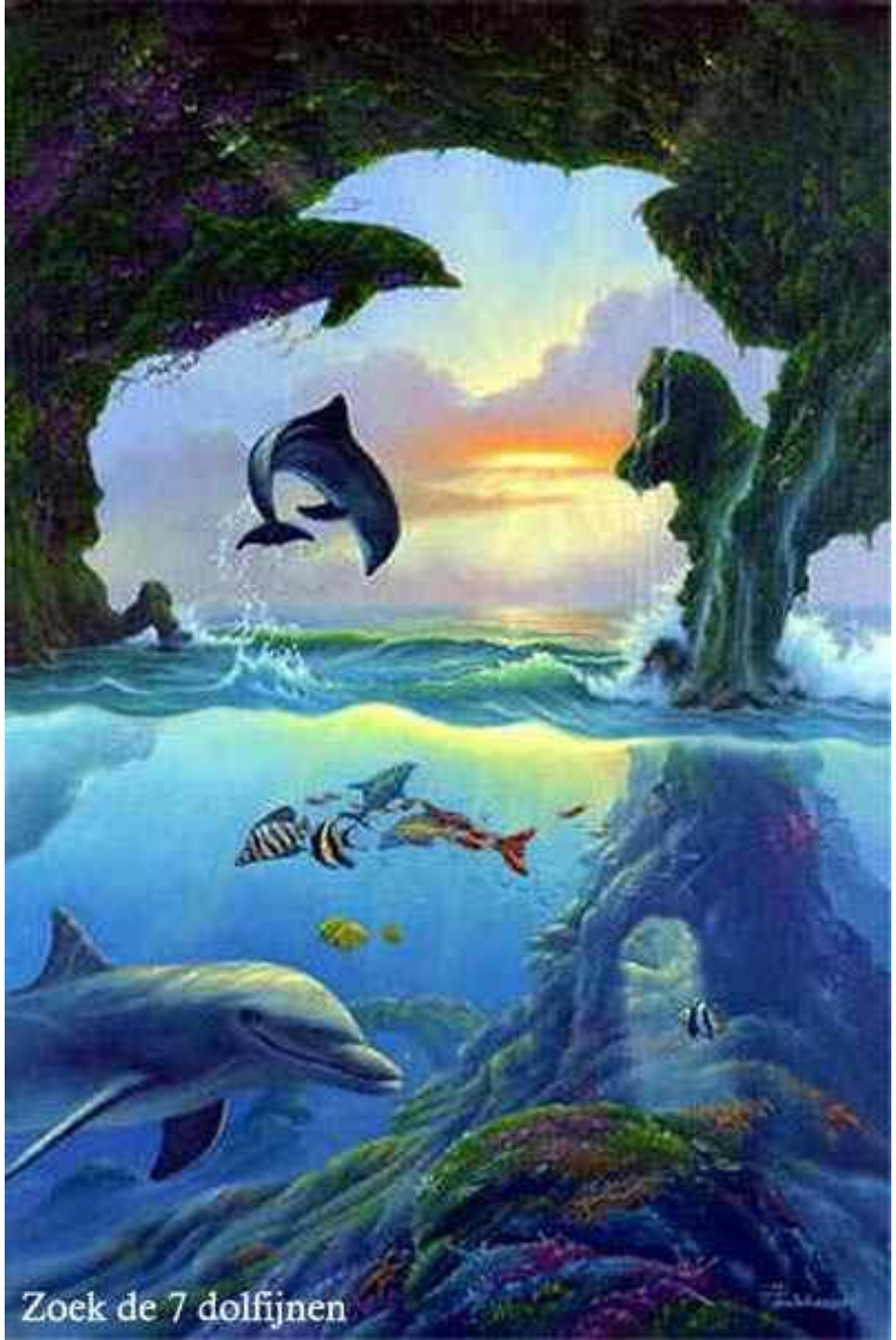
www.JonathonArt.com

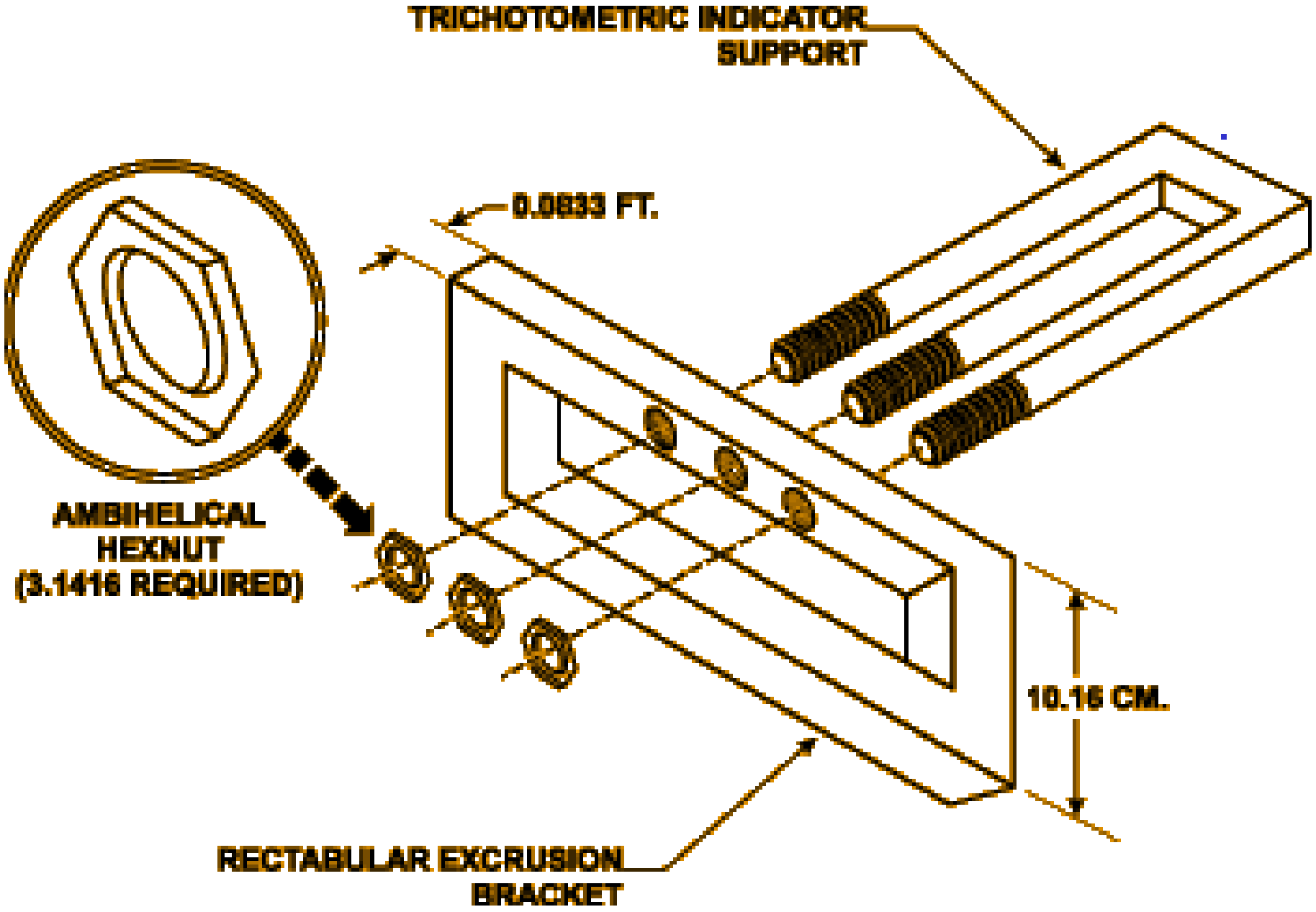

Copyright – Jonathon Earl Bowser – www.JonathonArt.com

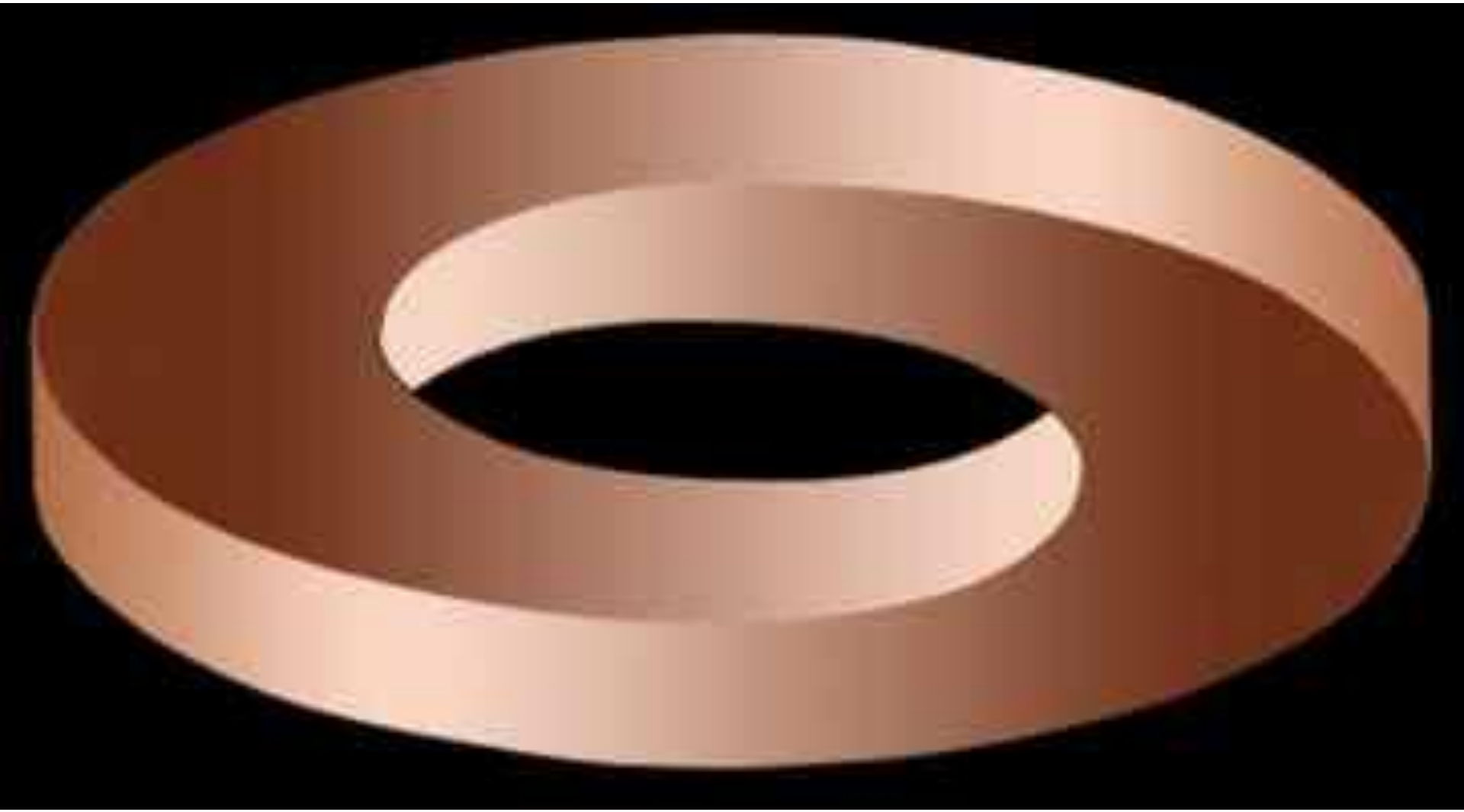
Old Woman...Or Young Girl


HOMMAGE A LEONARDO DA VINCI

Zoek de baby


Zoek de 7 dolfijnen


TRICHOTOMETRIC INDICATOR SUPPORT
0.0833 FT.
AMBIHELICAL HEXNUT (3.1416 REQUIRED)
10.16 CM.
RECTABULAR EXCRUSION BRACKET



Worth1000.com

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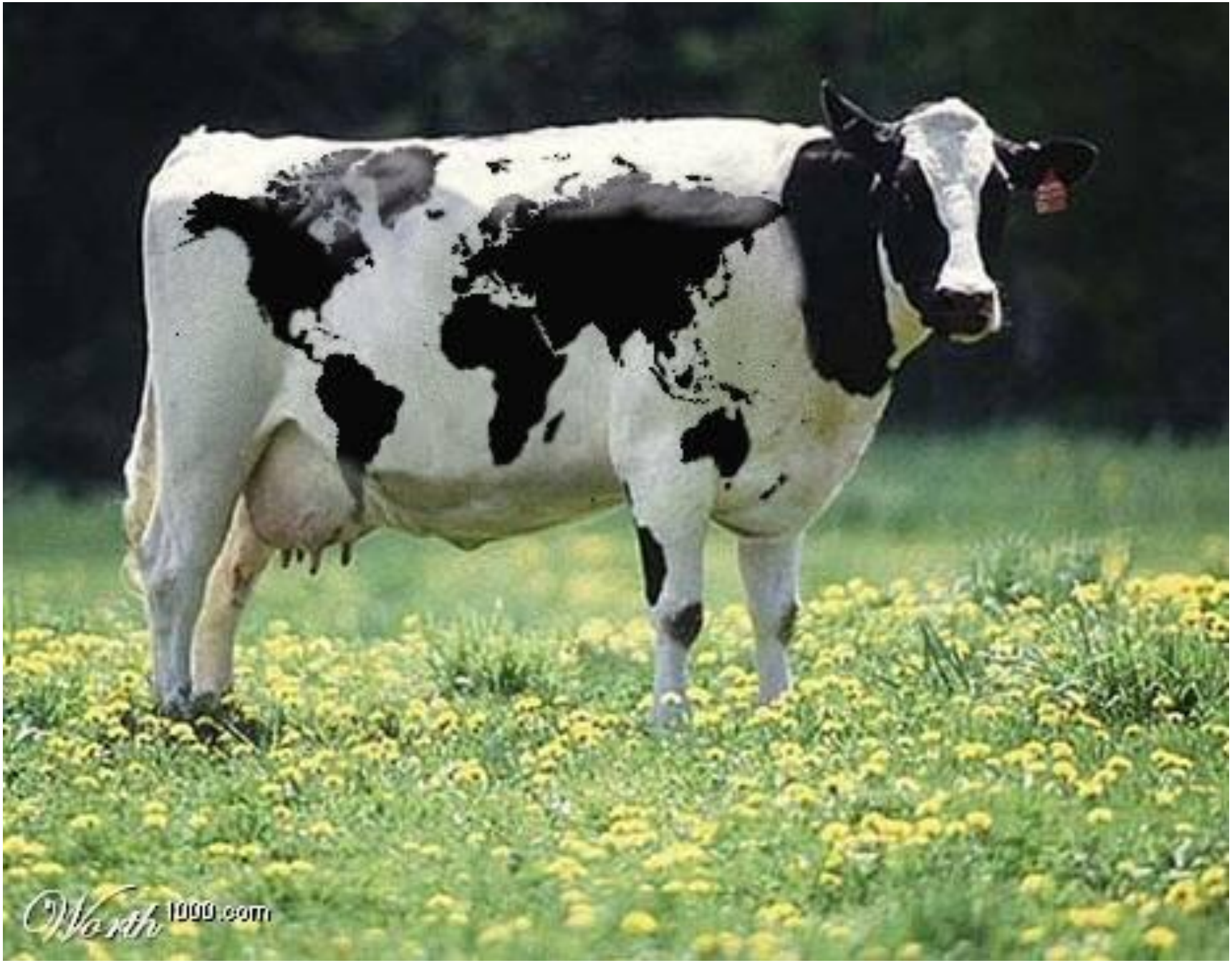
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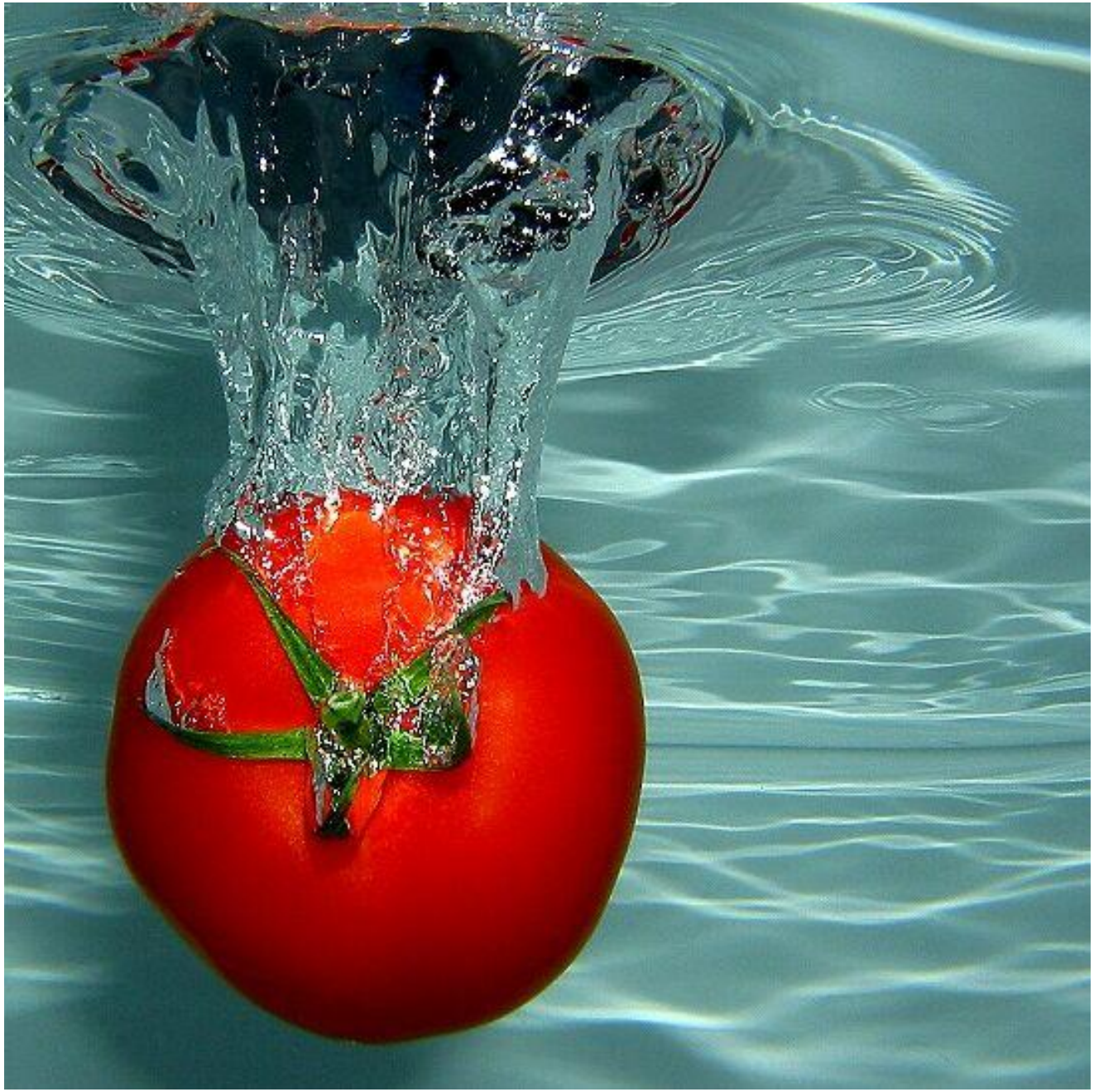


