# art-research

## sponge & the topological media lab

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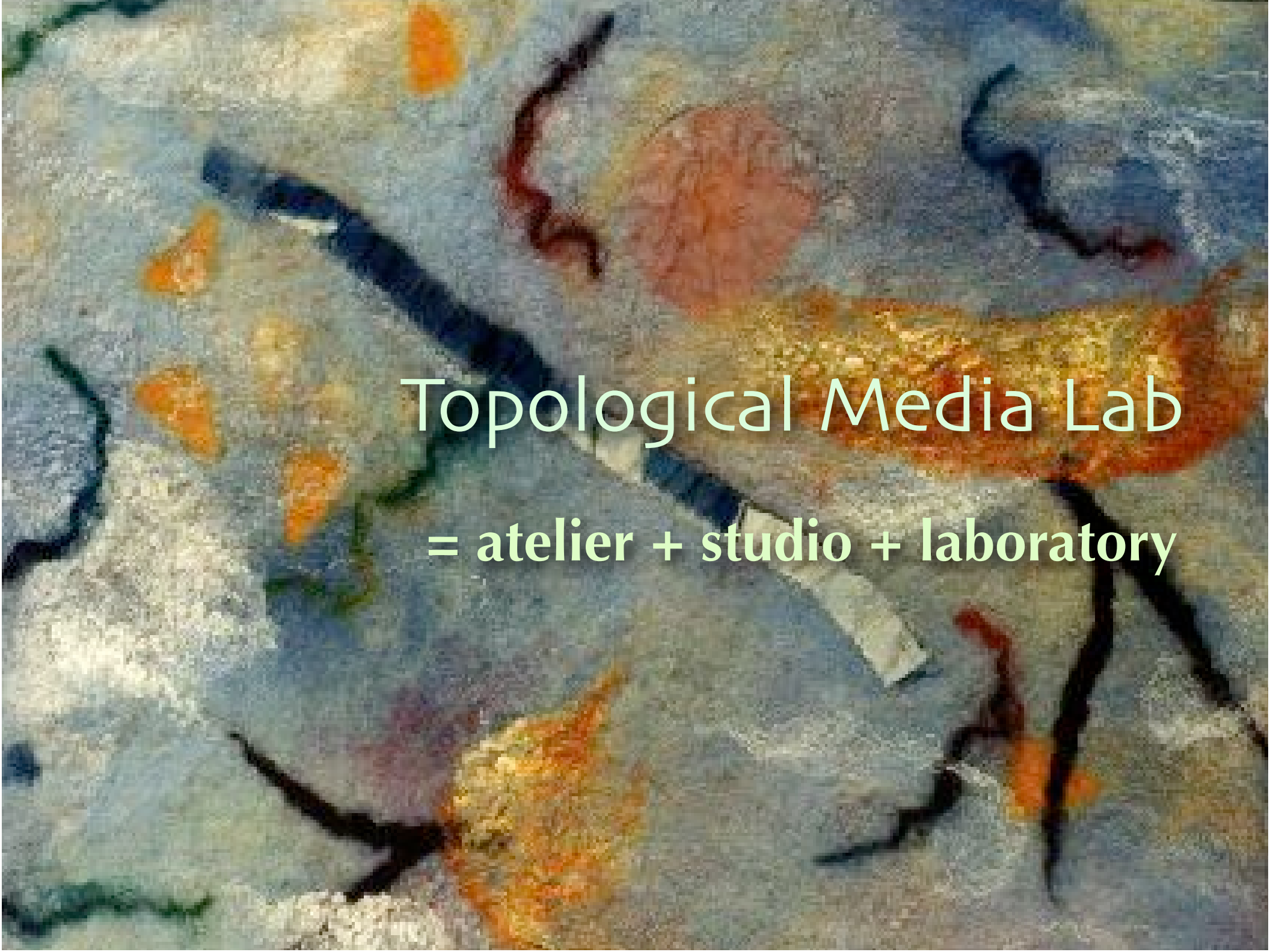
Topological Media Lab
= atelier + studio + laboratory

# Body of Work

Single body

Multiple views

- Art: Installation-events & Performance
- Engineering: Responsive environments
- Humanities: Process philosophy

Scope and depth, 1984 - 2006

# biography

1984 - 1994

Scientific simulation & visualisation, Stanford

1994 - 1997

Human-computer Systems, Stanford

Interaction and Media Group Faculty Seminar

1997 - 1998

Interval Research

1999 - 2001

Computer Science, Mathematics, History of Science, Stanford

Winograd, Mazzeo, Lenoir

Sponge Art Group, San Francisco / Berlin / Atlanta

2001 - 2004

Georgia Tech, LCC, Graphics, Visualization and Usability Center

2004 - 2005

Harvard

MIT

2005

Concordia

# Motivations

Strategy: Create works in public, cultural domain
Derive questions from these public projects
Develop conceptual approaches
Design & build laboratory
Create new works in public, cultural domain

Events in Public
(What do we need more art, objects for?)
What's an event: A game, theater, dance, festival...
athletic event, climbing a mountain, a dinner, speech, ...

# design spaces and **events** as architectural phenomenological experiments

arakawa and gins, ubiquitous site, nagi



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How can we build a world that's not complicated, but rich?



