

The background of the slide features a faded, grayscale image of a classical building with a prominent portico and columns. A semi-transparent grid of thin, reddish-brown lines is overlaid on the entire image, creating a technical or architectural aesthetic.

Technologies of Writing

Differential Geometric

Performance

Sha Xin Wei • Stanford University

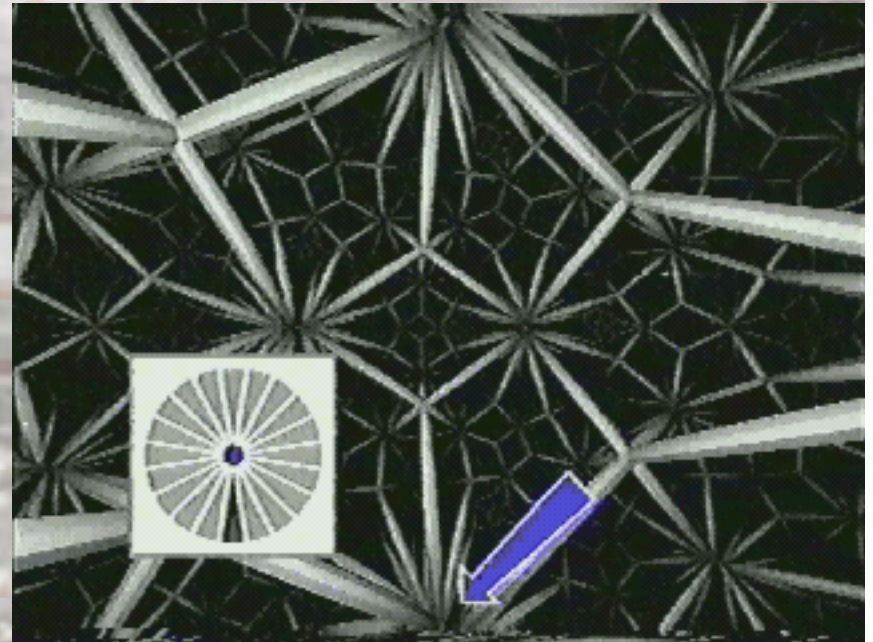


Starting Places

∞ & C^0

How do we acquire intuitions about infinite or continuous things?

How do we represent continuous or infinite things with finite, discrete representations?



Where does the intersubjective power of mathematics come from?

“Damn machines”

Why have computers been so unhelpful in the doing of differential geometry?



(Media fusioning by MetaSynth)



Geometric Computation

Seeing vs Making

Technologies

Programming Languages

Visualizations (e.g. eversion of sphere)

Simulations

numeric, e.g. physics microworlds

scripted, e.g. mTropolis

(how to distinguish?)

increase number of particles!

```
*
* Function: sqcurve_force()
*
* Purpose: Does square curvature force
*
*/

void sqcurve_force(v_id,e_id,side)
vertex_id *v_id; /* vertex list of face
edge_id *e_id; /* edge list */
REAL (*side)[MAXCOORD]; /* side vectors
{
    REAL det;
    struct v_curve *vc[FACET_VERTS];
    int i,j,k;
    REAL force[FACET_VERTS][MAXCOORD];
    REAL tt[FACET_VERTS][FACET_VERTS];
    REAL area;
    struct e_curve *ec[FACET_EDGES];
    int fixcount=0;

    for ( j = 0 ; j < FACET_VERTS ; j++
        for ( k = 0 ; k <= j ; k++ )
            tt[j][k] = tt[k][j] = SDIM_dot(
                vc[j],vc[k]);

    det = tt[0][0]*tt[1][1] - tt[0][1]*
            tt[1][0];

    area = sqrt(det)/2;
    for ( i = 0 ; i < FACET_VERTS ; i++
        { vc[i] = v_curve + ordinal(v_id[i];
          vc[i]->area += area;
        }
    if ( boundary_curvature_flag ) /* sq
        { fixcount = 0;
          for ( i = 0 ; i < FACET_VERTS ;
              if ( get_vattr(v_id[i]
                  for ( i = 0 ; i < FACET_VERTS ;
                      if ( !(get_vattr(v_id[
                          vc[i]->a += 3*area/(3-fixcount);
          }
        for ( i = 0 ; i < FACET_EDGES ; i++
            ec[i] = e_curve + ordinal(e_id[i]);

    memset((char*)force,0,sizeof(force));
    for ( j = 0 ; j < FACET_VERTS ; j++
        { int i1 = (j+1)%FACET_VERTS;
          int i2 = (j+2)%FACET_VERTS;
          for ( i = 0 ; i < SDIM ; i++ )
```

Winners

Email.

But what software was the most commonly dedicated to their scientific work?

TeX (why?)

Shallow: pure syntax of typeset (“pure” signifier).

No attempt to model meaning.

Hybrid Writing

Mathematica

Shallow: pattern rewrite

Multi-modal


Acts on itself



On Writing

Writing: Wittgenstein

Wittgenstein

“How does it come about that this arrow  *points*?

...The arrow points only in the application that a living being makes of it.”