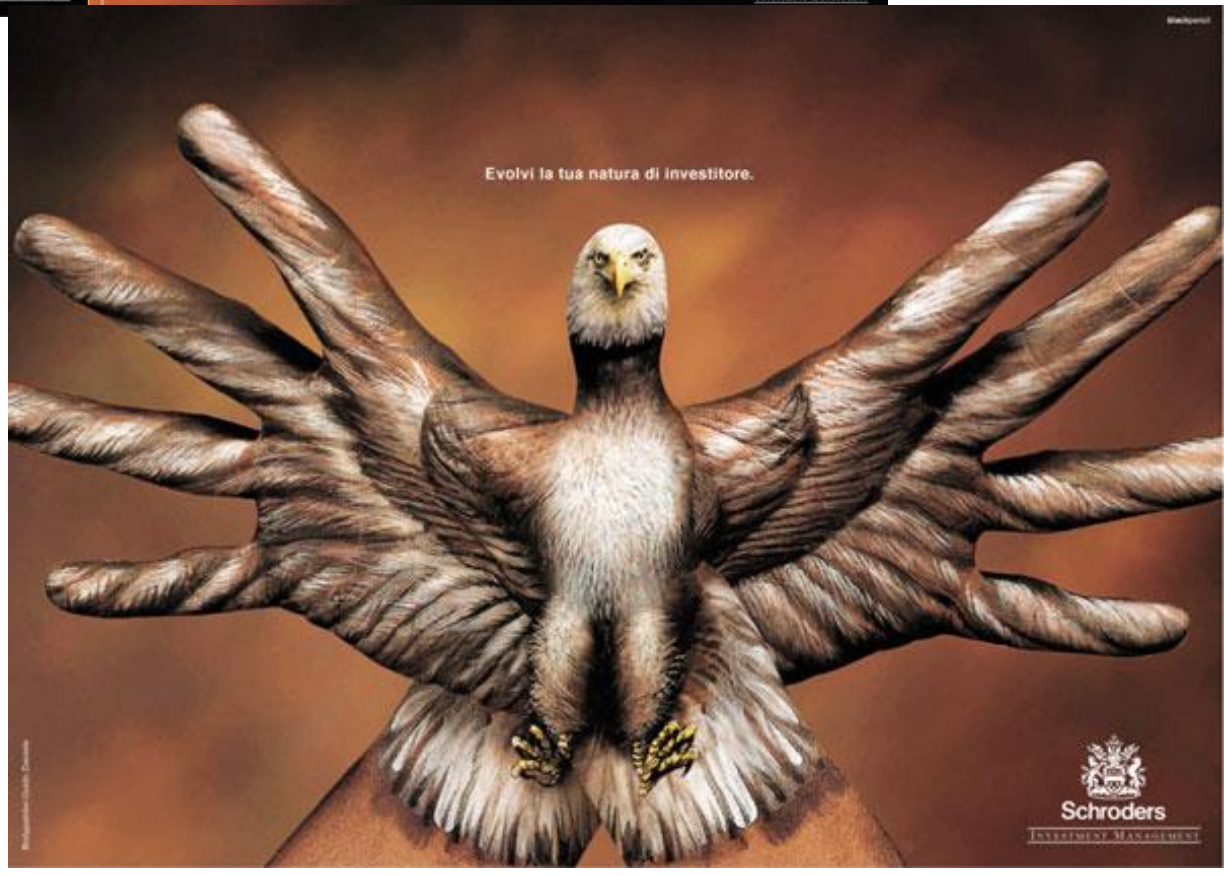
5 6 7 8 9

Towards the Troublems…

- Real world photo from P. Bourkes homepage

Evolvi la tua natura di investitore.
Schroders
Investment Management

Evolvi la tua natura di investitore.
Schroders
Investment Management


Evolvi la tua natura di investitore.
Schroders
Investment Management

Worth1000.com

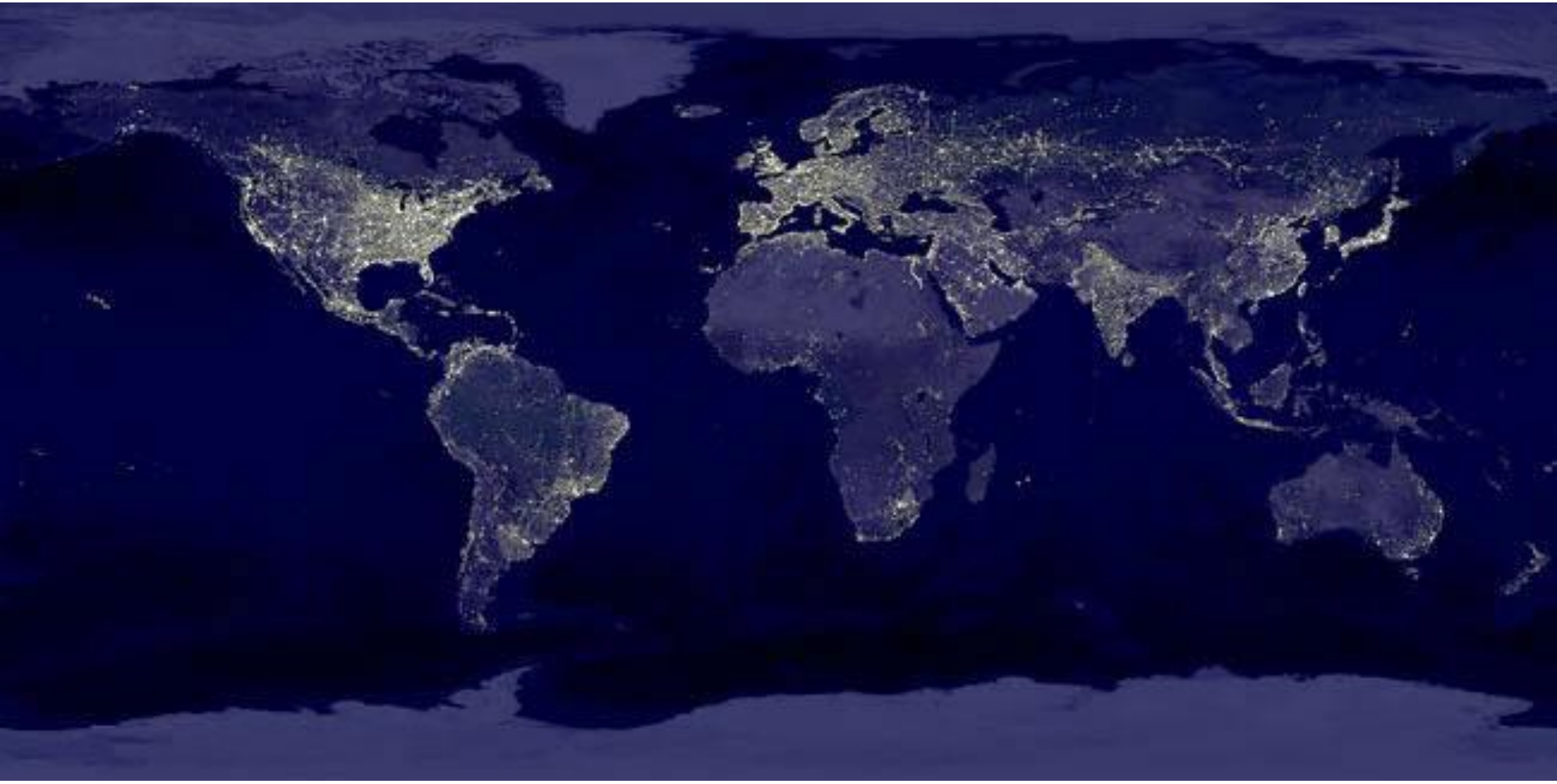
Worth1000.com

SPOT

AH!

Earth in the Night

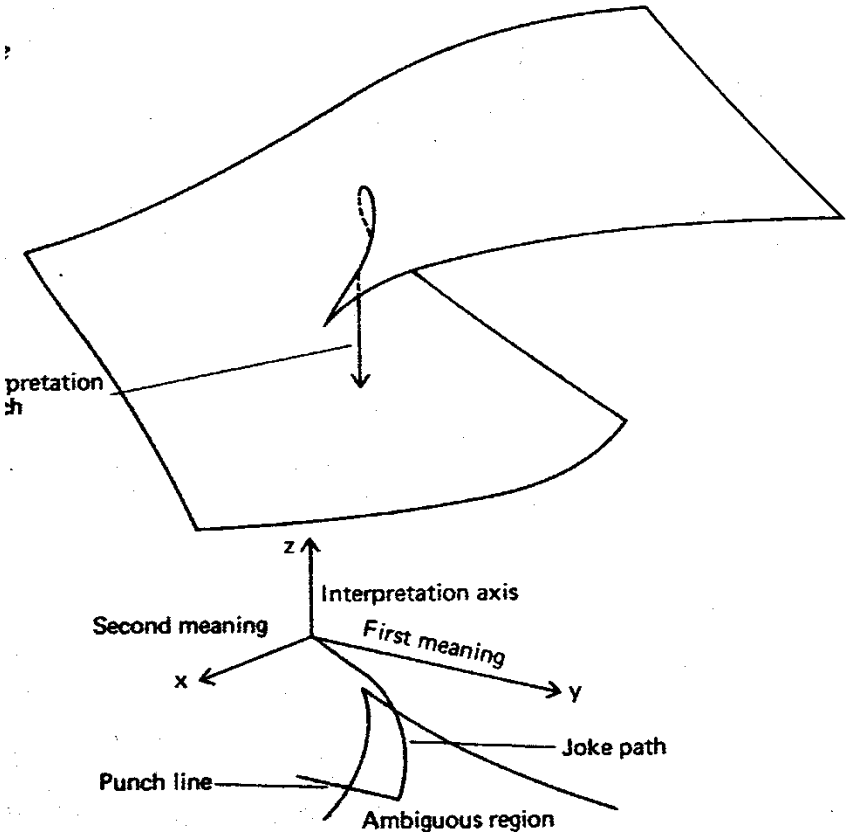
AHA!



http://antwrp.gsfc.nasa.gov/apod/ap001127.html

НАНА!

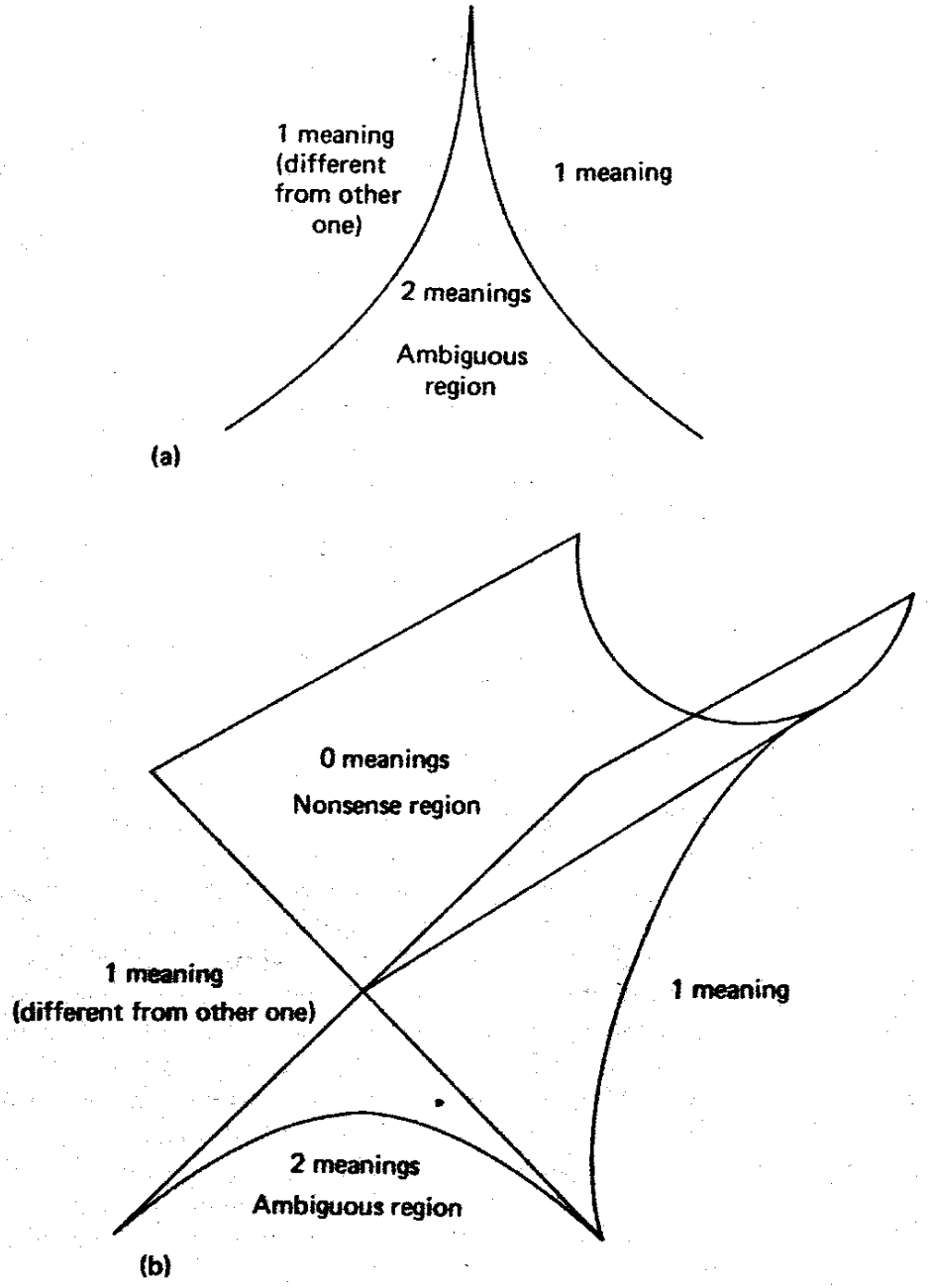
Model of a Joke



- **A catastrophe theory model of joke by J. A. Paulos**

Ambiguity…

- Meanings
- Signs
- Semiotics...
- Bakhtin theory:
- Popular culture



Science

- **Discovery**

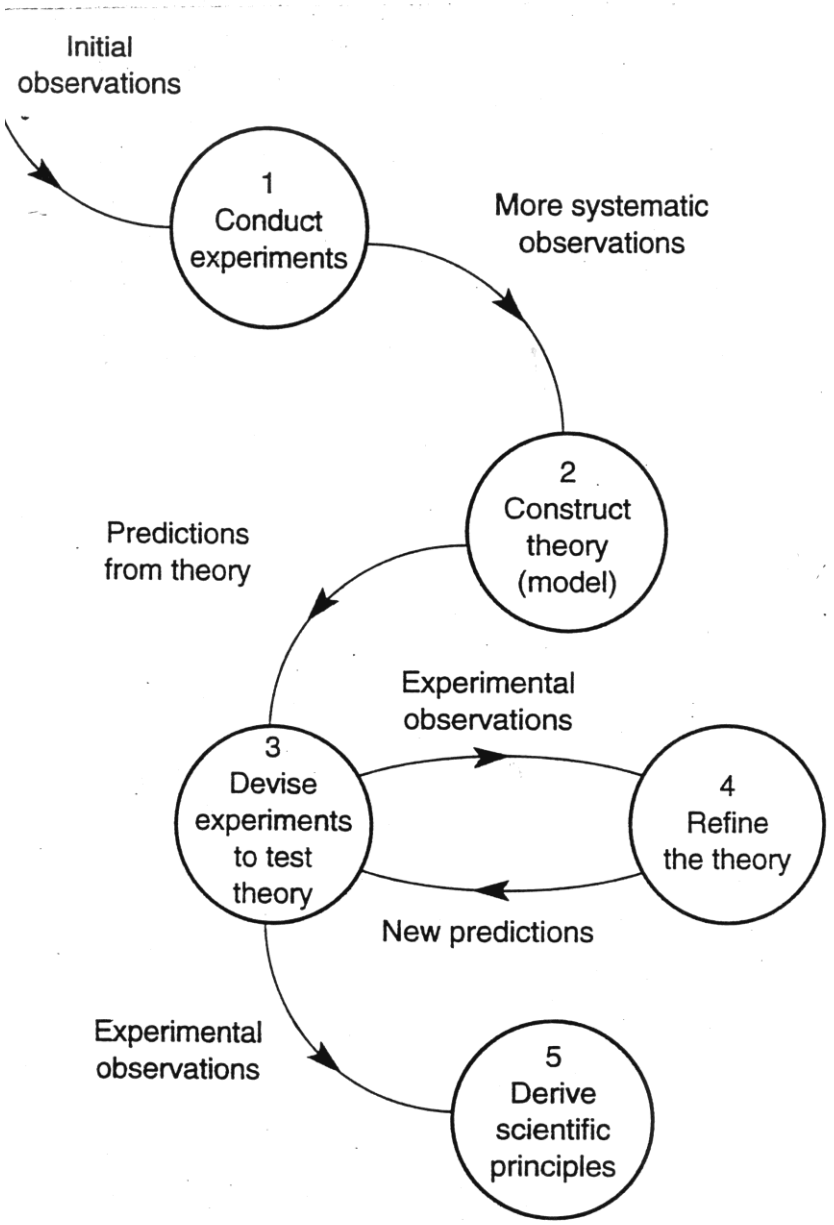


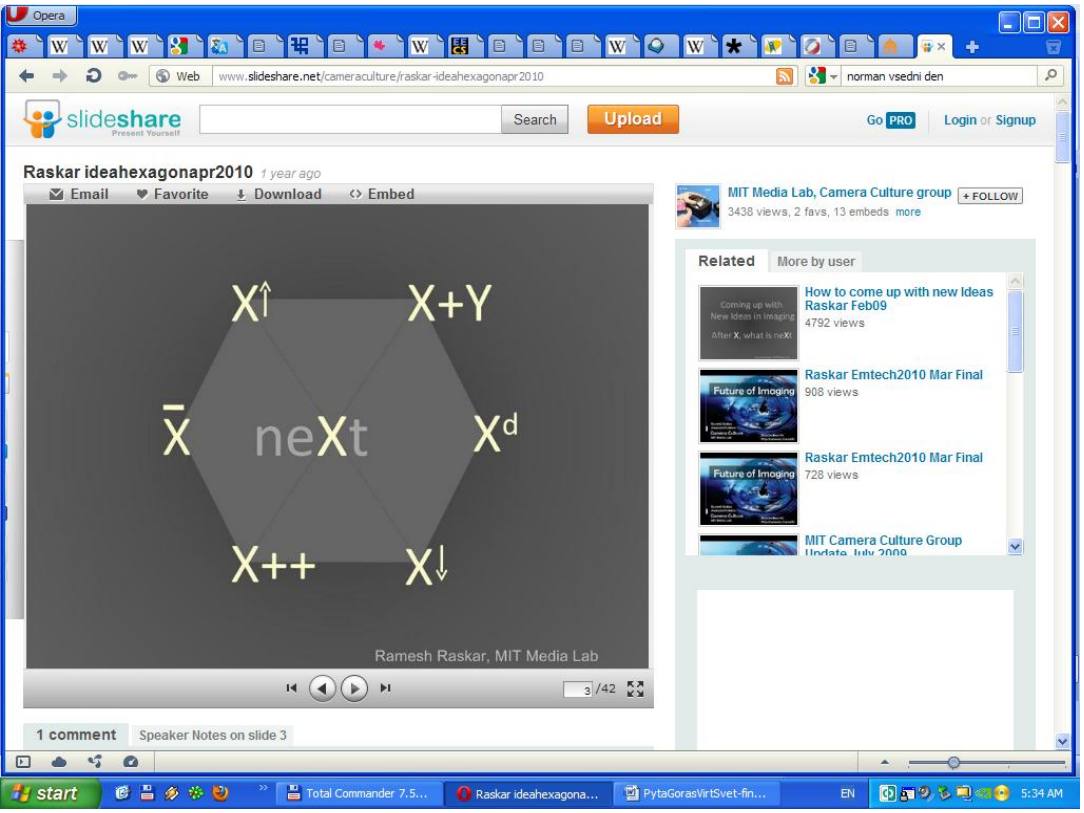
Figure 1.1 The nature of scientific analysis.