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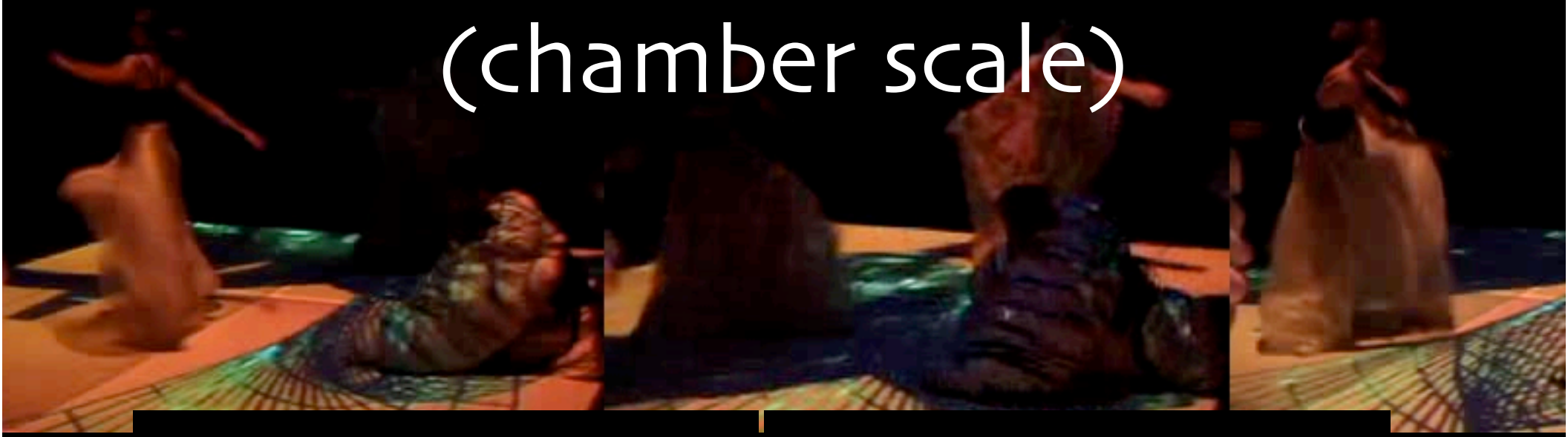
# events in responsive spaces (chamber scale)



*tgardens 2000-2001 sponge + foam*



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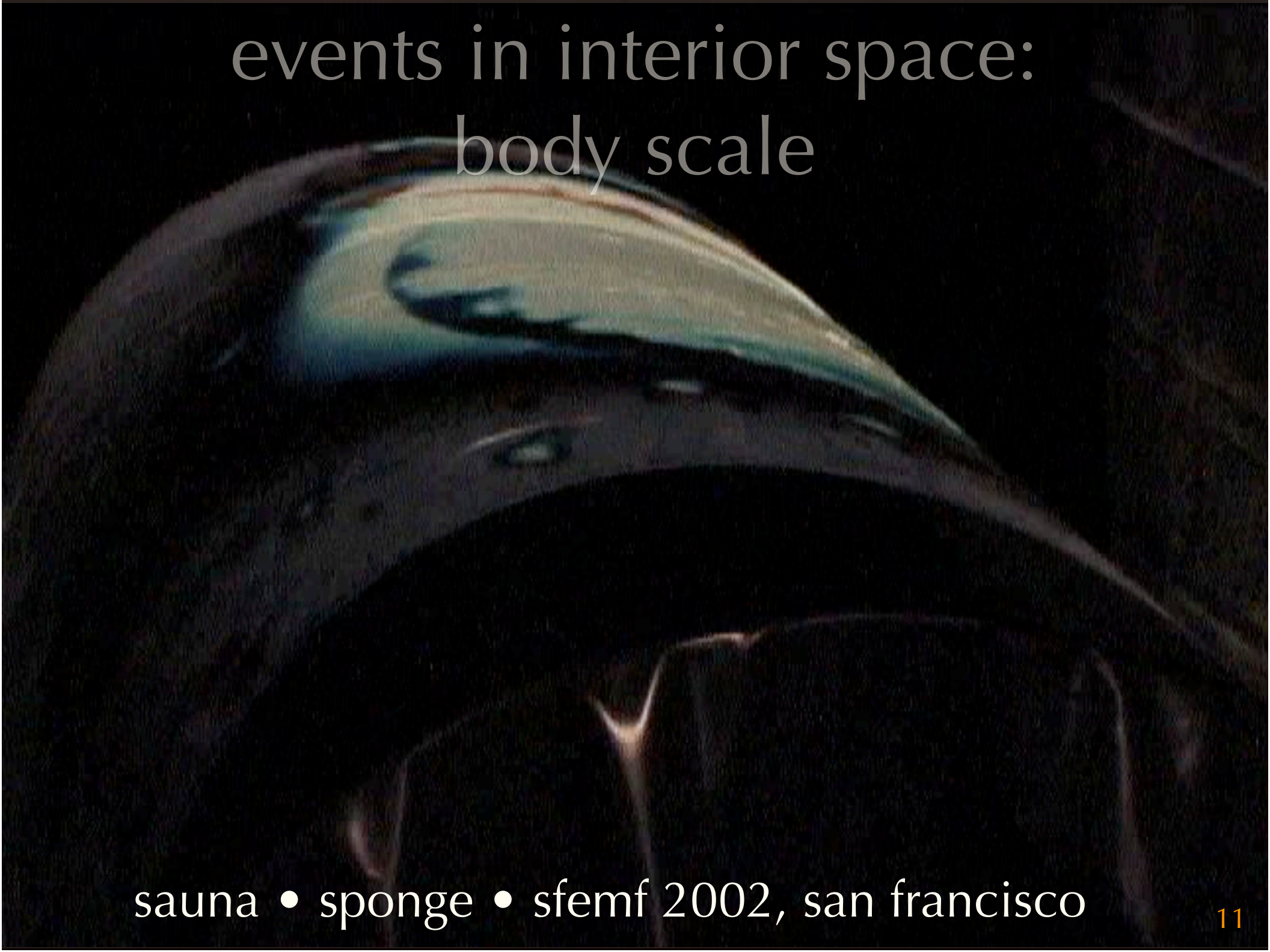
# events in responsive spaces (building scale)