[Philosophical Investigations §454]

Writing: Derrida

“I have already alluded to theoretical mathematics; its writing -- whether understood as a sensible graphie ... (and that already presupposes an identity, therefore an ideality, of its form...), or understood as the ideal synthesis of signifieds or a trace operative on another level, or whether it is understood, more profoundly, as the passage of one to the other -- has never been absolutely linked with a phonetic production. Within cultures practicing so-called phonetic writing, mathematics is not just an enclave....This enclave is also the place where the practice of scientific language challenges intrinsically and with increasing profundity the ideal of phonetic writing and all its implicit metaphysics.”

[Grammatology 10]

Writing: Guattari

Recognition of these machinic dimensions of subjectivation leads us to insist, in our attempt at redefinition, on the heterogeneity of the components leading to the production of subjectivity.

Thus one finds in it:

1. Signifying semiological components which appear in the family, education, the environment, religion, art, sport...
2. Elements constructed by the media industry, the cinema, etc.,
3. A-signifying semiological dimensions that trigger informational sign machines, and that function in parallel or independently of the fact that they produce and convey significations and denotations, and thus escape from strictly linguistic axiomatics.

[Chaosmosis: An Ethico-Aesthetic Paradigm 4]



Olde Philosophy

Olde Philosophical Responses

Realist

Constructivist (NOT Social)

Formalist (Hilbert)

Intuitionist (Brouwer)

Fictionalist (H. Field)

Responses

Cognitivism

Psychology

Logicism

Lakoff's Metaphor Theory

Cognitivism in Sheep's Clothing



Differential Geometric Performance

Mathematical Modes

Examples

Algebra -- sequence of homology groups

Freehand drawing -- almost embedded cmc

Analytic -- function growth, operators on L^p spaces

Geometric -- notion of tangent space; curvature

[striated $\sim T_p M$, Deleuze & Guattari *Thousand Plateaus* 373]

Kinetic -- Flow by mean curvature

Mode vs. Genre

Material Phenomenology

Husserl: evidence and intuition

Rota

Material...

Embodied...

Temporal...

Mathematics

Both poietic and technic
Both medium and object

•••

Mathematics is a Mangling

Mangled Agencies

Andrew Pickering --

Human agency, Material agency, Disciplinary agency

Disciplinary agency

“ Conceptual systems [like algebra], then, hang together with specific disciplined patterns of human agency, particular routinized ways of connecting marks and symbols with one another. Such disciplines -- acquired in training and refined in use -- carry human conceptual practices along, as it were, independently of individual wishes and intents.... It is ... the agency of a discipline -- elementary algebra for example -- that leads us through a series of manipulations within an established conceptual system.”

[Mangle of Practice 116]

Mangled Agencies

“The notion of discipline as a performative agent might seem odd to those accustomed to thinking of discipline as a constraint on human agency, but I want (like Foucault) to recognize that discipline is productive. There could be no conceptual practices without the kind of discipline at issue; there could be only marks on paper. [Mangle of Practice 116]

Mathematical structures serve as translation devices between diverse cultural elements (Latour)

If cultural extension in conceptual practice is not fully under the control of active human agents, due to the constitutive role of disciplinary agency, then the making of new associations...is nontrivial....[O]ne has to expect that resistances [and accommodations] will arise in the construction of new conceptual associations. [Mangle of Practice 119]

(Aside) Dimensionalizing Moves

Latour

matter | human

natural | social

Add another axis: degree of stabilization

Pickering

Three agencies

sponge

spectator | actor

substrate



Technologies of Writing

Technologies of Writing

Extend notion of writing

Roy Harris

from telementationalist to integrationalist

From documentarism, alphabetism and typographic reductionism

Rotman -- Diagrams, Techniques of mathematical Persuasion

Other modes (see above -- mathematical modes)

Exteriorization of thought

Leroi-Gourhan, *Speech and Gesture*.

Kittler's media thesis (a little too strong?)

Writing technologies:

- are based upon non-communicative aspects of language
- are embedded in social practices;
- include gestures and other bodily moves coordinated with the written;
- give material form to abstract entities;
- enable the gradual and collaborative refinement of notions;
- involve non-linguistic as well as linguistic objects;
- generate "social" objects - objects which are upheld by and coordinate between more than one person.

Looking backward

Blackboard

larger than personal reach

co-presence (no transport communication!)

performance

ephemeral writing (Bolter)

gesture

Examples

– Alexandrov reflection argument (high dimensional)

Almost embedded surface

Maximum Principle \Rightarrow leaves of H-flow don't stick

Better Blackboards?

Stanford Interactive Workspace & Mural Projects



Perceptual Landing Spot

Recall Derrida' conjectured:

mathematical writing -- understood more profoundly, as the passage of sensible graphie [manner of writing] to the ideal synthesis of signifieds or a trace operative on another level...

But I've argued that there is no ideal, there is only one ontological layer, part of a larger project with Niklas Damiris.

Perceptual Landing Spot

Geometers habitually use non-textually mediated forms of extensive writing, a writing which is a fusion of graphic, algebraic, numeric, as well as discursive modes of performative experience.

This technology of writing, old and new, is what enables the supra-individual persistence and more, the disciplinary agency of mathematics.

Yes, it is constructed and objective in this constructed sense, BUT quite different from what social constructivists like Bloor or Ernest mean.

Not all the constructors are human.

field work

sponge

m1 m2 m3

~~what is human?~~

how to human?