T.B-L. Web Science Talk

http://www.w3.org/2007/Talks/1018-websci-mit-tbl/#(1)

Design

- **Invention, Hexagon**
- **By Ramesh Raskar**



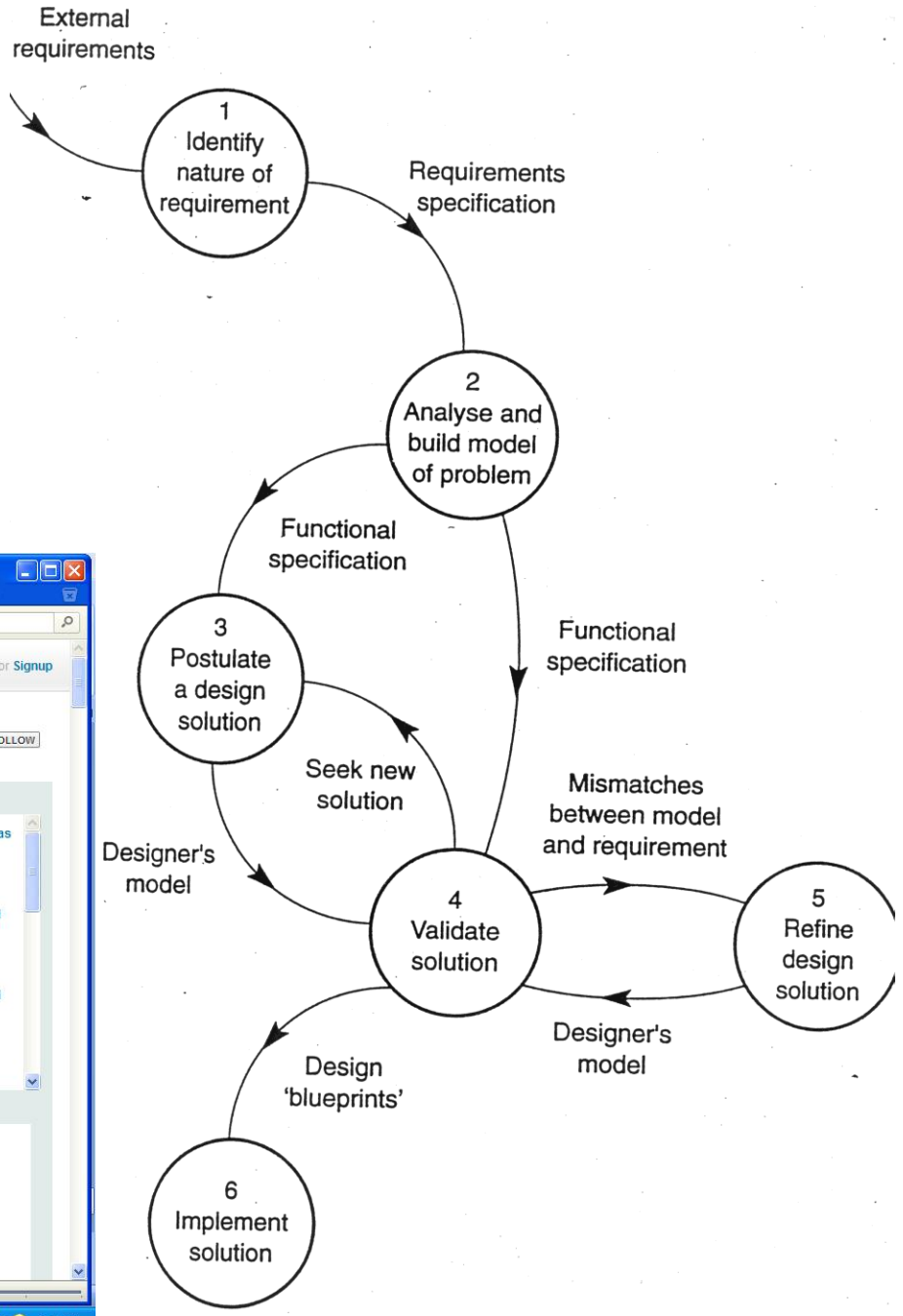


Figure 1.2 A model of the design process.

Koestler, Paulos, Raskar…

- *1905-1983

*1945

*MERL, MIT

Koestler, Paulos, Raskar…

- **Arthur KOESTLER *The Act of Creation***
- **John Allen PAULOS *Mathematics and Humor***
- **Ramesh RASKAR *How to Invent, Idea Hexagon***

- ***…***

- **BLYTHE, M.A. et al. *Eds. Funology: From Usability to Enjoyment***

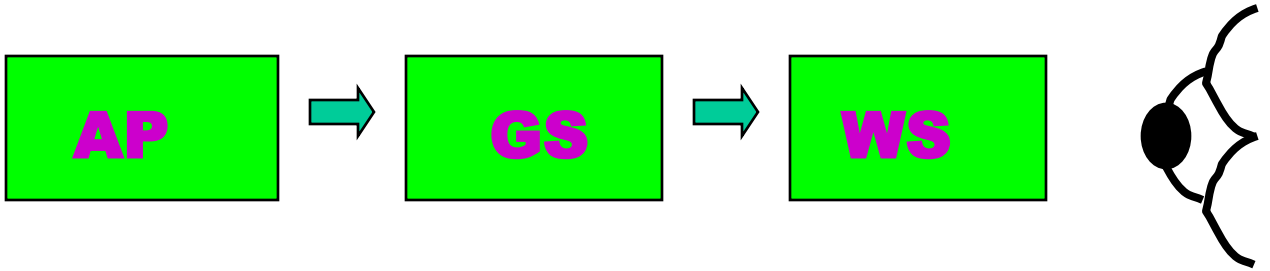
Algorithmic Strategies

- **Iteration**
- **Divide et Impera**
- **Sorting**
- **Sweeping Technique**
- **Prune and Search**
- **Locus**
- ***...***

- **CHALMOVIANSKY, P. et al. 2001. *Zložitosť geometrických algoritmov. Bratislava: UK 2001***

The Infinite Error

- **Controlled Error: Model, Algorithm… Solution**



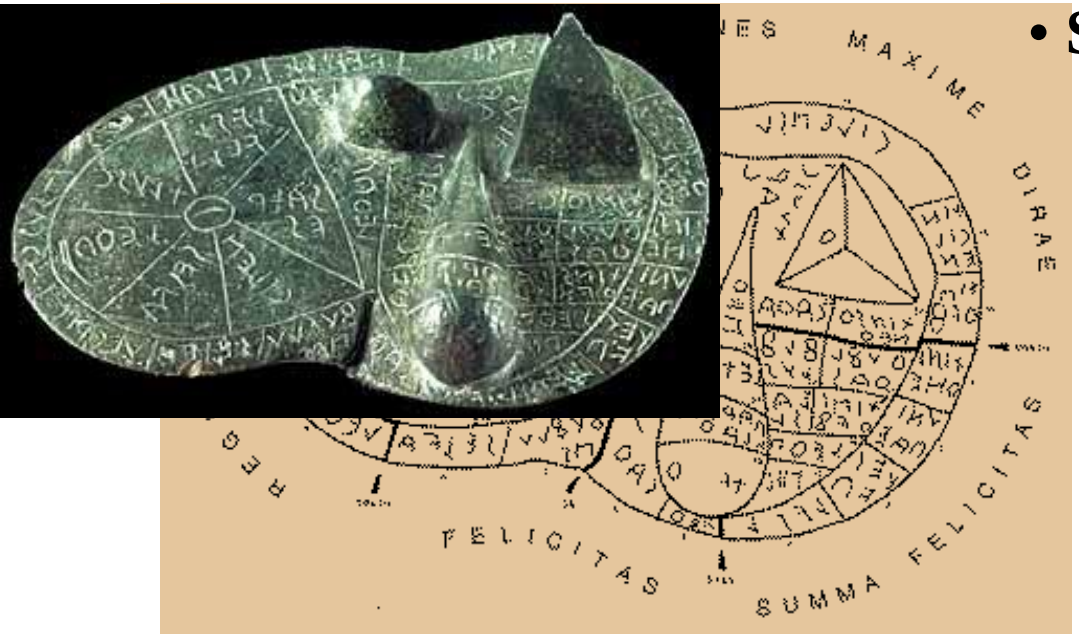
- **Computer Graphics >> Visualization**

$\varepsilon \rightarrow 0$ **>>** $\varepsilon \rightarrow$ **infinity**

Visualization Metaphors

- **Confrontation of Meanings**
- **Pritaca, comparison...**
- **For example, desktop metaphor/GUI, Simulated Annealing... Recall Koestler & bisociation**

Etruscan Liver, Cholera in London

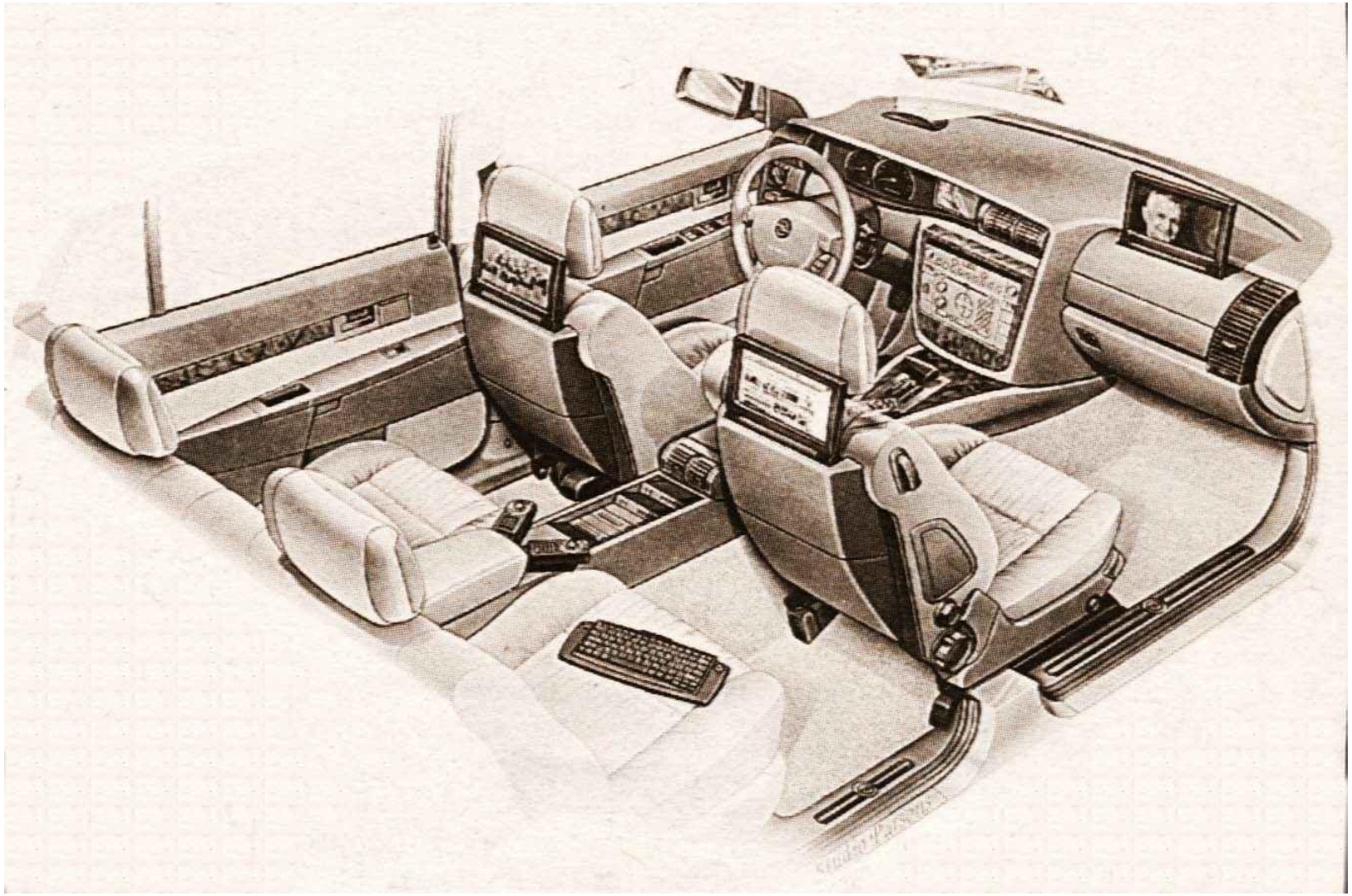


- **Sheep Liver & Names of Gods**

•**http://www.ou.edu/class/ahi4163/files/bronz12.html**

The idea of representing data visually has been around for much longer than computer based visualisation. The linking of the spread of cholera to water supply provides an early example of the use of visualisation in problem analysis. During the 1853-54 cholera outbreak in London, Dr. John Snow identified a large grouping in the Soho area. He went on to plot the homes of the 500 victims who died in the first 10 days of September 1854 on a map of the area. This simple representation of the data he had collected showed that the grouping of cholera sufferers in the area was centred round a particular water pump. Investigation of this water pump established that it had been contaminated by a leaking cesspool.

Opel OMEGA



Chatam Sófer M. by J. Krizik

- **WCH?**

Conclusions

- **AH, AHA, HAHA ~ Discovery + WWW**
- **Hexagon ~ Invention**
- **Laughter culture in the sense of Bakhtin**
- **Visualization metaphors**
- **Bonus: CG reference model**

- **Future >> Funology >> Topologic Model >> (Quality/Usability) Metrics**

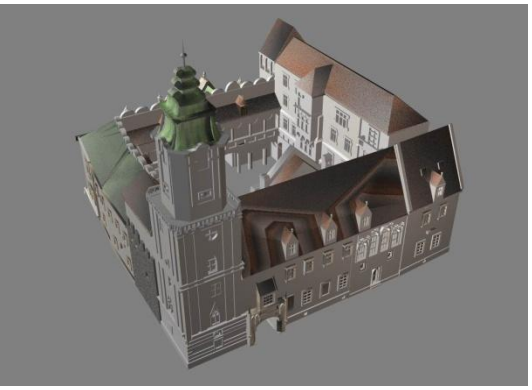
Matematický model vtipu a smiechová kultúra IT

Andrej FERKO

Comenius University Bratislava

Týždeň vedy 2012, FMFI UK

Bratislava



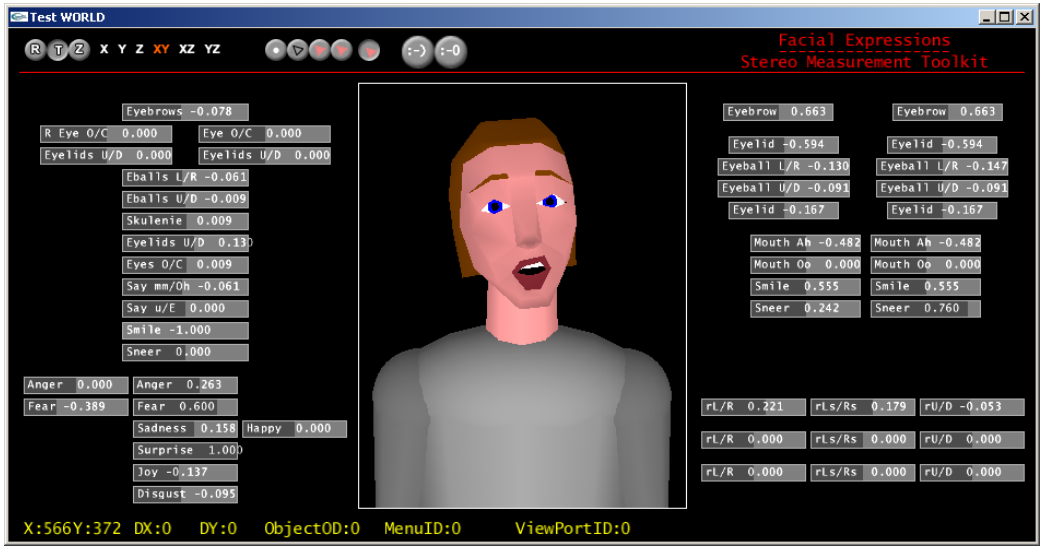
Virtual Heart of Central Europe, Culture 2000

- Awarded by EuroPrix Quality Seal

www.VHCE.info

- 330 kEUR, 150 kEUR from EC, ready to submit – Pirelli Award
- follow-up 2005-2006 (SK, SI, PL, CZ), submitted, 256 kEUR

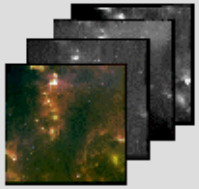
Navigation&Cooperation in VEs: Virtual Bratislava (2002-2004)



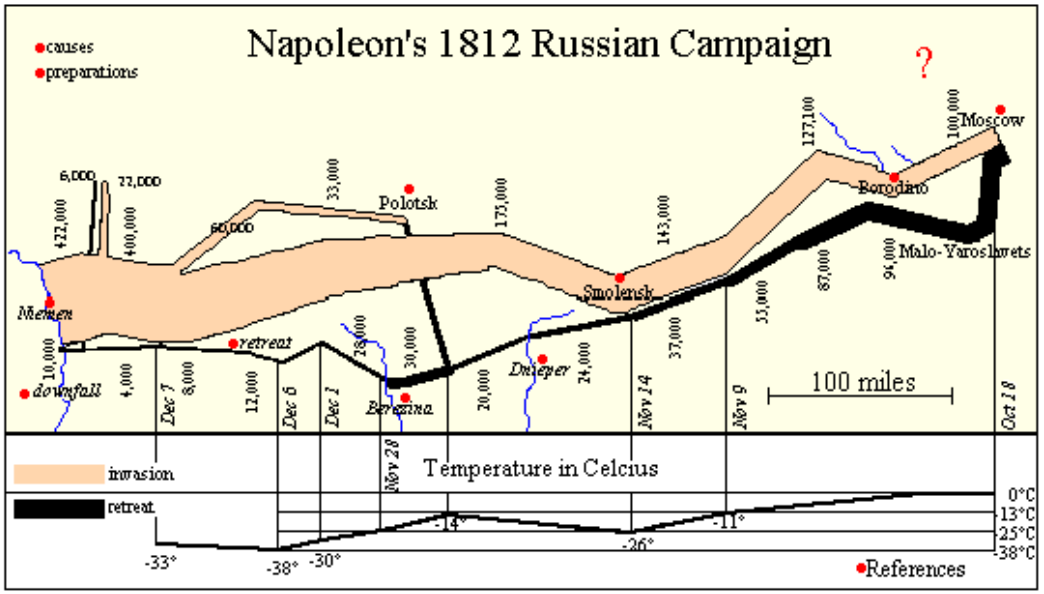
http://www.sccg.sk/~projects/

- 900 000 SKK, 506 000 SKK from Slovak government, APVT agency
- Follow-up 2005++
- Key researchers M. Zimanyi, S. Stanek & P. Kubini

March of the Napoleon Army 1812



Examples of Visualization



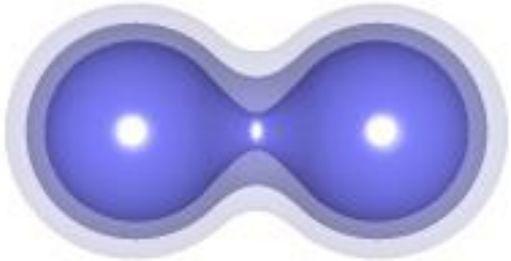
This graphic is an adaptation of M. Charles Joseph Minard´s „March of the Napoleon Army" by Sunny McClendon, as part of an Information Design Class at the University of Texas at Austin.