# events in interior space: body scale



sauna • sponge • sfemf 2002, san francisco



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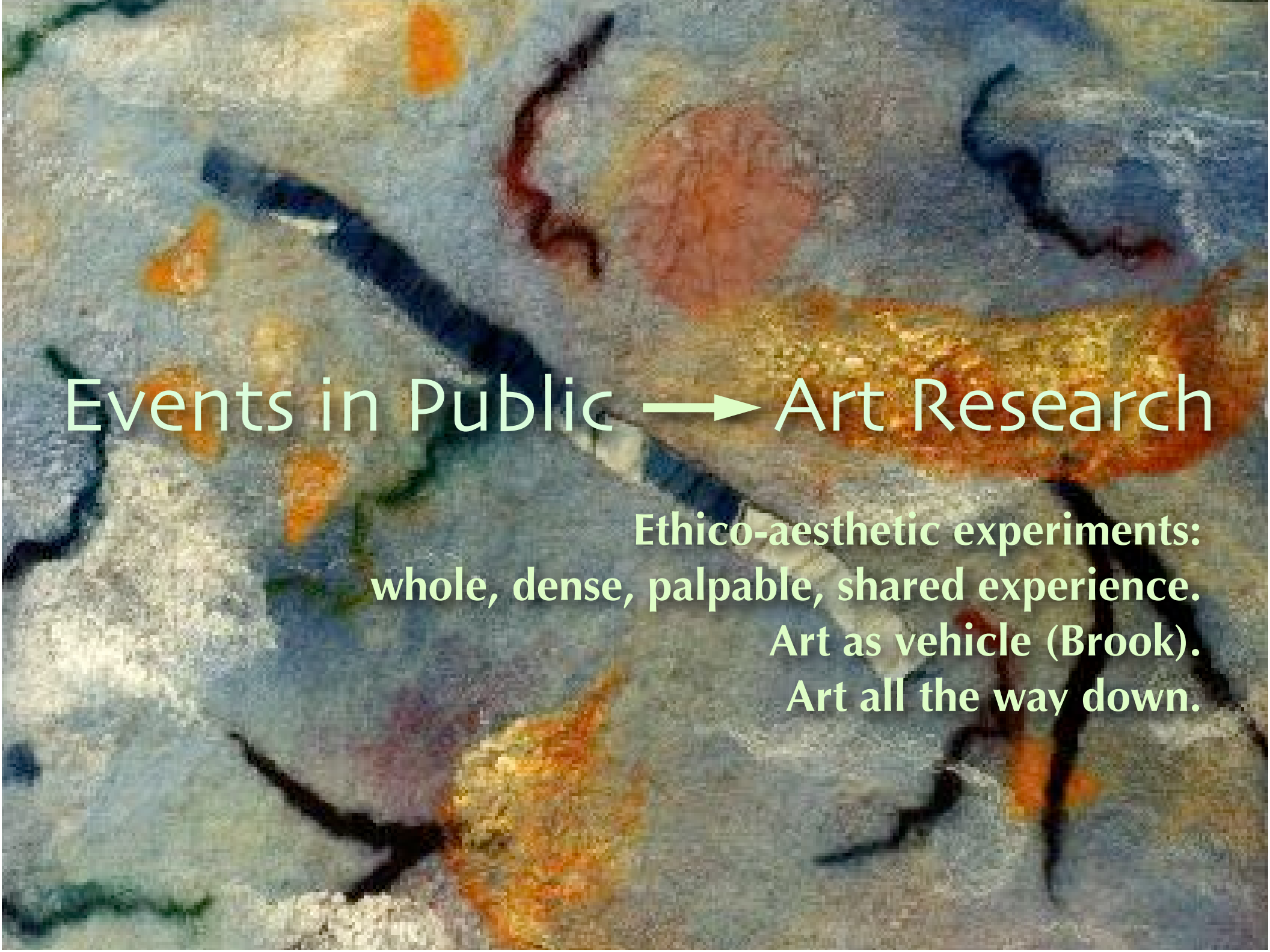
cybernetics (“why can’t we open the windows?”) vs  sponge sauna 2003 (open-loop air-conditioning)

**events in exterior space: the city**

public speech, speech as writing as speech


Events in Public → Art Research
Ethico-aesthetic experiments:
whole, dense, palpable, shared experience.
Art as vehicle (Brook).
Art all the way down.

# design spaces and **events** as architectural phenomenological experiments

arakawa and gins, ubiquitous site, nagi



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# Art Research: Ethics+Aesthetics

Design EVENTS (not objects)

sensitive to context, from intimate to urban scales of design.

Discover heuristics for techno-scientific research:

"We can make anything.  Why this, rather than that?"

Hence Critical Studies of Media Arts and Sciences.



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# What does an event do?

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# TML model

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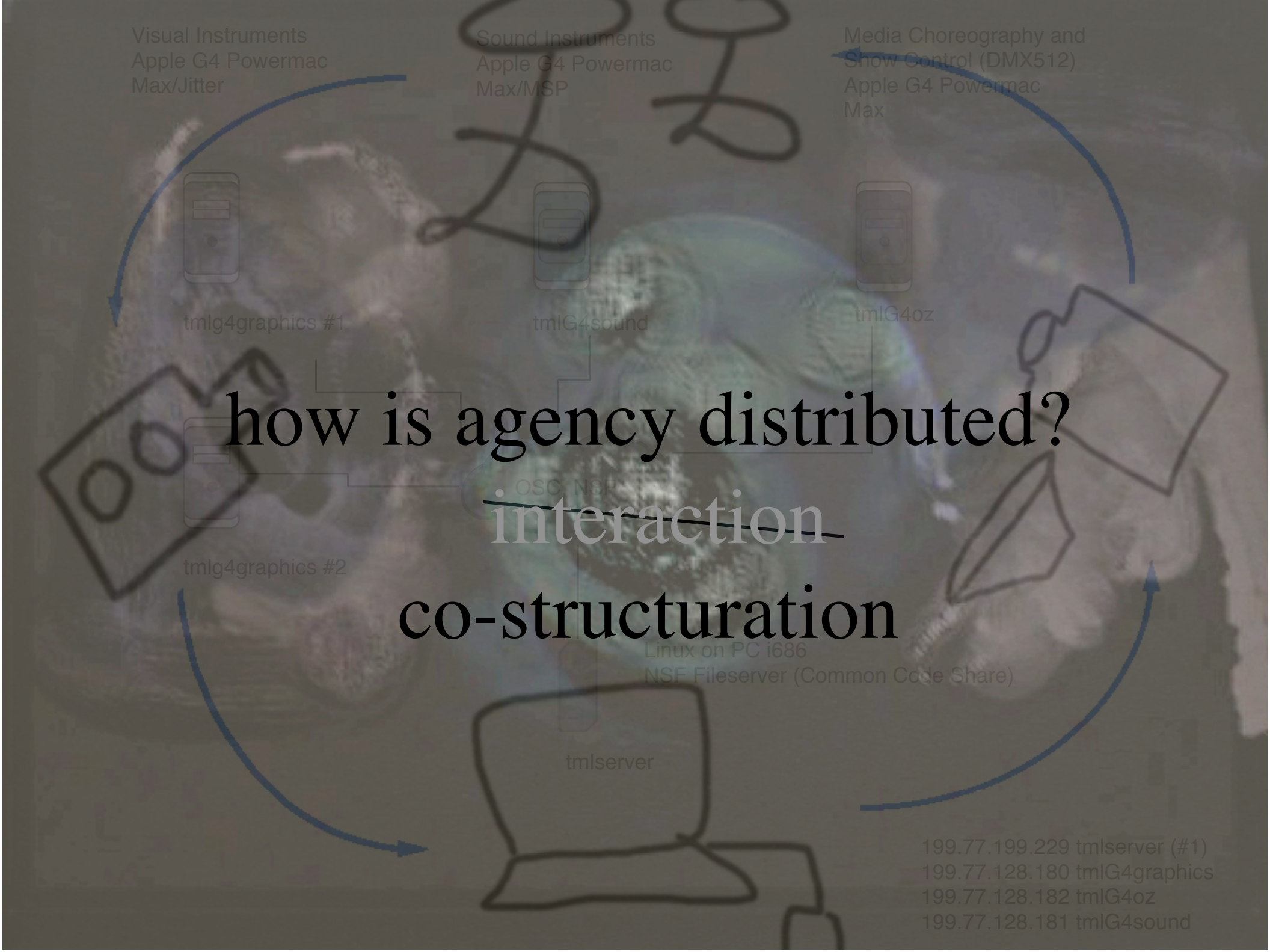
Research Program
distributed materiality, agency, gesture
responsive environments
gestural sound
calligraphic video
sensate/animate textiles
media choreography
movement arts and architecture

