Future of Multimedia and the Arts
UK Multimedia Knowledge Management Network, Workshop, KMi/OU, Milton Keynes, Feb. 14, 2008

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A few years ago...

In 1999: the SHAPE Lab. is created at Brown University.

www.lems.brown.edu/shape
The digitisation bottleneck

What can we really do with the technology?

We may drown under too much data!!

One site can (easily) produce hundreds of thousands of registered artifacts.
Since 1993, the Great Temple of Petra, project of Brown Univ., M. Joukowski.
VR & large DB access @ Brown: the ARCHAVE system for the Great Temple at Petra, Jordan (E. Vote, D. Acevedo, D. Laidlaw).

Challenge: multi scale, multi user interplay with large multimedia DB via VR systems.
Art and Perception

Consider Art as a window on the human mind.

Art as “a way of seeing,” apprehending,
giving thoughts substance,
acting as reflections on our thought processes,
providing “memory stores.” [Leyton]*

Theories of perception
try to pinpoint such thought processes.

Arts Computing attempts at marrying
the two views.

Lascaux paintings

Initial goal: Study the creative “grammar” of the artist.

Early result: the artist proceeds by steps, from an image, real or virtual, to a feature space, to a gesture space, and finally to a rendering space.

The set of processes is studied individually in a sequential manner in AIKON's first versions.
Drawing
Drawing

AIKON: Automated/Artistic IKONograph
P. Tresset & F. F. Leymarie @ Goldsmiths
AIKON: Automated/Artistic IKONograph
P. Tresset & F. F. Leymarie @ Goldsmiths
www.doc.gold.ac.uk/aikon/
Drawing

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What next?

- Introduce feedback mechanisms --- how to undo, how to modify the next drawing gesture as a function of the previous one.

- Study other styles, other artists: make explicit the cognitive and motor processes which lead to an artwork.
Art and Perception

Consider Art as a window on the human mind.
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Art and Perception

Consider Art as a window on the human mind.

Lincoln / Gala (by Dali, 1976)
“Gala contemplating the Mediterranean sea which at 20 meters becomes a Portrait of Abraham Lincoln --- Hommage to Rothko”
The perception/design of gardens

Ryonji garden, Japan, 15th century
The perception/design of gardens

The perception/design of gardens

The perception/design of gardens

Gert van Tonder et al. --- **Stylistic signature of creators.**

Local (A1) vs. global (A2) MA's in Ryonji

B1: Zakkein (no longer exists) – B2: Akisato Ritoh (1799)

Fractal-like designs
Perception --- Motion

Etienne-Jules Marey --- Motion studies (1886)

M. Duchamp
Nude descending a staircase (1912)
Art and Creativity

Consider Art as a catalyst of the creative mind.

Art as “a way of exploring,” discovering, shading new lights on accepted “truths” re-interpreting our memories.

Constructive paradigms (in painting, sculpting, architecture, ..., biology) as a source of formalisms (to be re-interpreted).

Arts Computing offers the artist new efficient ways to blend the boundaries.
Computational Schemes for Biomimetic Structures

Brower Hatcher
Karl Aspelund
Andrew Willis
David Cooper
Jasper Speicher
Frederic F. Leymarie
Biomimetics & Sculpting

Collaboration with Mid-Ocean Studio

Brower Hatcher's manifesto:

Paradigm for sculpting where a deformable, layered, approximately regular scaffold structure is used as a framework upon which other sculptural elements can be associated.
The Need for Digital Tools

- Explore complex 3D free-form structures
- Permit the inclusion of environmental features and function values.
- Create and flatten-out scaffold layers at large scales.
Biomimetics & Sculpting

Collaboration between Mid-Ocean Studio, Brown University & Goldsmiths College
Towards biomimetism

Laser scanned toy bear --> Surface layer --> Growth
Art and Creativity

Consider Art as a catalyst of the creative mind.
The artist seeks new solutions in a space of possible forms.