1D

©1999

Volume .. Surface

sampled data



geometric model

3D reconstruction

image synthesis

discrete voxel space

isosurfacing

voxelization

continuous geometric space

volume rendering

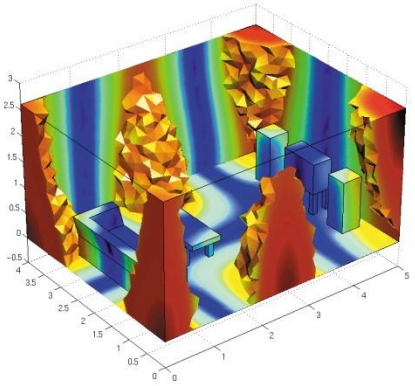
surface rendering

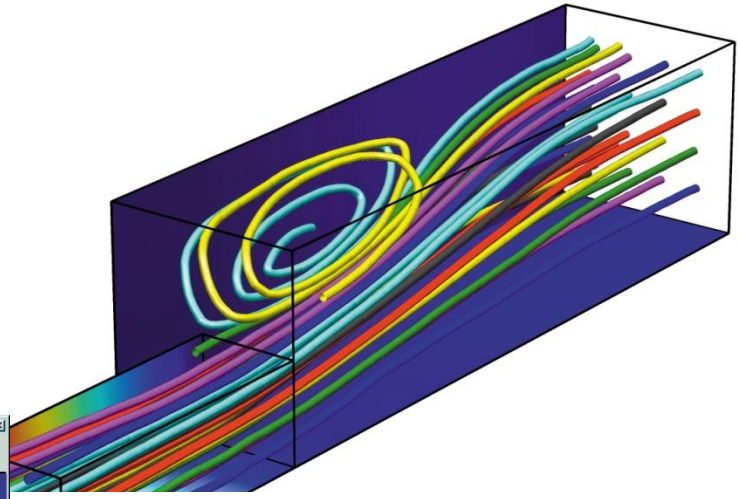
image

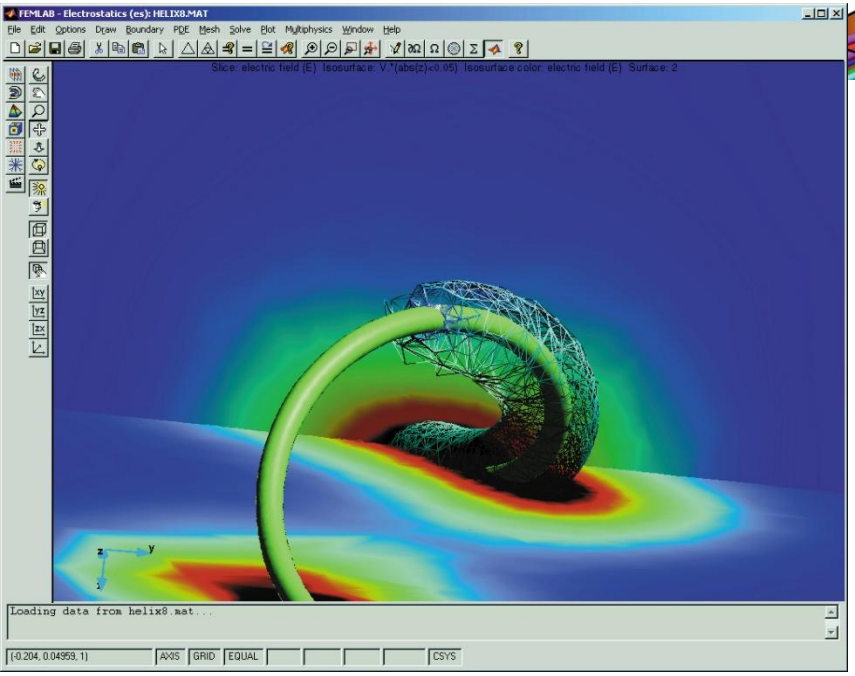
3D

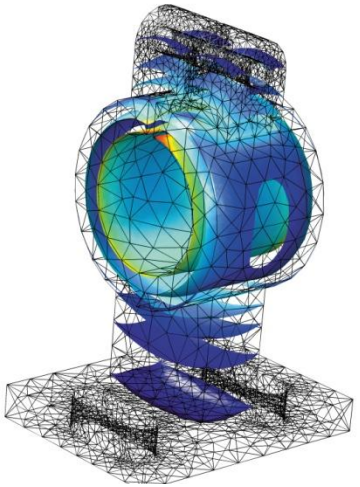
MatLab: www.femlab.com

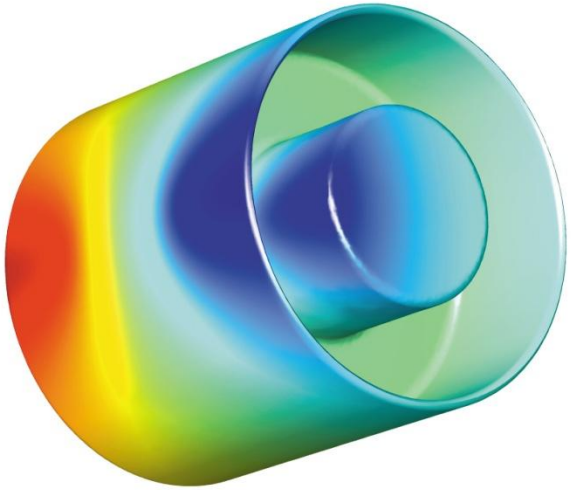
moreD

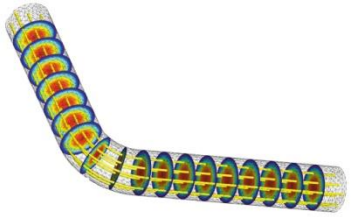












Viz-Course Contents

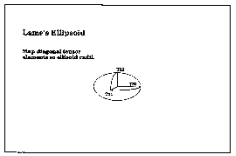
- **1. Introduction, motivation**
  reference model, scenarios, graphics and visualization difference
- **2. Data**
  data types, coordinate representations, data connectivity
- **3. Mathematical models and languages**
- **4. Representation**
  scalar, vector, tensor, multivariate, using color, glyphs
- **5. Visualization software**
- **6. Information Visualization**
  graph drawing, algorithm animation, …
- **7. Recent Directions**
  data sonification, visualizing relativity, NPR in scientific visualization...

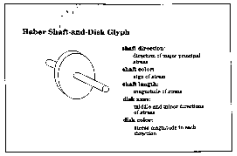
Visualization of Data

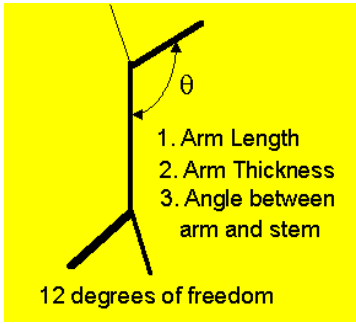
- 1D, 2D, 3D: Rendering
- 4D: Animation (Juran.)
- nD - in general: Open Problem
- Glyphs, faces by statistician Herman Chernoff
- http://people.cs.uchicago.edu/~wiseman/chernoff/
- other metaphors: terrain, garden, IFS...

Glyphs

- **UNICODE glyphs: A, @, 7, α, β, γ, δ, Σ, θ, ω… ?, *, §, … symbolic information**
- **Visualization glyphs**



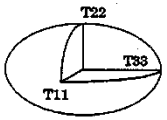




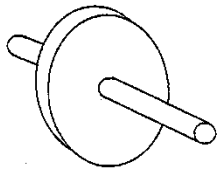
Visualization Glyphs

Lame's Ellipsoid

Map diagonal tensor elements to ellisoid radii.



Haber Shaft-and-Disk Glyph



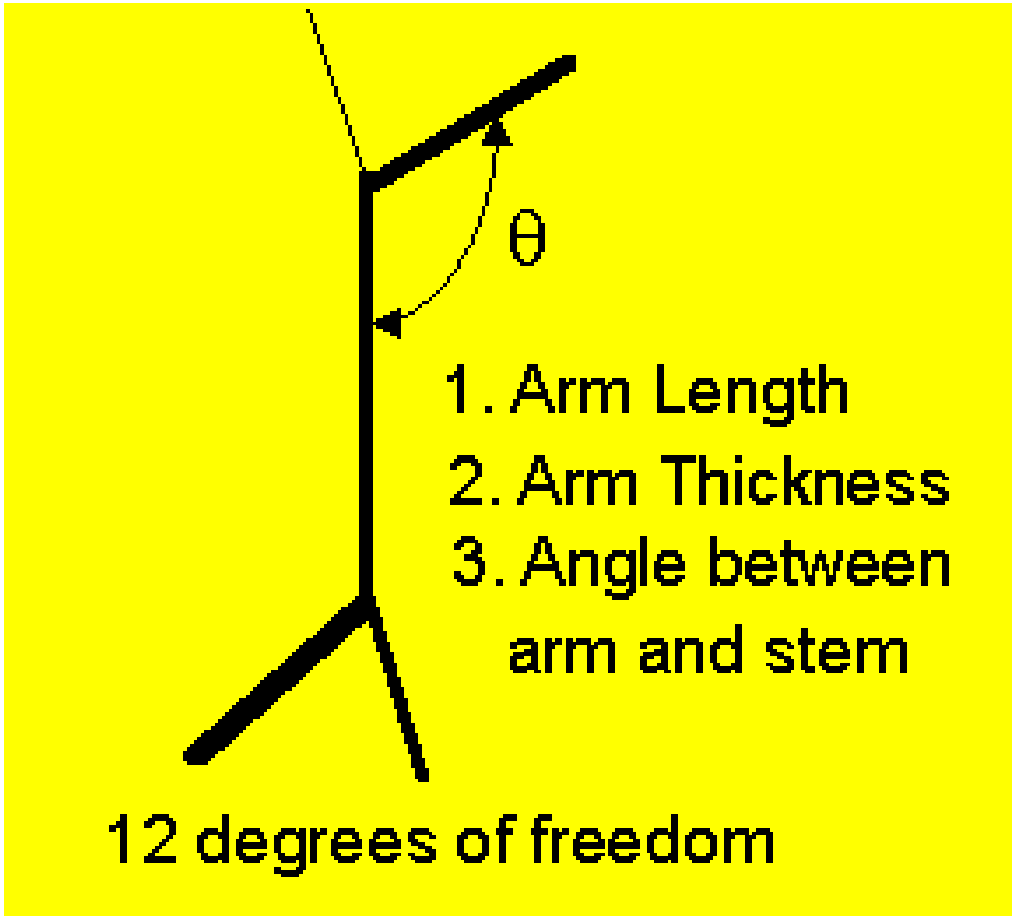
shaft direction:
direction of major principal stress

shaft color:
sign of stress

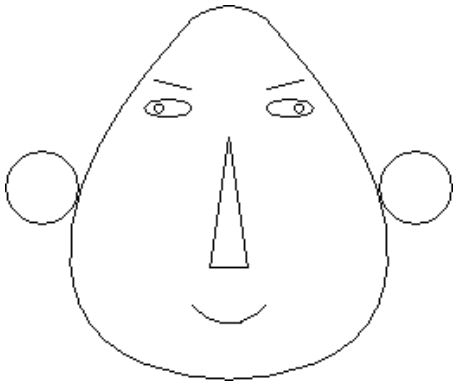
shaft length:
magnitude of stress

disk axes:
middle and minor directions of stress

disk color:
stress magnitude in each direction



Chernoff Faces



20D

- **http://www.epcc.ed.ac.uk/epcc-tec/documents/SciVis-course/SciVis.book_47.html**

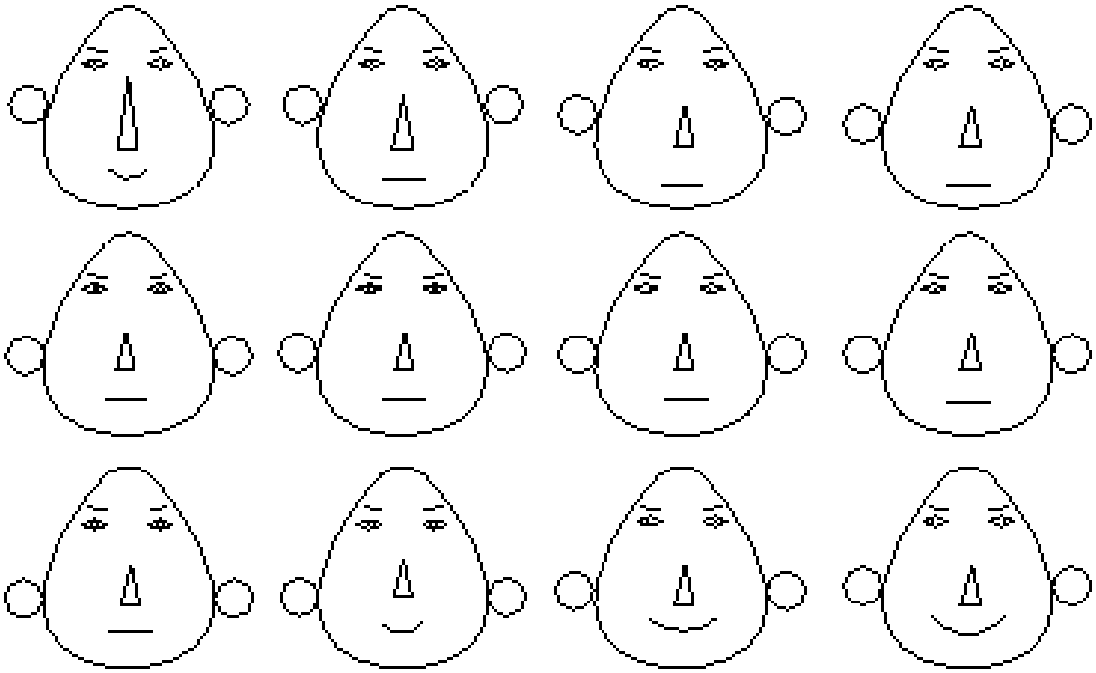


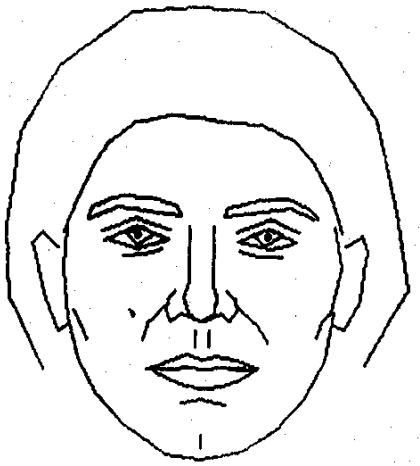
Table 1: Description of facial features of Chernoff face

Dimension	Facial Feature
1	Face width
2	Ear level
3	Half face height
4	Eccentricity of upper ellipse of face
5	Eccentricity of lower ellipse of face
6	Length of nose
7	Position of centre of mouth
8	Curvature of mouth
9	Length of mouth
10	Height of centre of eyes
11	Separation of eyes
12	Slant of eyes
13	Eccentricity of eyes
14	Half length of eye
15	Position of pupil
16	Height of eyebrow
17	Angle of brow
18	Length of brow
19	Radius of ear
20	Nose width

Facial Representation of nD Data?

Fig.3:

A neutral nosex face.



362D

- **Susan Brennan, 1985 and**

http://www.sccg.sk/~ferko/VISFORUMABSTRACT.pdf

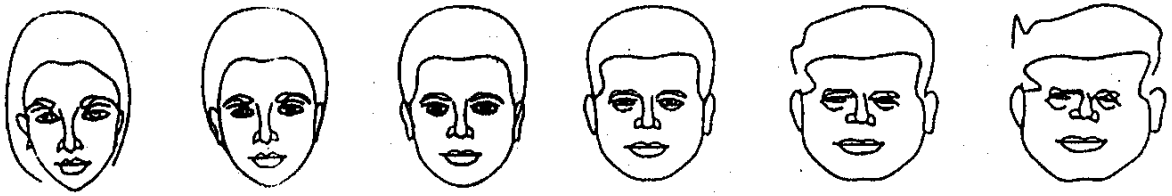


Fig.1: E. Taylor and Kennedy during changing their faces.