what makes something tangible?

# materiality

tg2001 sponge foam


Visual Instruments
Apple G4 Powermac
Max/Jitter
Sound Instruments
Apple G4 Powermac
Max/MSP
Media Choreography and
Show Control (DMX512)
Apple G4 Powermac
Max
tmlg4graphics #1
tmlG4sound
tmlG4oz
how is agency distributed?
~~interaction~~
co-structuration
tmlg4graphics #2
Linux on PC i686
NSF Fileserver (Common Code Share)
tmlserver
199.77.199.229 tmlserver (#1)
199.77.128.180 tmlG4graphics
199.77.128.182 tmlG4oz
199.77.128.181 tmlG4sound

# what (when) is a gesture?

Craig Dongoski, Atlanta 2004.

Satinder Gill, Cambridge, musicality and rhythm in collective gesture, 2005-2009.



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# intentional gesture

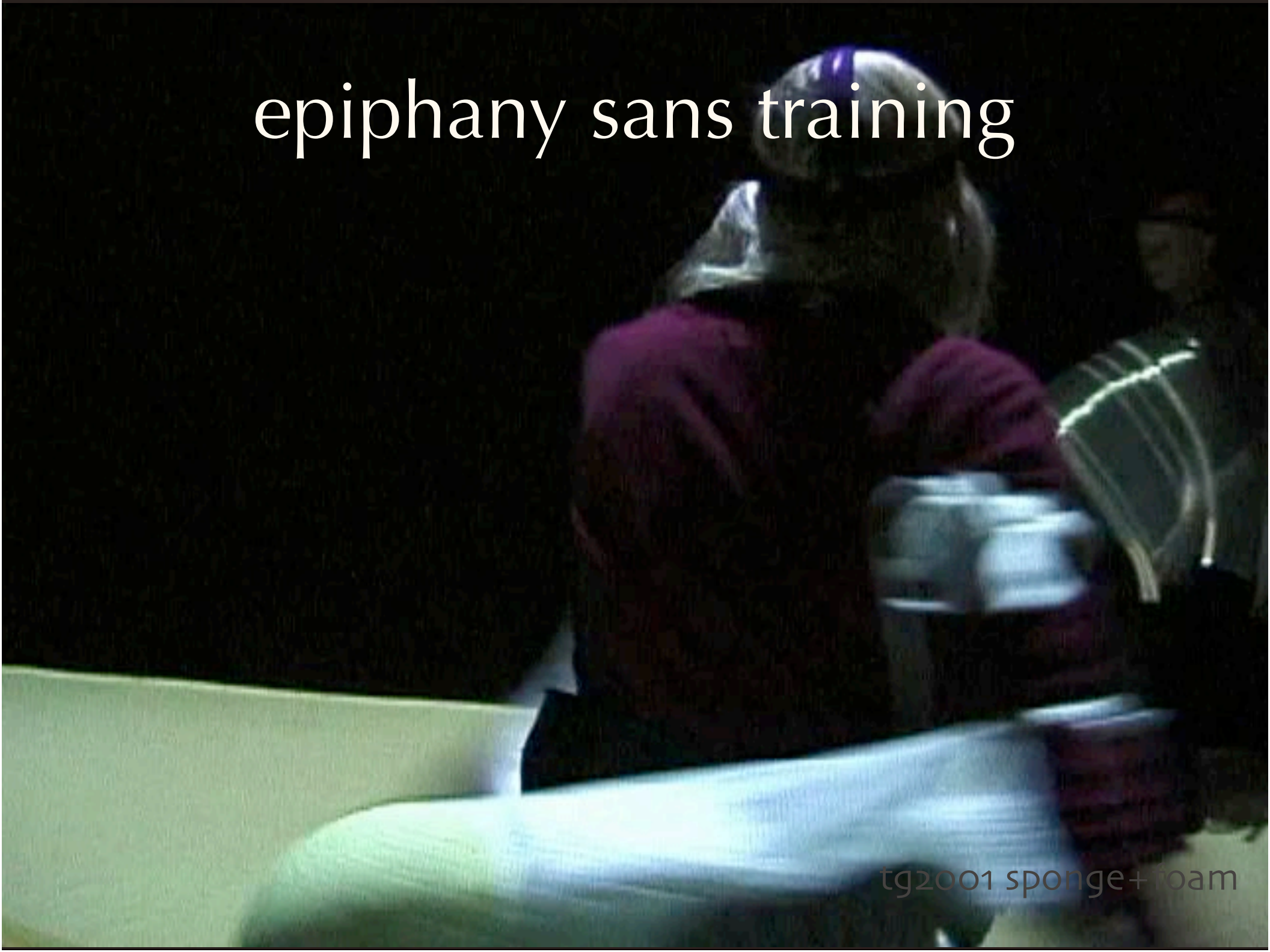
Search for correlates, not certificates, of intentional gestures.