Aesthetics decisions provide guidelines to navigate this space and aim at regions of “interest.”
Project *Mutators*

*FormGrow:* Stephen Todd & William Latham (early 1990's)
Project *Mutators*

William Latham's organic art
Spending much time at The Natural History Museum. London, producing large scale evolutionary drawings. looking at Form (W. Latham, mid 1980's).
Latham's *FormSynth* (mid to late 1980's).
**FormGrow**

**Formal Grammar**

Based on plant forms: Branch, L-Systems, Fractals
Based on animal horns: Horn
Based on webs: Web
Based on worms: Segmentation

But can be combined:

Horn-of-Horns
Horn of Horn Branches
HornWeb of L-Systems of horns
Horn-of-Horns-of-Branch-of Horn-of-Webs
Mutator: Navigating Parameter Space

3 Parameters

0  Bend(?)  10,000

10,000  0  10,000

Ribs(?)  Twist(?)
Genotype

CGA GTA CGTTA

Phenotype

Mammalian Tapeworm.

Since 2006: MUTATOR revisited

Genotype

FormA (399, 34, 743, 3455, 332, 455, 345, 1, 234, 450, 5598, 45)

Phenotype

Form Grow.
Horn-of-Horns
Horn of Horn Branches.
HornWeb of L-Systems of horns of horns.
Horn-of-horns-of-branch-of-horn-of-webs ....
Genotype

CGA GTA CGTTA

COMPUTATIONAL GEOMETRY
Working with Geneticists to try and find common factors.
• Gene waking / freezing.
• Directed cellular goal growth without intersection
• Growth control mechanisms.

 Phenotype

Reference Scientific American.

Mammalian Tapeworm.

Since 2006: MUTATOR revisited

Genotype

FormA (399, 34, 743, 3455, 332, 455, 345, 1, 234, 450, 5598, 45)

Form Grow.
Horn-of-Horns
Horn of Horn Branches.
HornWeb of L-Systems of horns
### Creative Playground

<table>
<thead>
<tr>
<th>Geneticists</th>
<th>Artists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problems with visualisations</td>
<td>“Aesthetic Navigators”</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Common Language</td>
<td>Good at working in purely abstract terms</td>
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<td></td>
<td>+</td>
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<td></td>
<td>Sensitive to form, colour, shape, balance</td>
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<tr>
<td>Computer Scientists</td>
<td>Morally adaptive</td>
</tr>
<tr>
<td>Mathematicians</td>
<td>+</td>
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<tr>
<td>New challenging problems..</td>
<td>Good at working with formal problems</td>
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<tr>
<td></td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Fairly good at lateral thinking</td>
</tr>
</tbody>
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Using DNA to Create 3D Mutator Forms

Nature’s method

Mutator's method

DNA Sequence
ctgcttgacggctaga...

Amino Acids
His - Ala - Ser ....

Protein

3D Shape
“The History of the Species”
Film of the De/Evolution of Two Proteins.

- Case study: From the Delta crystallin (from the lens of the eye) to Argininosuccinate lyase (from the liver).

- Sketch at SIGGRAPH 2007
- www.mrg-gold.com
Delta crystallin

Argininosuccinate lyase

http://hos.mrg-gold.com
Arts (Design, Music, Architecture,...) Computing

• to better understand the mind

• to create new forms, possibilities

• to collaborate and design in novel useful ways

• to process multimedia data more efficiently
Special thanks:

Michael Leyton (Rutgers), Ben Kimia & David Cooper (Brown),
Franz-Erich Wolter (Hannover),
Gert van Tonder (Kyoto), Liliana Albertazzi (Bolzano),

The “Providence team” : Engineering, Applied Maths, Archaeology at
Brown, the Mid Ocean studio, Andrew Willis (North Carolina).

The “England team” : Computing Dept. at Goldsmiths, incl. Miki Shaw,
Digital Studios (Janis Jefferies, Mark d'Inverno, Robert Zimmer et al.),
artists Patrick Tresset and William Latham,
mathematician Peter Giblin (Liverpool) and Stephen Todd (Goldsmiths),
computer scientist Stefan Rueger (KMi),
bio-informaticians Ben Jefferys & Lawrence Kelley (Imperial).

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