Fig. 4.1

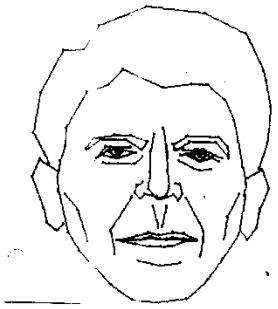


Fig. 4.2

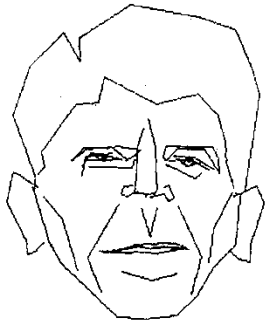


Fig. 4.3

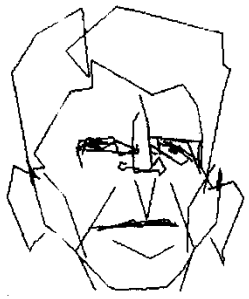


Fig. 4.4

Fig. 4.1 - 4.4: An example of four step generation of the caricature. Figure 4.1 represents a data snapped from the real image of the former president R. Reagan.

Reagan

- .

Fig. 4.1

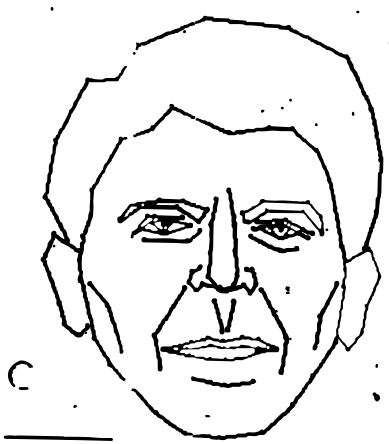


Fig. 4.2

Fig. 4.3

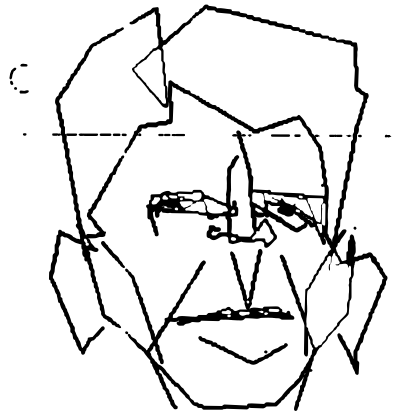
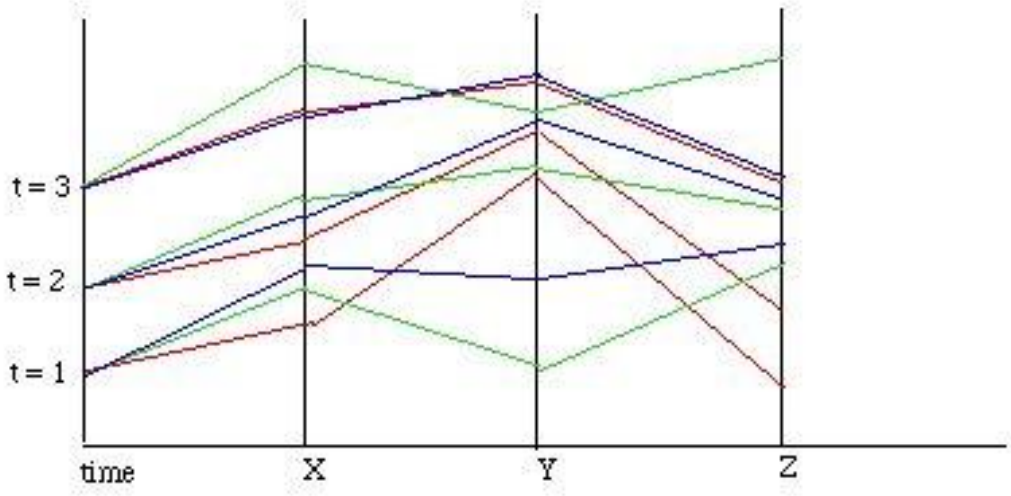


Fig. 4.4

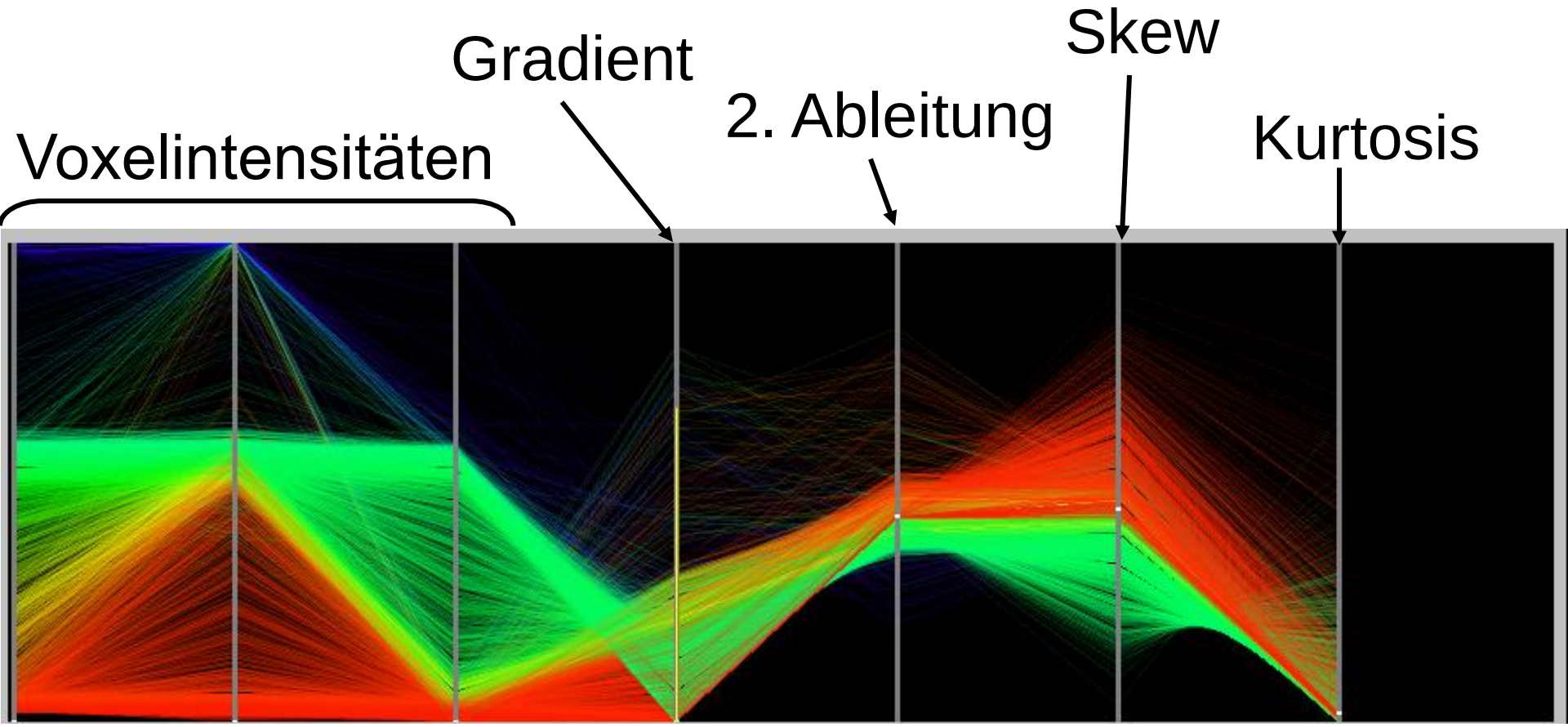
Fig. 4.1 - 4.4: An example of four step generation of the caricature. Figure 4.1 represents a data snapped from the real image of the former president R. Reagan.

Parallel Coordinates

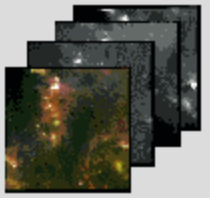
- INSELBERG, A. DIMSDALE, B. 1990. "Parallel Coordinates: A Tool for Visualizing Multi-Dimensional Geometry," Proc. of the First IEEE Conference on Visualization. 361 (1990).
- **http://www.caip.rutgers.edu/~peskin/epriRpt/ParallelCoords.html**



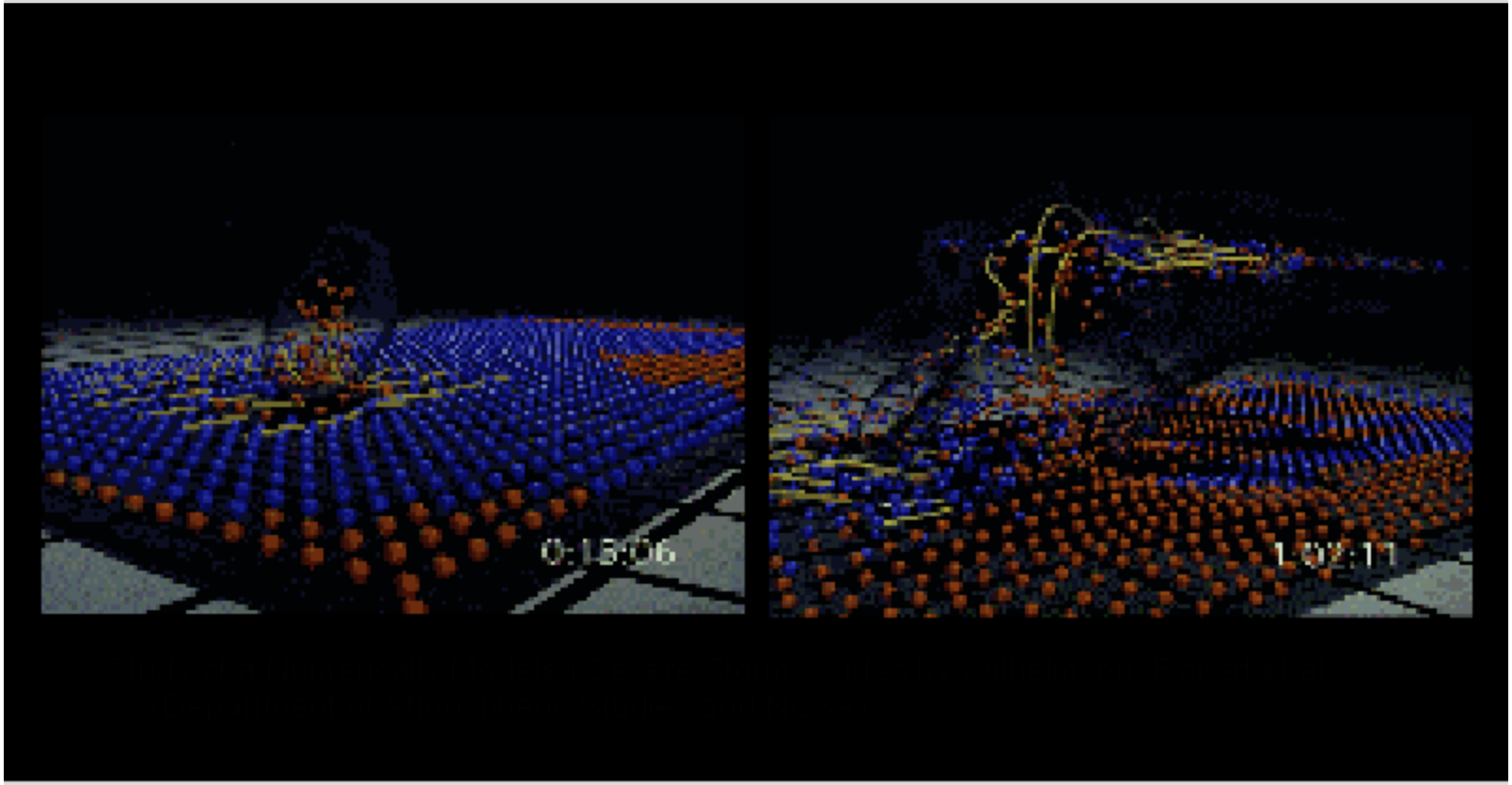
Volumendarstellung (19), Dr. Bartz



http://www.uni-paderborn.de/fachbereich/AG/agdomik/visualisierung/vis-report/tutorial/chapter1/tsld011.htm



Examples of Visualization



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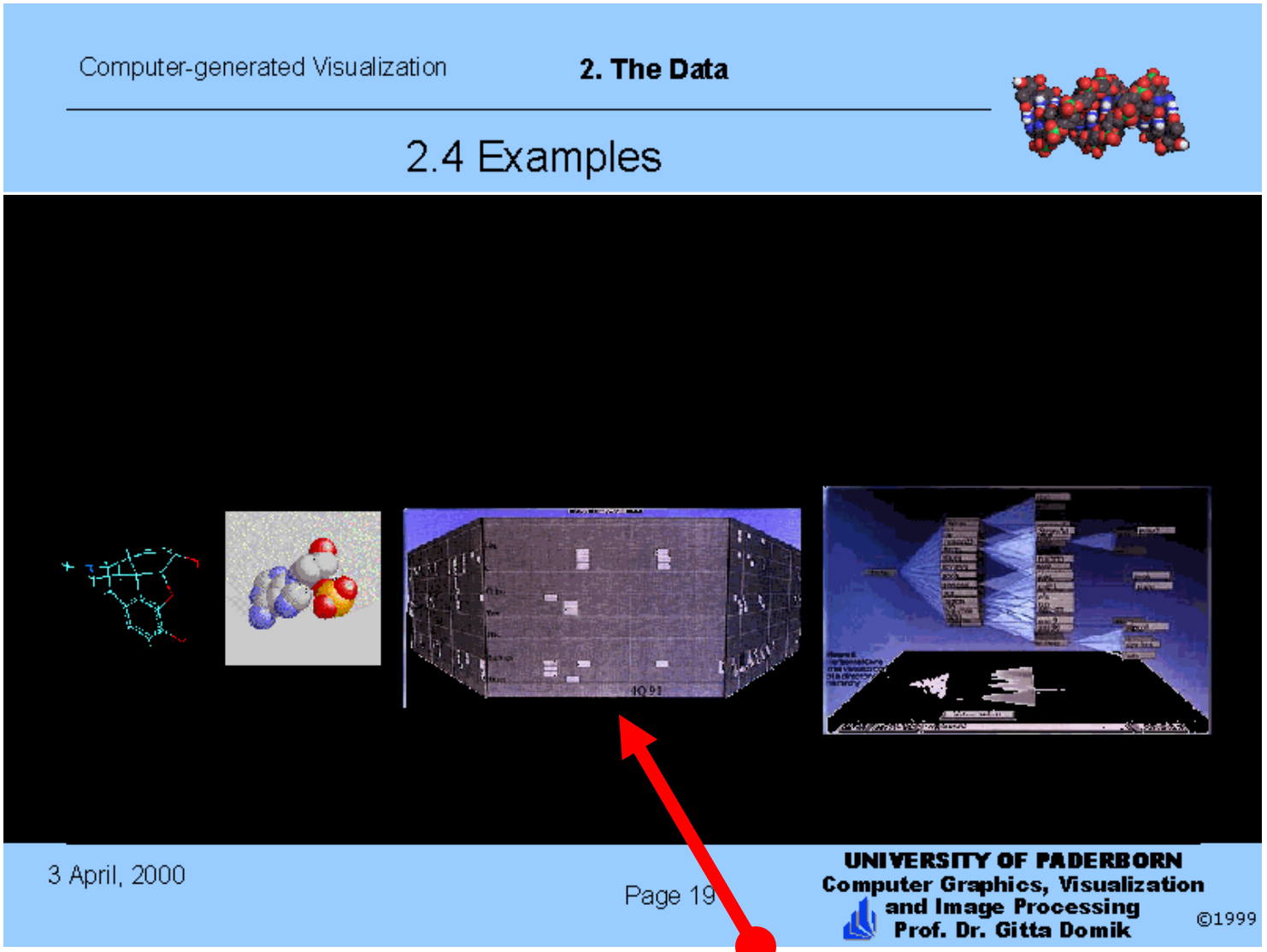
http://www.uni-paderborn.de/fachbereich/AG/agdomik/visualisierung/vis-report/tutorial/chapter1/tsld011.htm



- ***Used even in movies: CSIs, Assa, Hackers 2, Amelie de Montmartre…***

http://www.uni-paderborn.de/fachbereich/AG/agdomik/visualisierung/vis-report/tutorial/chapter1/tsld011.htm

http://www.uni-paderborn.de/fachbereich/AG/agdomik/visualisierung/vis-report/tutorial/chapter1/tsld011.htm

Examples of Visualization

From: Visualization in Geographical Information Systems, Plate 10. Edited by H. M. Hearnshaw and D. J. Unwin, Wiley

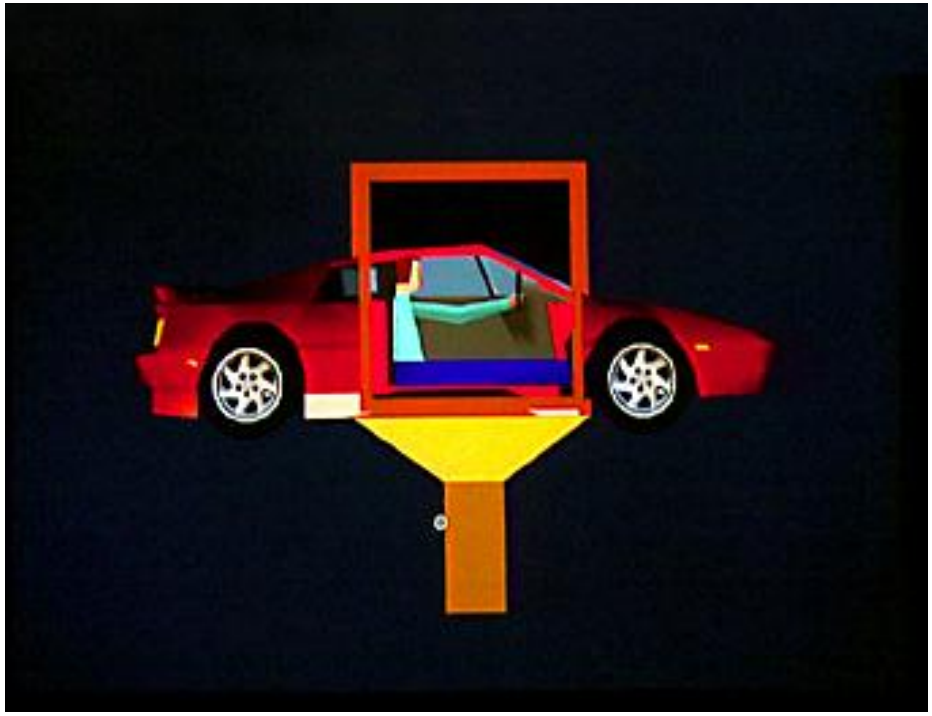
Figure 1: Seesoft profile display.