Candidates:

- Periodicity (Auto-correlation)
- Synchrony (Correlation)
- Breaks from prediction (Kalman filter as discrepancy measure)

Continuous, real-time measures, range = [0,1] not {0,1}

# epiphany sans training



current research areas
7 PhD's
24 Masters and Undergrads
12 Affiliate Artists and Researchers

# calligraphic video

fire, smoke / Yoichiro Serita et al. TML 2003



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# Ising video operator

Yannick Assogba, 2006



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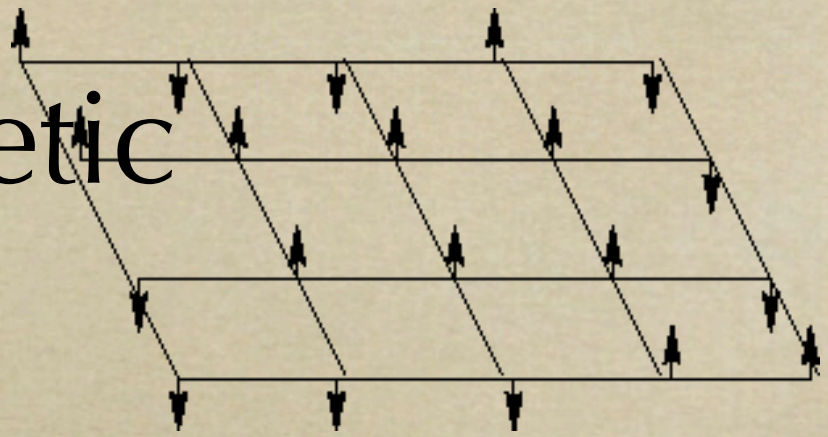
# Ising Model magnetic domains



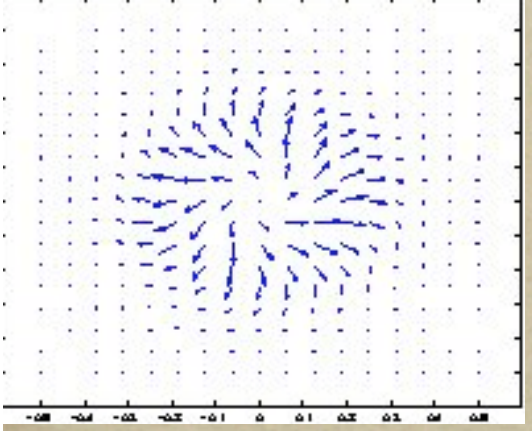
spin up or down of a magnetic domain

$$\sigma_i = \begin{cases} 1, & \text{“up”} \\ -1, & \text{“down”} \end{cases}$$

J > 0 encodes energy favoring aligned spins

H encodes external field on magnetic domain

$$E = -H \sum_i \sigma_i - \frac{J}{2} \sum_{(i,j)} \sigma_i \sigma_j$$



# Ginsburg-Landau spin glass

Generalization of Ising model from discrete range {0,1} to continuous range $S^1$

$$\iota u_t^\epsilon + \Delta u^\epsilon = \frac{1}{\epsilon^2}(|u^\epsilon|^2 - 1)u^\epsilon$$

in which vortices form as $\epsilon \to 0$.

lattice-field works gracefully with lots of people

Navier-Stokes & Wave  Blackbox Inaugural May 2006



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# Gestural sound & Wearable computing