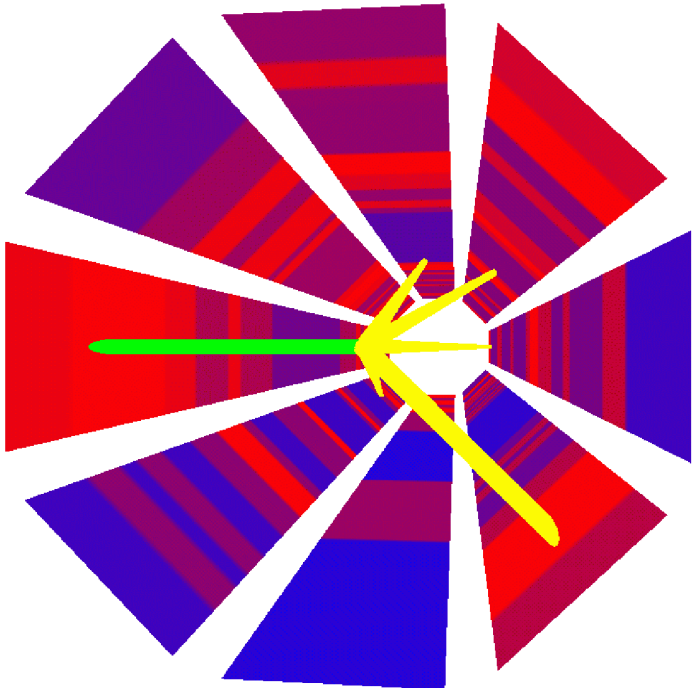
From: S.G. Eick and J.L. Steffen, Proc. Vis 92, IEEE Comp. Soc. Press

UNIVERSITY OF PADERBORN
Computer Graphics, Visualization and Image Processing
Prof. Dr. Gitta Domik
©1999

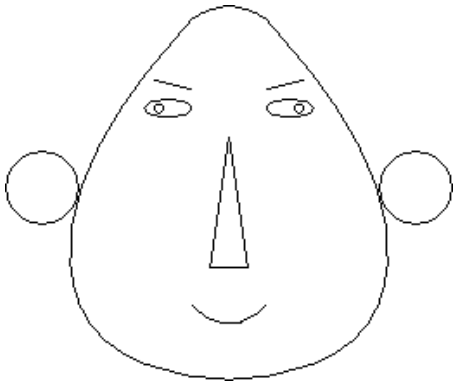
Visualization Magic…

- **Magic Mirror by Jerome Grosjean et al.**
- **Magic Tunnel by Bernhard Reitinger et al.**



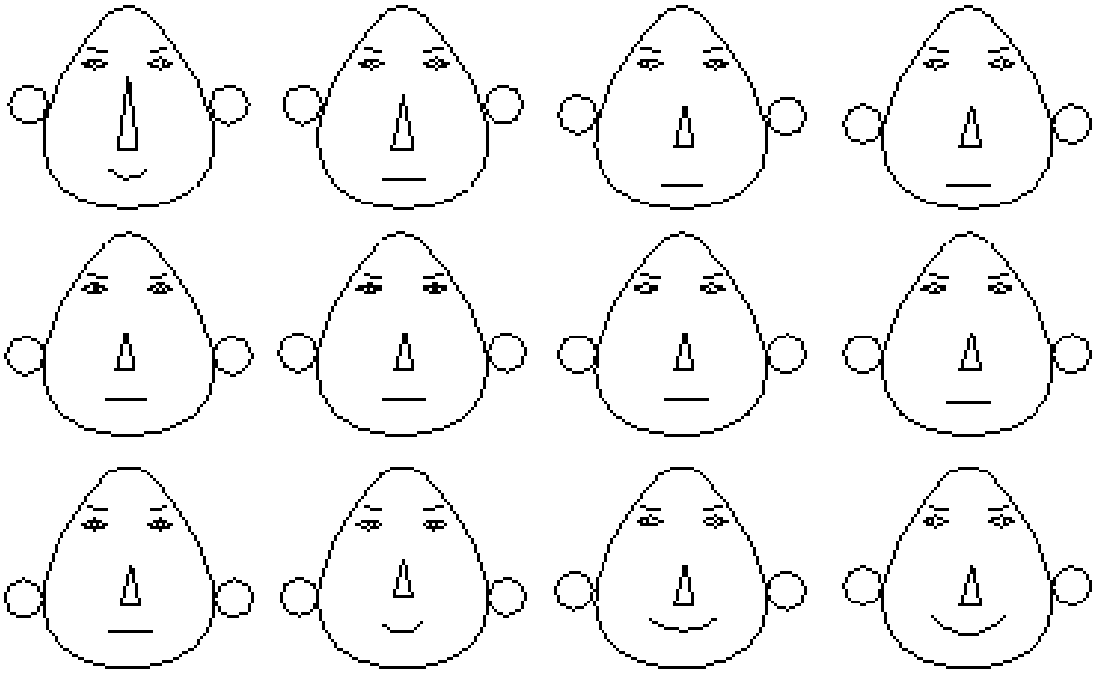


Chernoff Faces



20D

- http://www.epcc.ed.ac.uk/epcc-tec/documents/SciVis-course/SciVis.book_47.html



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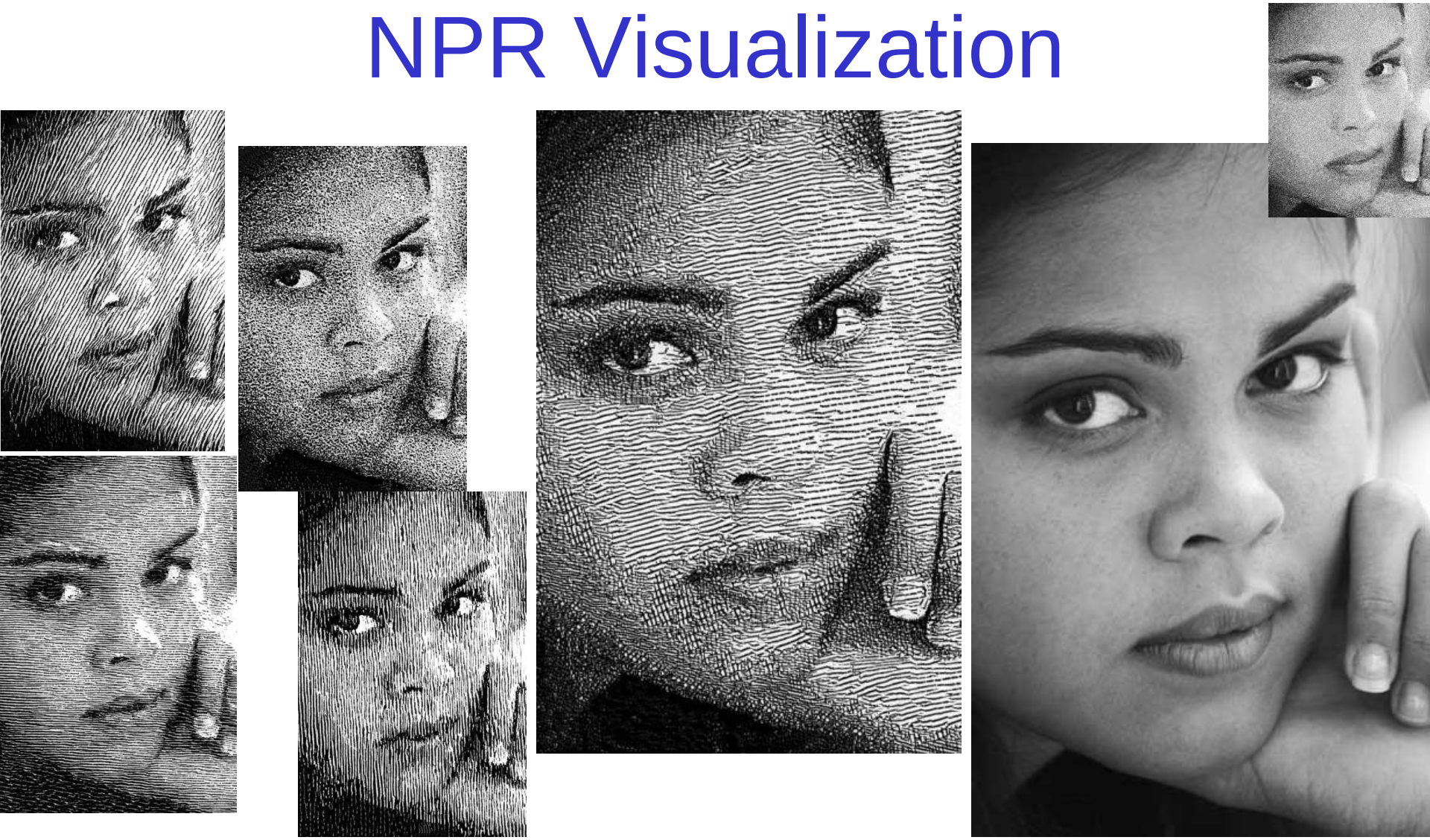
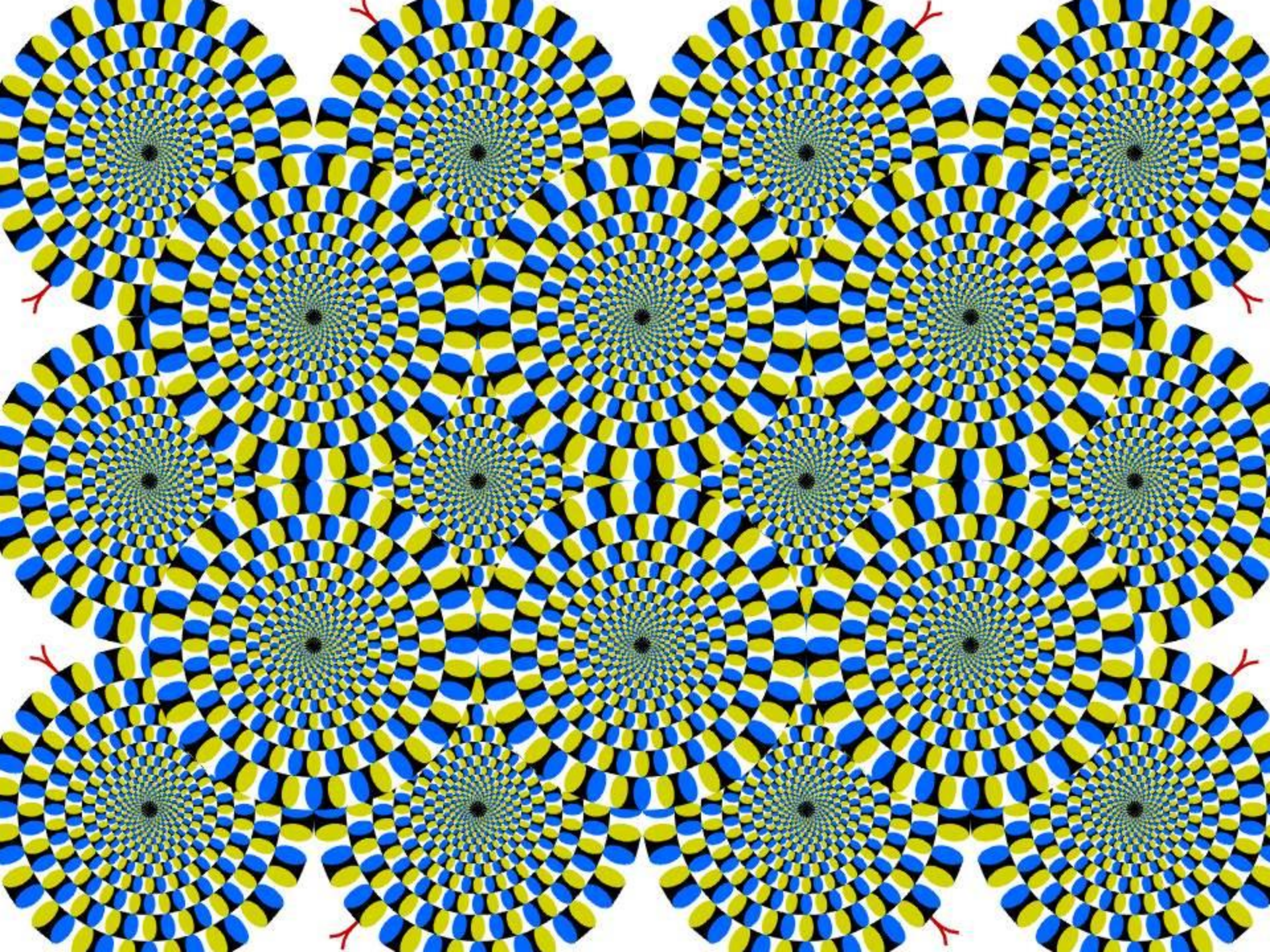
5	Eccentricity of lower ellipse of face
6	Length of nose
7	Position of centre of mouth
8	Curvature of mouth
9	Length of mouth
10	Height of centre of eyes
11	Separation of eyes
12	Slant of eyes
13	Eccentricity of eyes
14	Half length of eye
15	Position of pupil
16	Height of eyebrow
17	Angle of brow
18	Length of brow
19	Radius of ear
20	Nose width

NPR Visualization



- http://mrl.nyu.edu/projects/image-analogies/artistic.html **(SIGGRAPH 2001)**

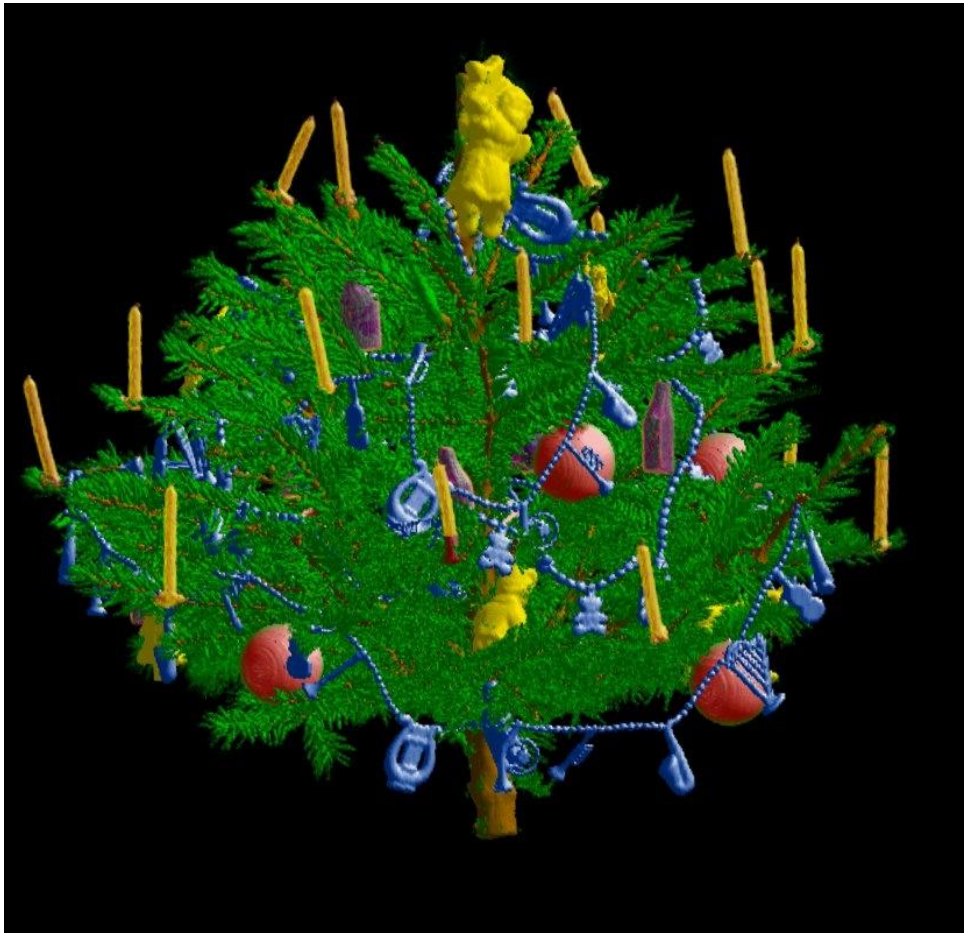


- Final Fantasy

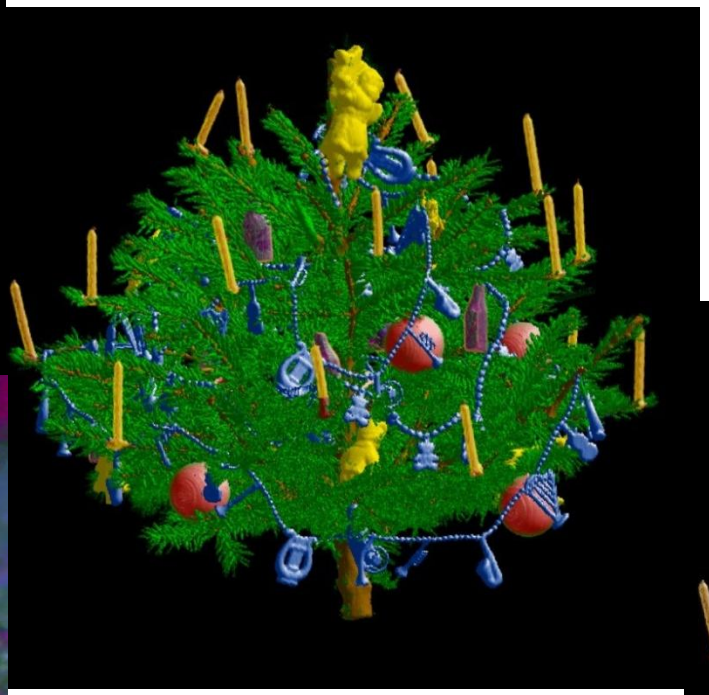
IMAGINATION/VR

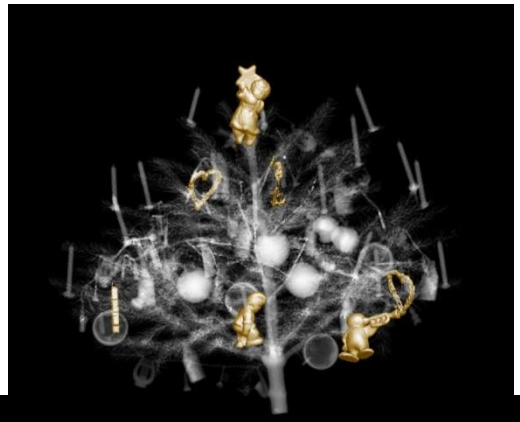
Xmas Tree in Heaven

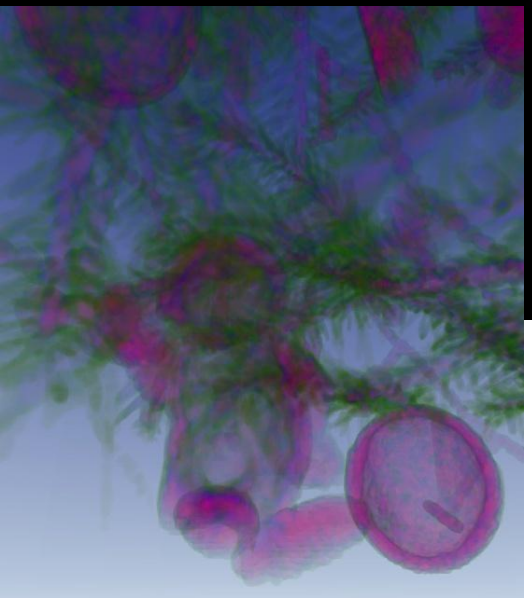
- **Christmas Tree Awarded Case Study, TU Vienna**