# wysiwyg gestural sound

Blackbox test • November 2006

+ Marcelo Wanderley, McGill, IDMIL

F. Abtan, D. Birbaum, D. Gauthier, E. Singyor, D. van Nort, + E. Conrad, R. Koehly • November 2006



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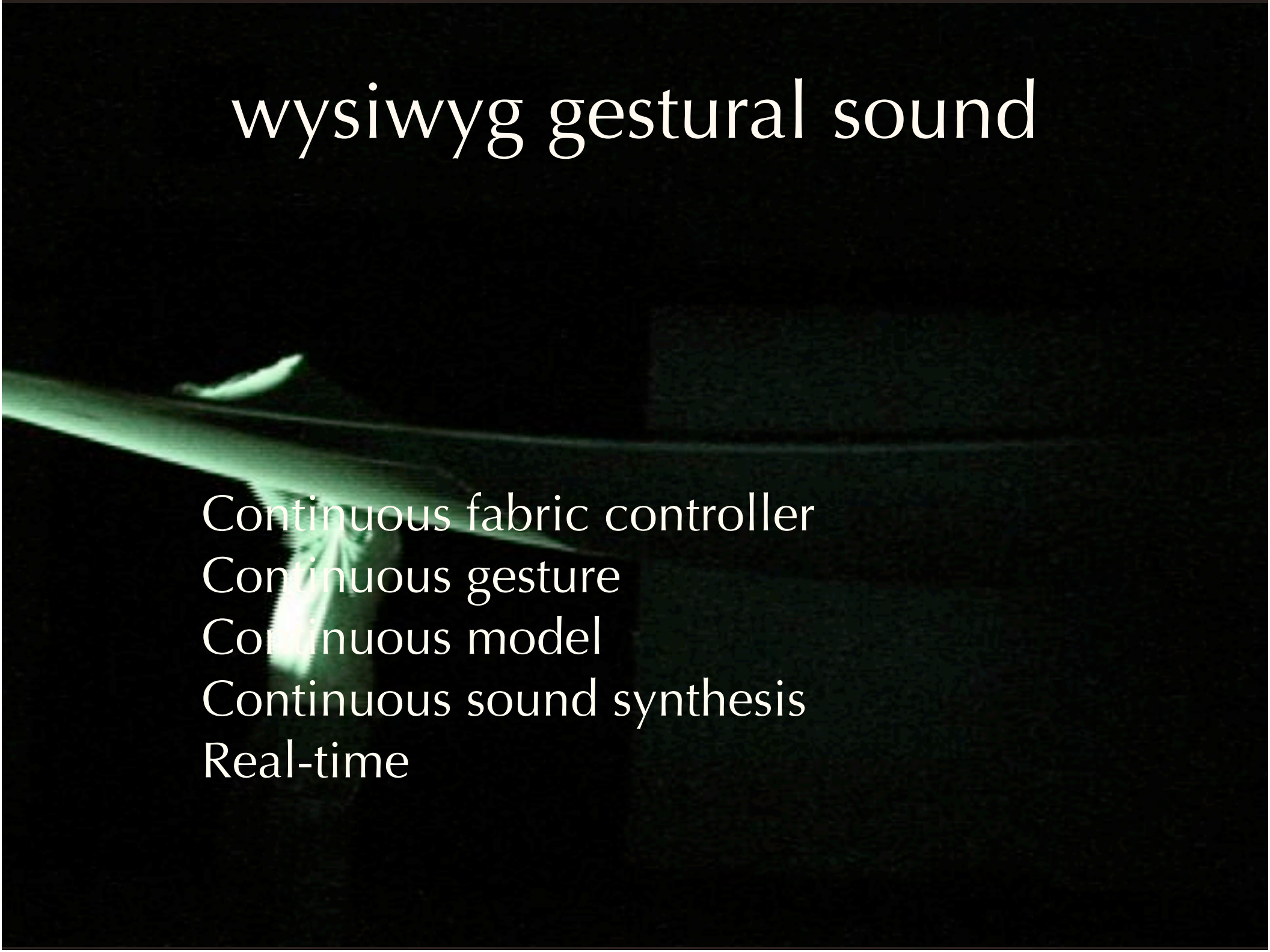
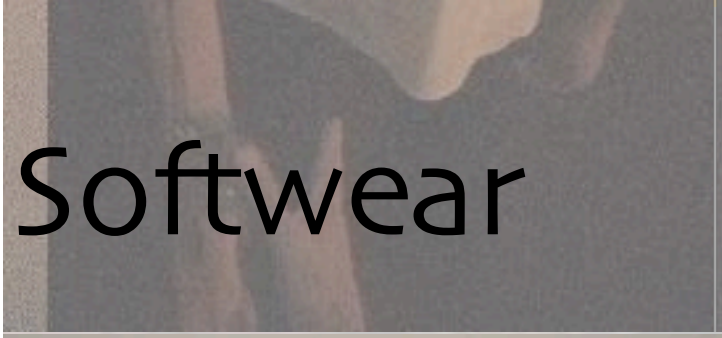
# wysiwyg gestural sound



Continuous fabric controller
Continuous gesture
Continuous model
Continuous sound synthesis
Real-time

# Softwear

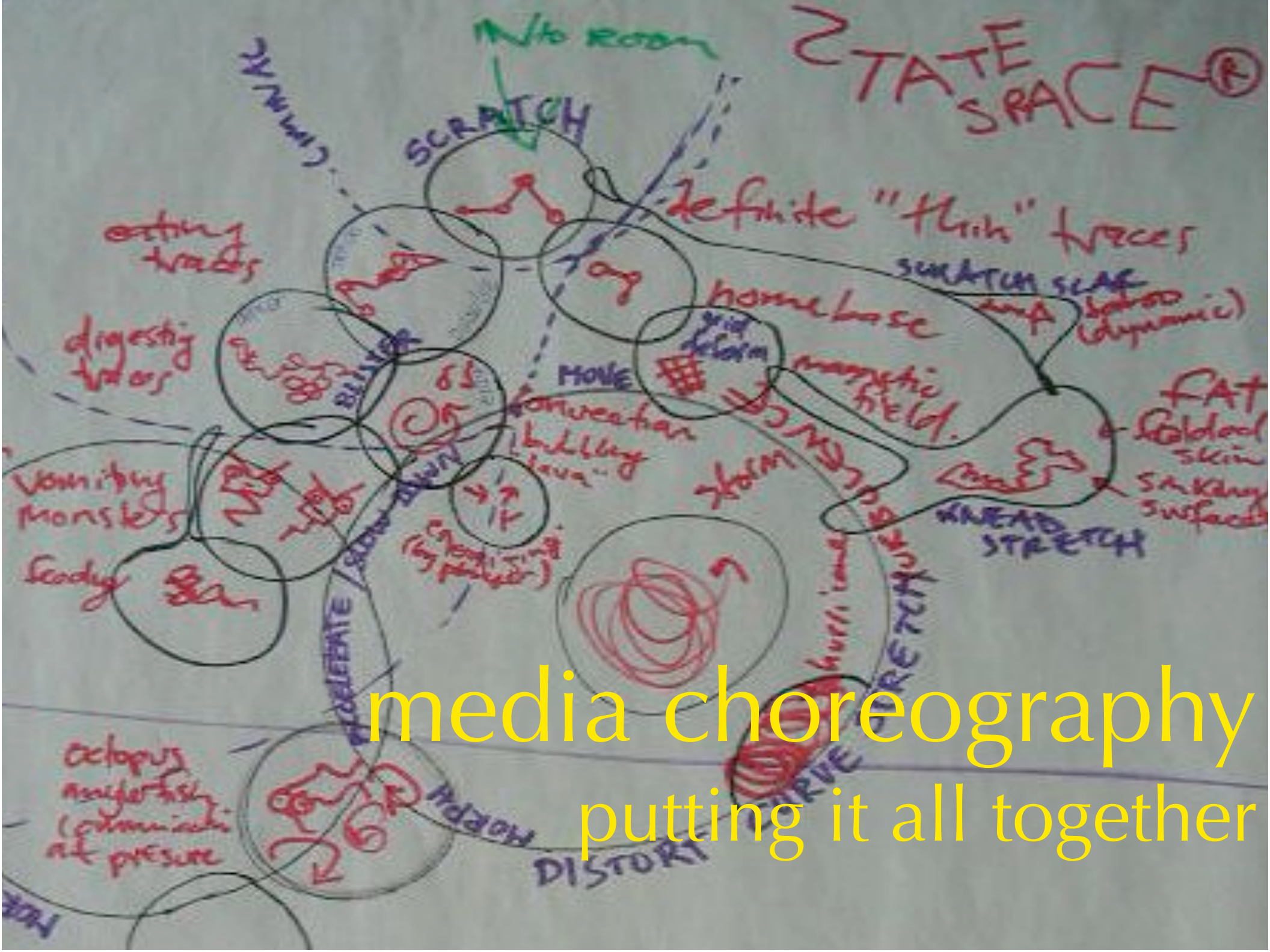


Hexagram Active Textiles and Wearable Computing Axis

Profs. J. Berzowska, B. Layne, I. Bachman (Fine Arts)