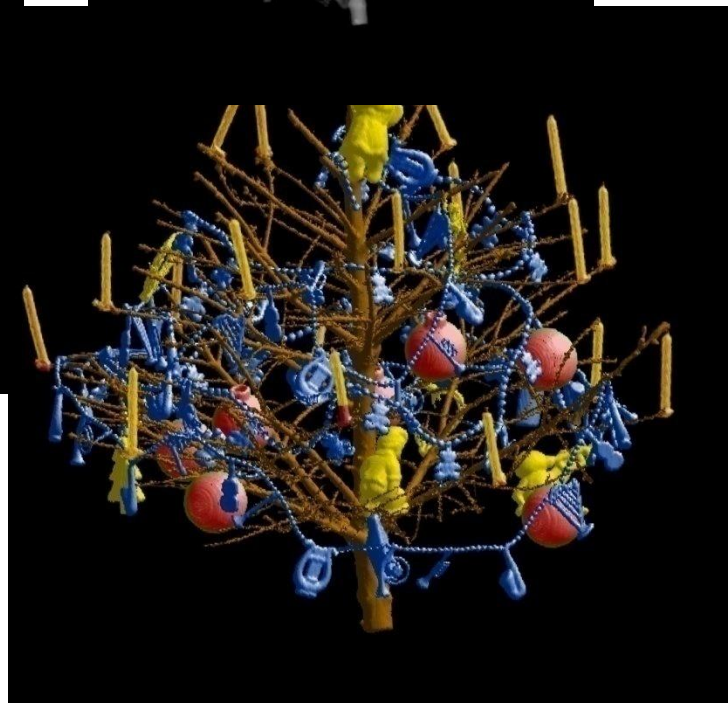


Xmas Tree in Heaven

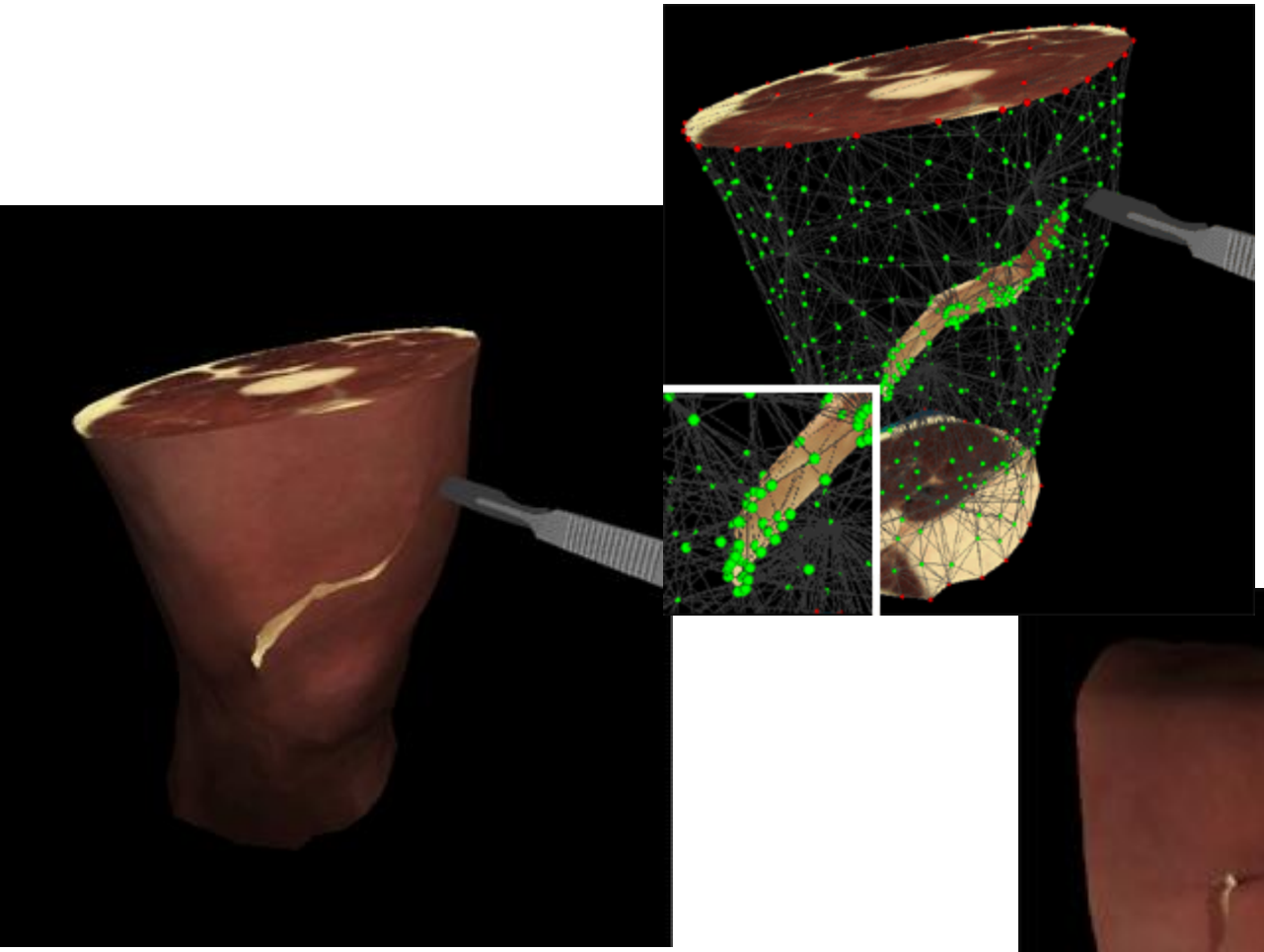








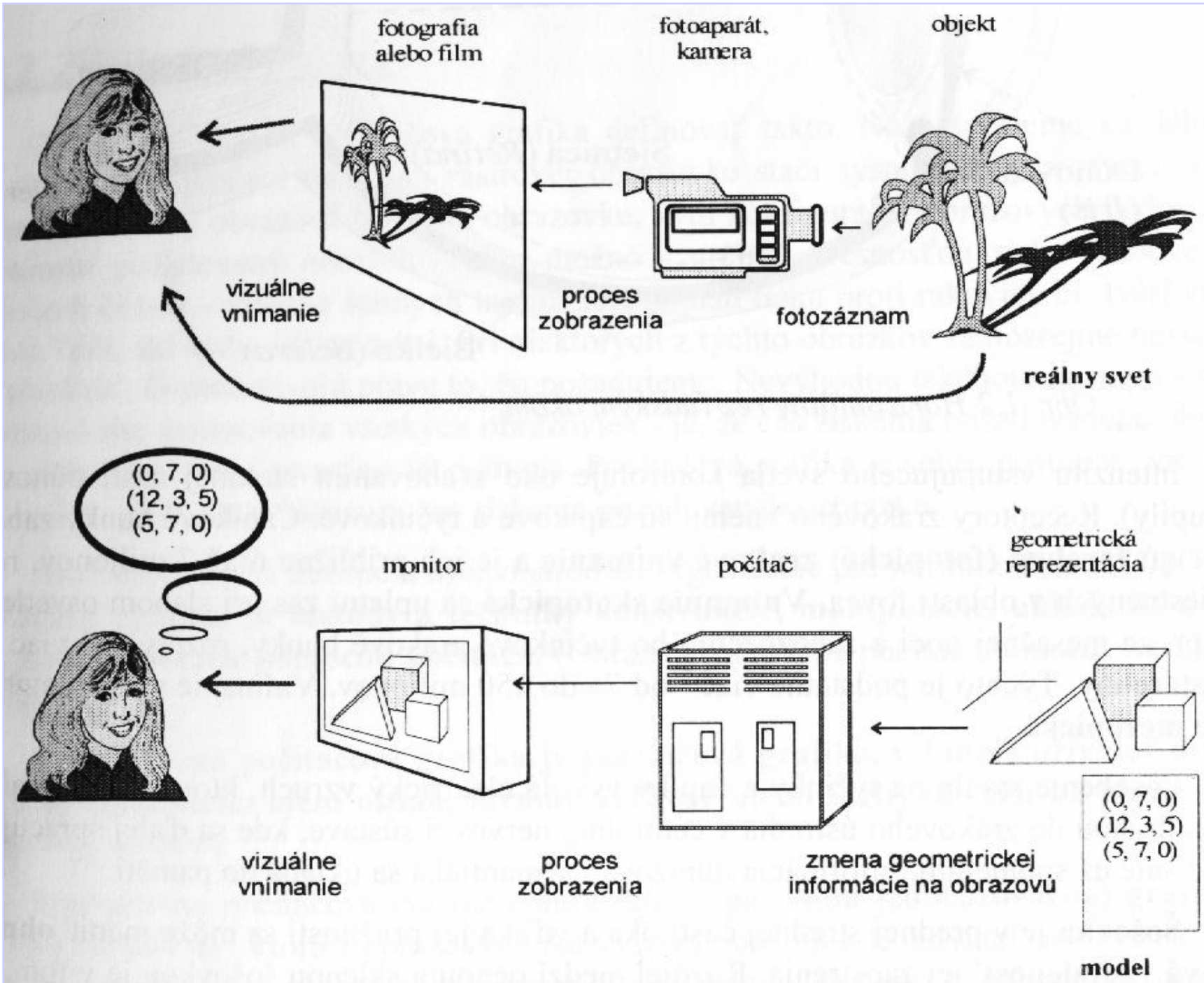
http://graphics.ethz.ch/~bielser/artist



Compare Reality - Synthesis

Photograph

Rendering using the deterministic method


fotografia
alebo film
fotoaparát,
kamera
objekt
vizuálne
vnímanie
proces
zobrazenia
fotozáznam
reálny svet
(0, 7, 0)
(12, 3, 5)
(5, 7, 0)
monitor
počítač
geometrická
reprezentácia
vizuálne
vnímanie
proces
zobrazenia
zmena geometrickej
informácie na obrazovú
(0, 7, 0)
(12, 3, 5)
(5, 7, 0)
model

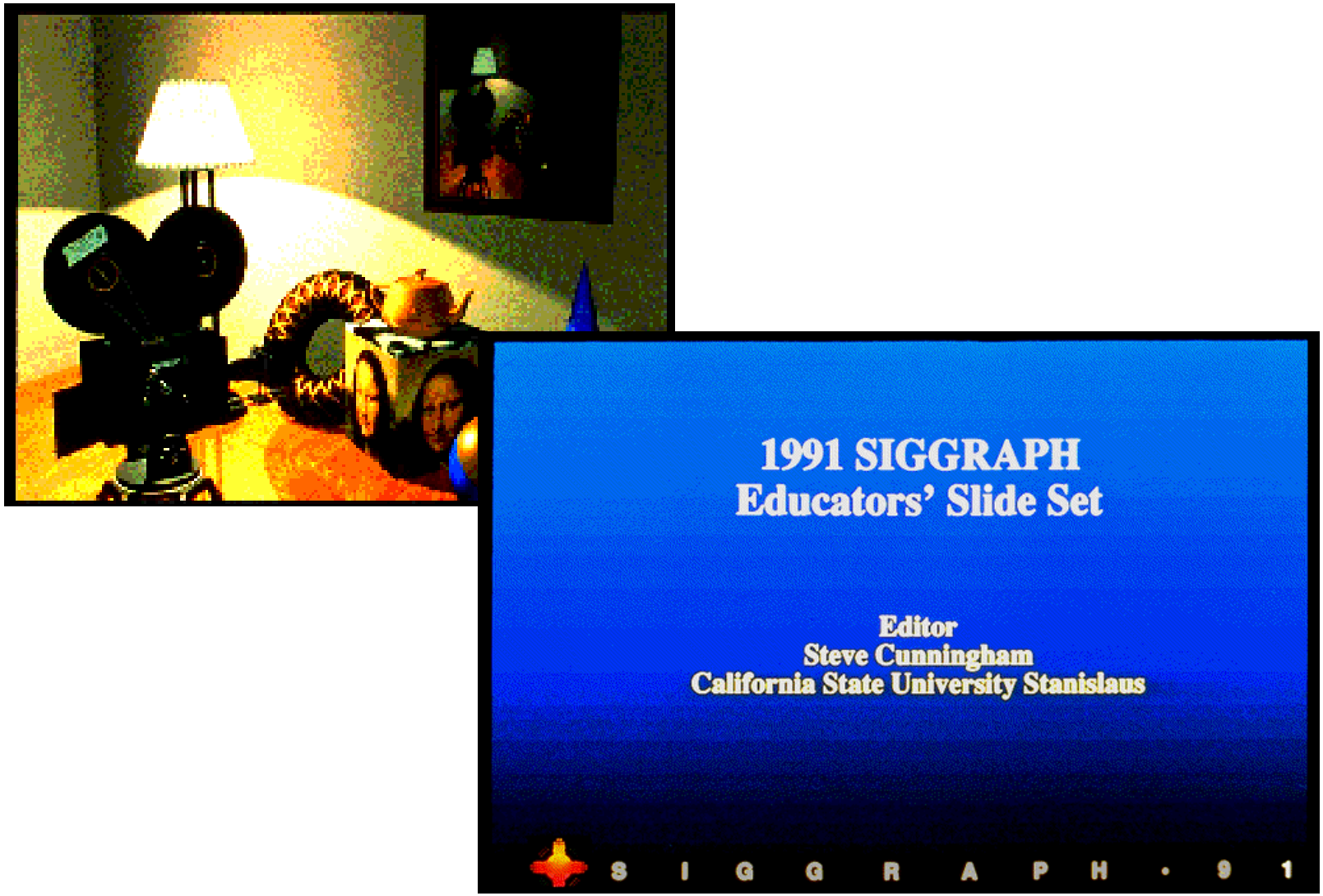
CG Functional Unit

- **known model**
- **wireframe or surface representation:** geometric tranformations, visibility calculations, interpolations and raster manipulations
- **photorealistic quality:** the lighting and rendering equations solved to simulate the illumination, shading, shadows, natural and synthetic textures and colors
- **viewing:** parallel or perspective projections) create the image space
- **animation:** kinematic & dynamic data compute/capture, hierarchy of motions, interpolations in the scene and in the resulting sequence of frames (fps)

Photography ~ computer graphics

- **ISO: Computer graphics:** methods & techniques for construction, manipulation, storage and displaying pictures using computer.
- [Dobkin97]: Computer graphics is a radiometrically weighted counterpart of computational geometry
- 8D (x, y, z, t) (r, g, b, transparency)
- Schnellkurs

SIGGRAPH Slide Show

- 

ShutterBug Credits

Produced by Tom Williams and H. B. Siegel, with the assistance of M. W. Mantle

All images rendered with PhotoRealistic RenderMan 3.2

Copyright Pixar, 1990

Produced for Computer Graphics, Principles and Practice, Second Edition, by Foley, van Dam, Feiner, and Hughes

Copyright Addison-Wesley, 1990

S I G G R A P H • 9

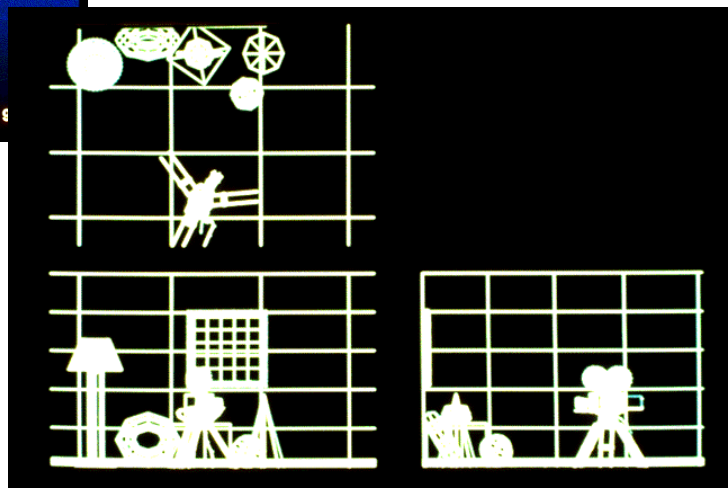
The Shutterbug Rendering Progression

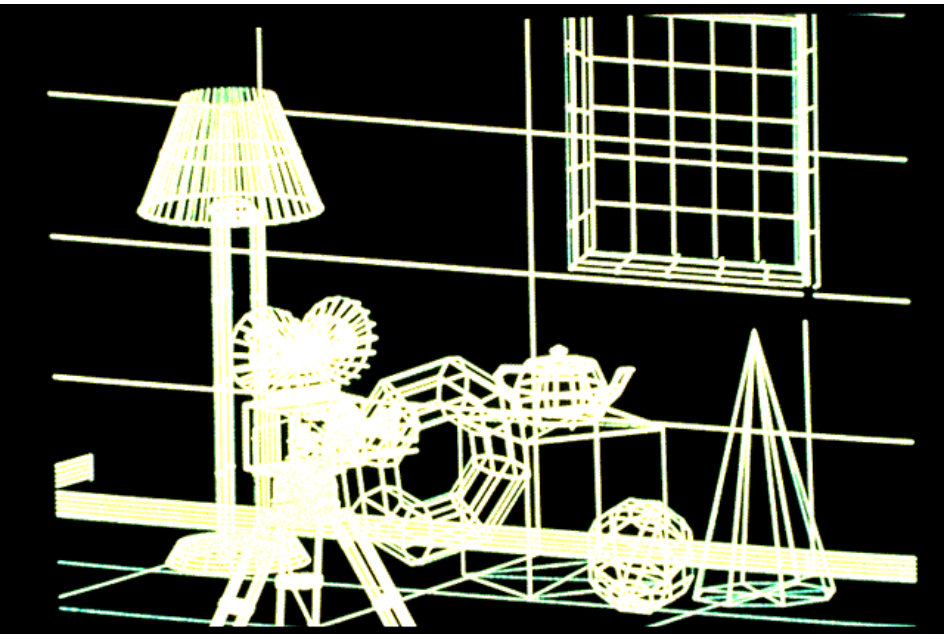
This sequence illustrates the progressive refinement of rendering algorithms.