WYSIWYG 2006, Prof. M. Wanderley + 6 (Concordia-McGill)

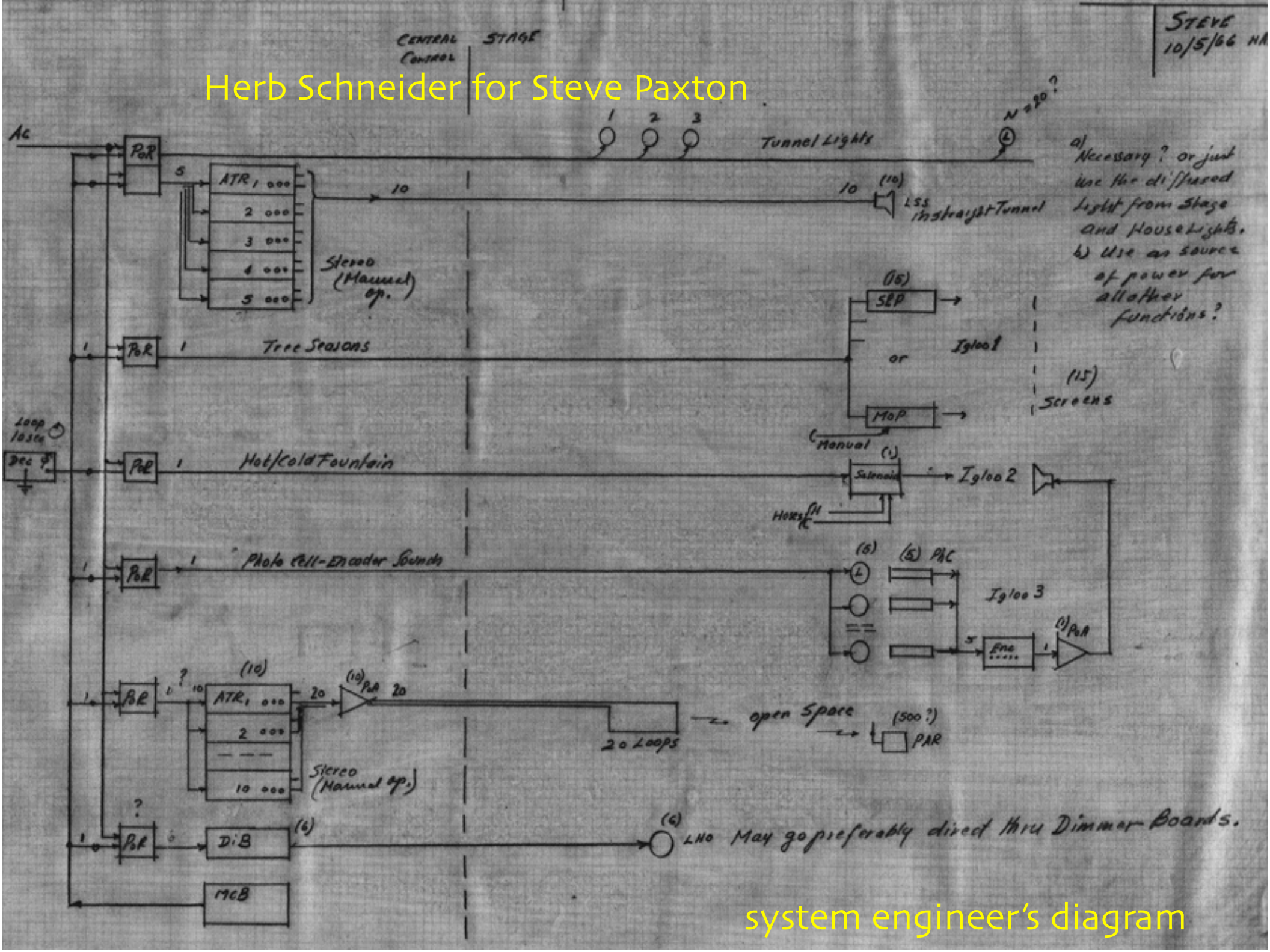
TML 2002-2004: J. Fantauzza, S. Park,Y. Caravia, S. Lee, G. Semeco,++