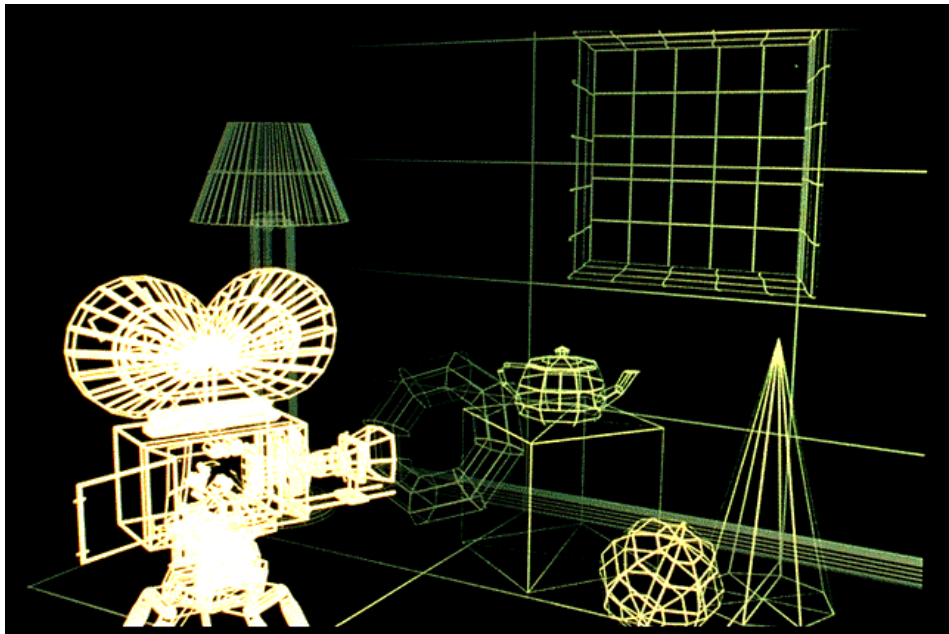
The images range from wire frames to photo-realistic renditions including reflections and shadows.

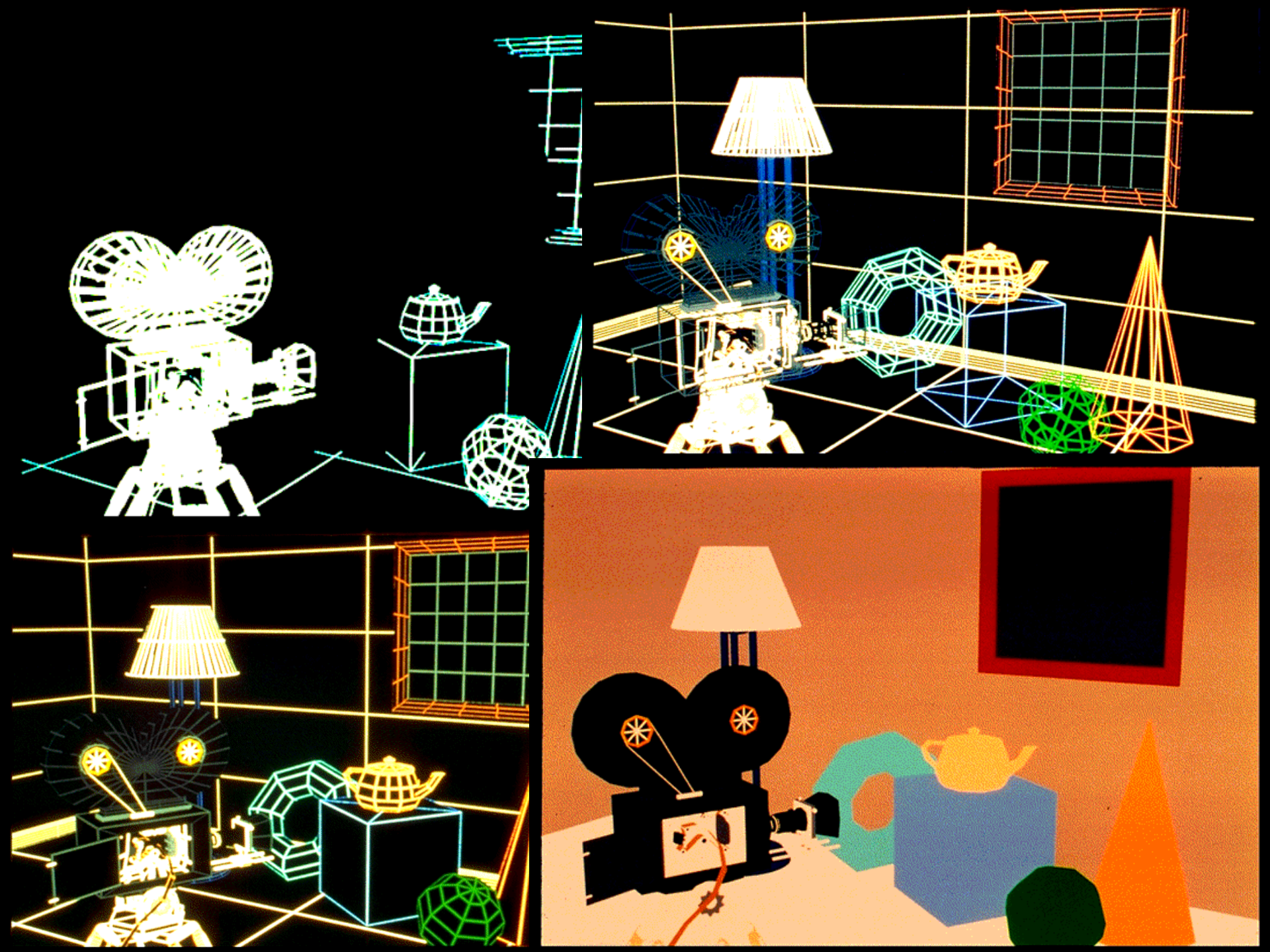
The rendering algorithm affects the quality and information conveyed by the image, independent of the underlying three-dimensional model.

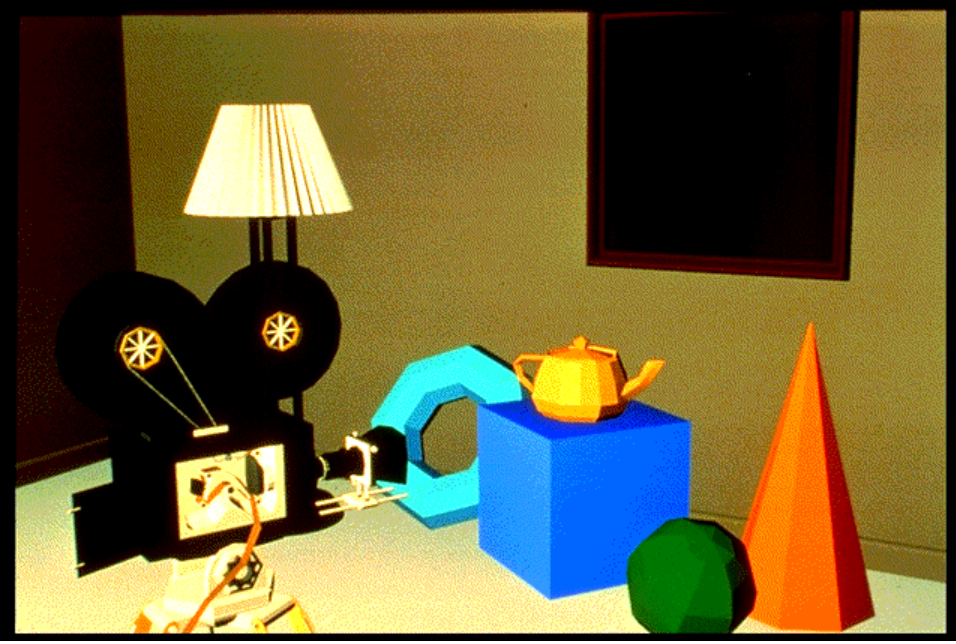
S I G G R A P H • 9 1

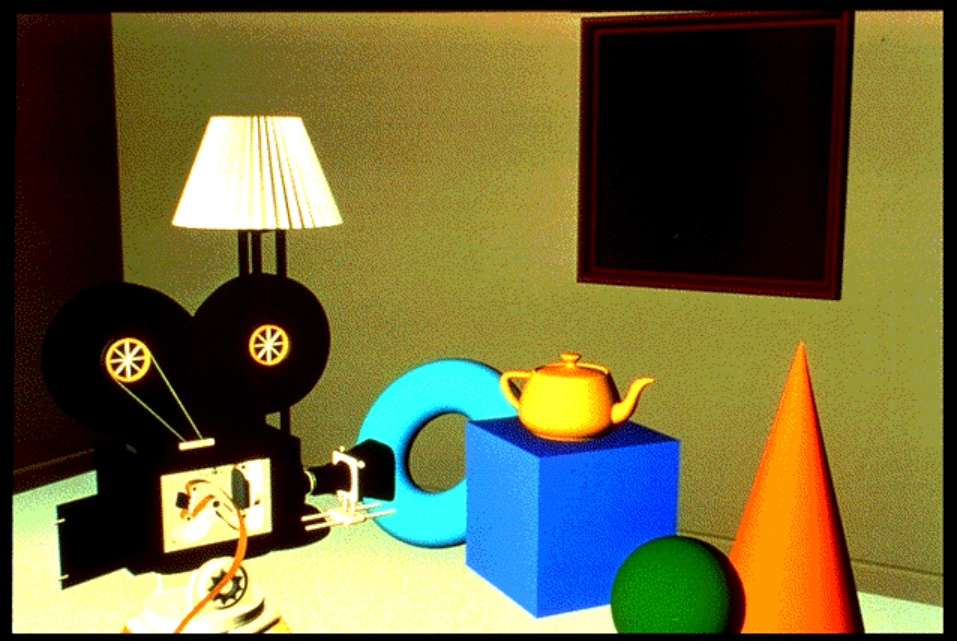


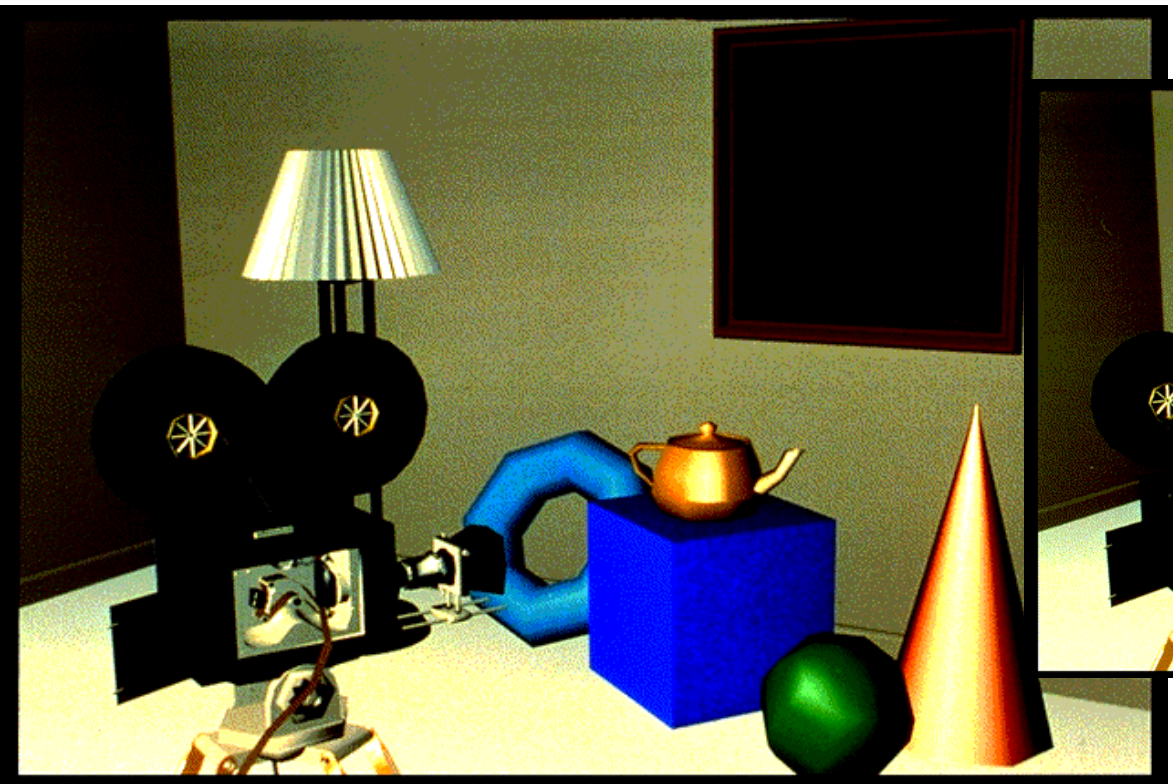


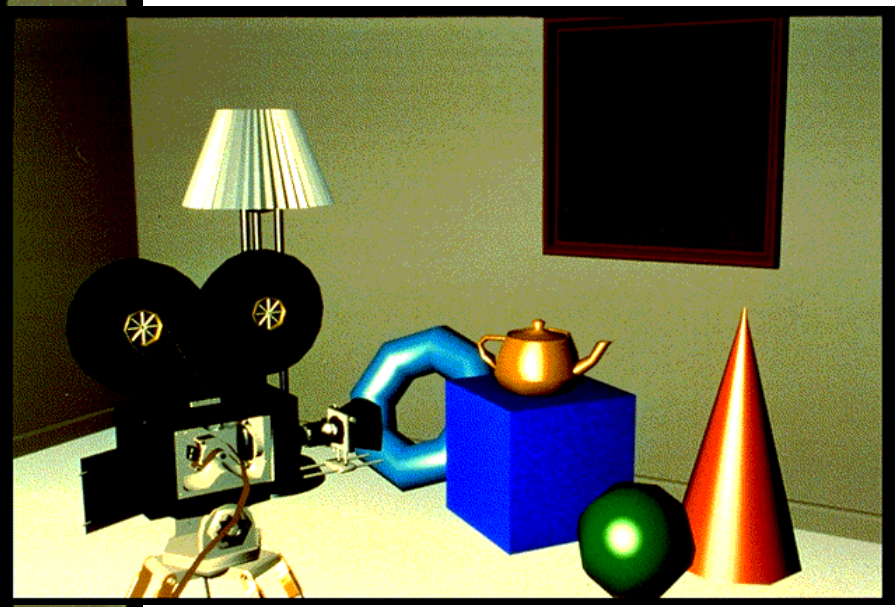


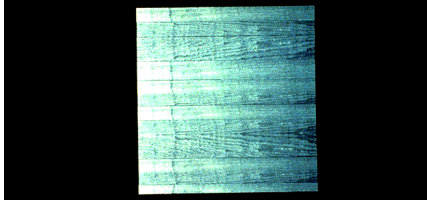


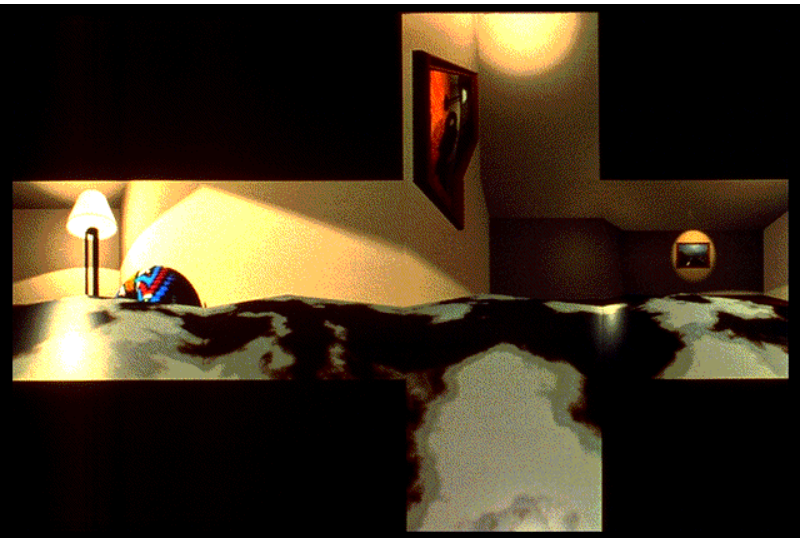


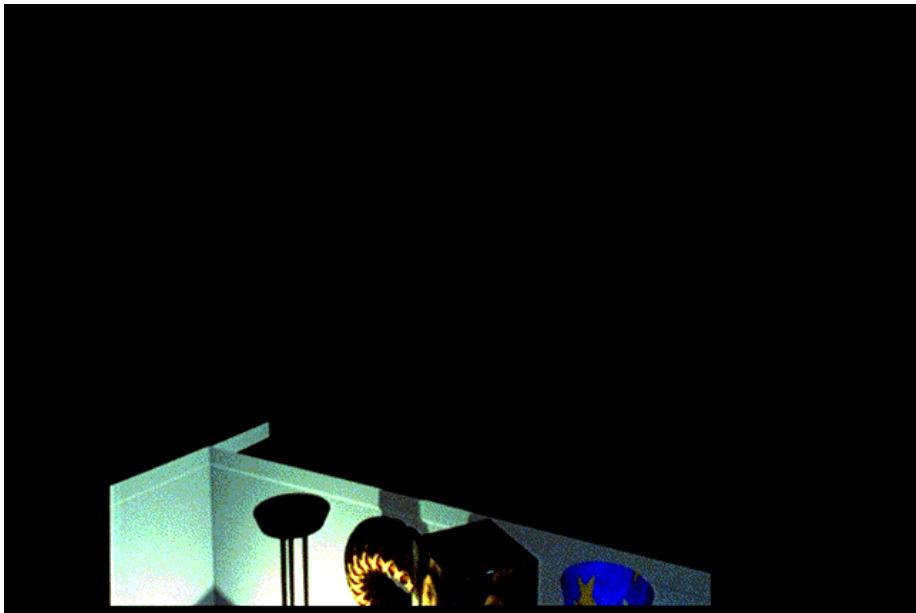












Conclusions

- **AH, AHA, HAHA ~ Discovery + WWW**
- **Hexagon ~ Invention**
- **Laughter culture in the sense of Bakhtin**
- **Visualization metaphors**
- **Bonus: CG reference model**

- **Future >> Funology >> Topologic Model >> (Quality/Usability) Metrics**

Matematický model vtipu a smiechová kultúra IT

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Týždeň vedy 2012, FMFI UK