# media choreography

## putting it all together

# Herb Schneider for Steve Paxton




system engineer's diagram

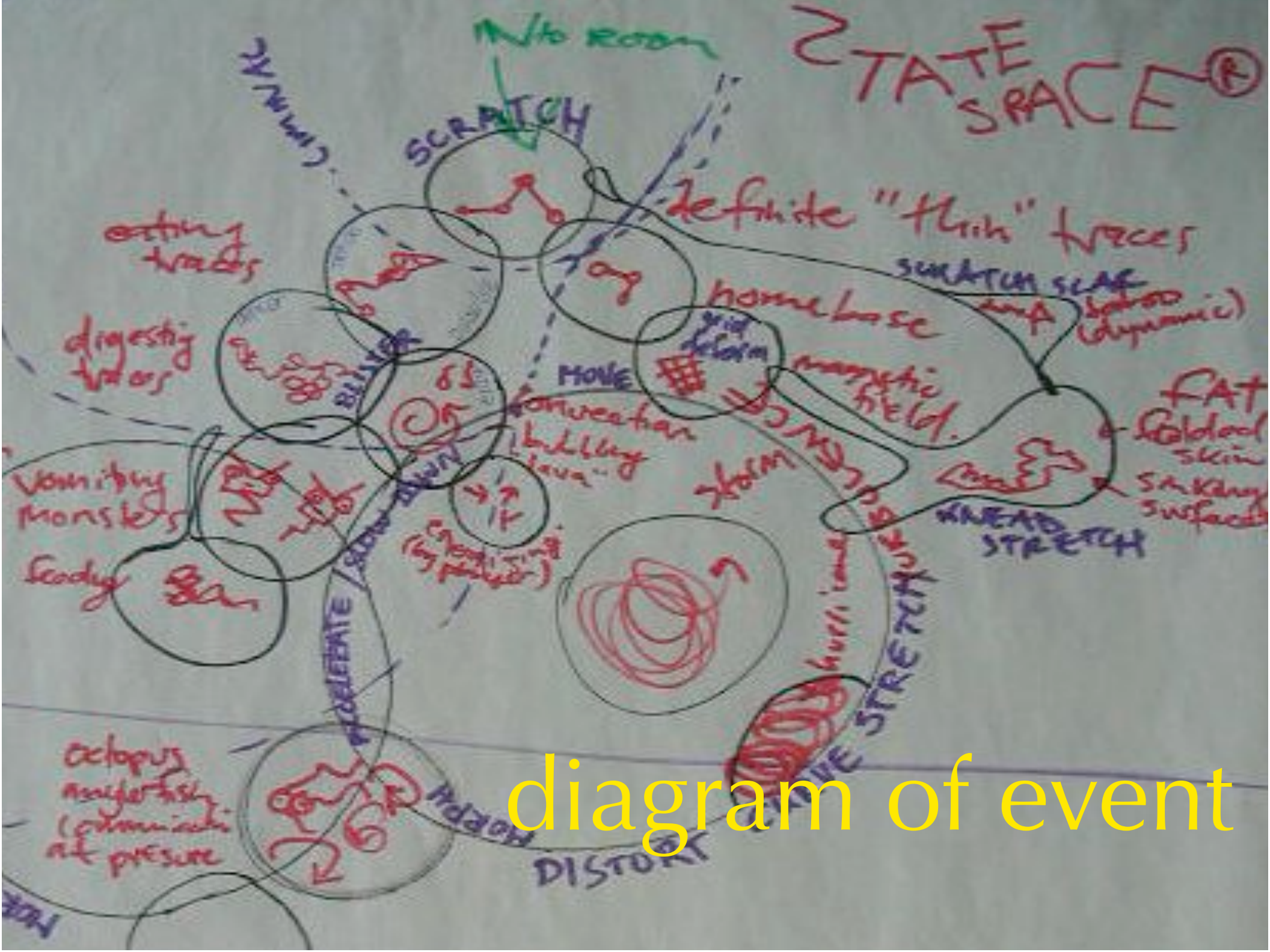



diagram of event

# e pur si muove

Continuous state evolution in four dimensions. Yon Visell (physics), Harry Smoak + Kevin Stamper (construction and physical computing), Chris Salter + Matthew Warne (sound instruments). TML 2004

# Thick/N media choreography

*phase change induced by speech and movement energy*
*Harry Smoak, Matthew Warne, Kevin Stamper  TML 2004*



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# event machine

TEEM like Oz 2001, Oxygen 2007, was built multiple aesthetic works, common system.  Differences: analog vs digital (memory), explicit software architecture for sensor analysis, rich textured video and sound,  and most importantly Oxygen's continuous dynamical system for evolving state.



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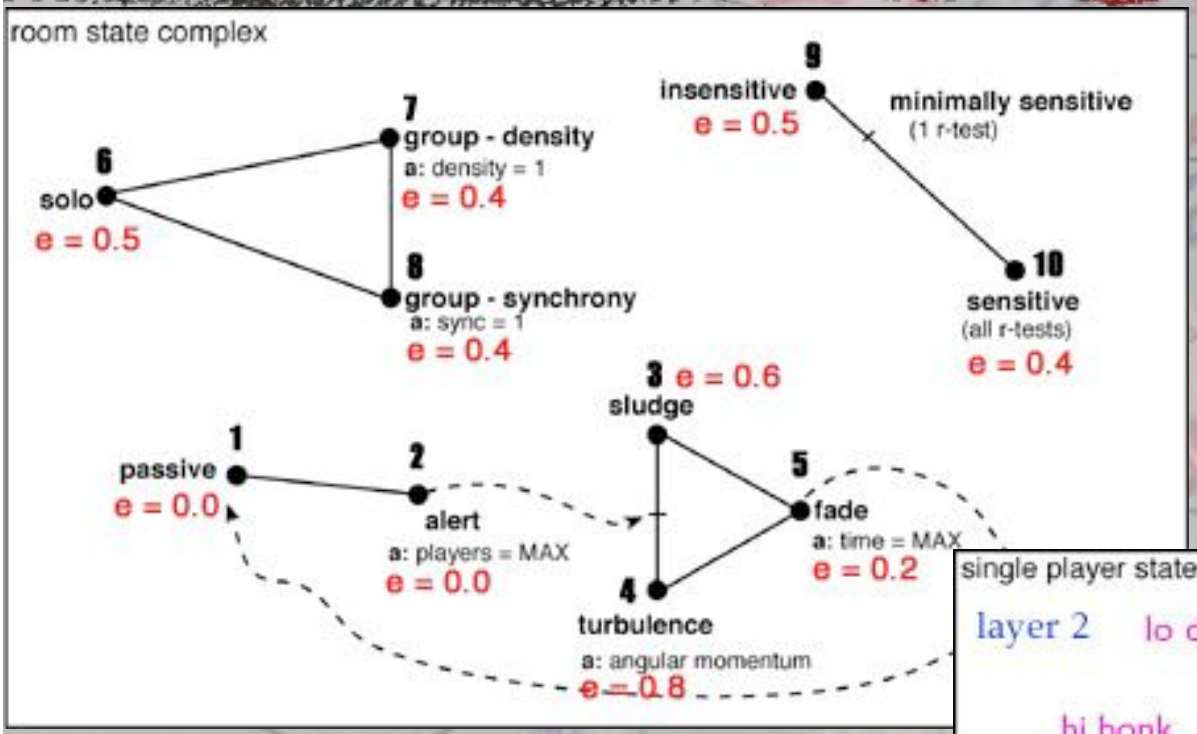
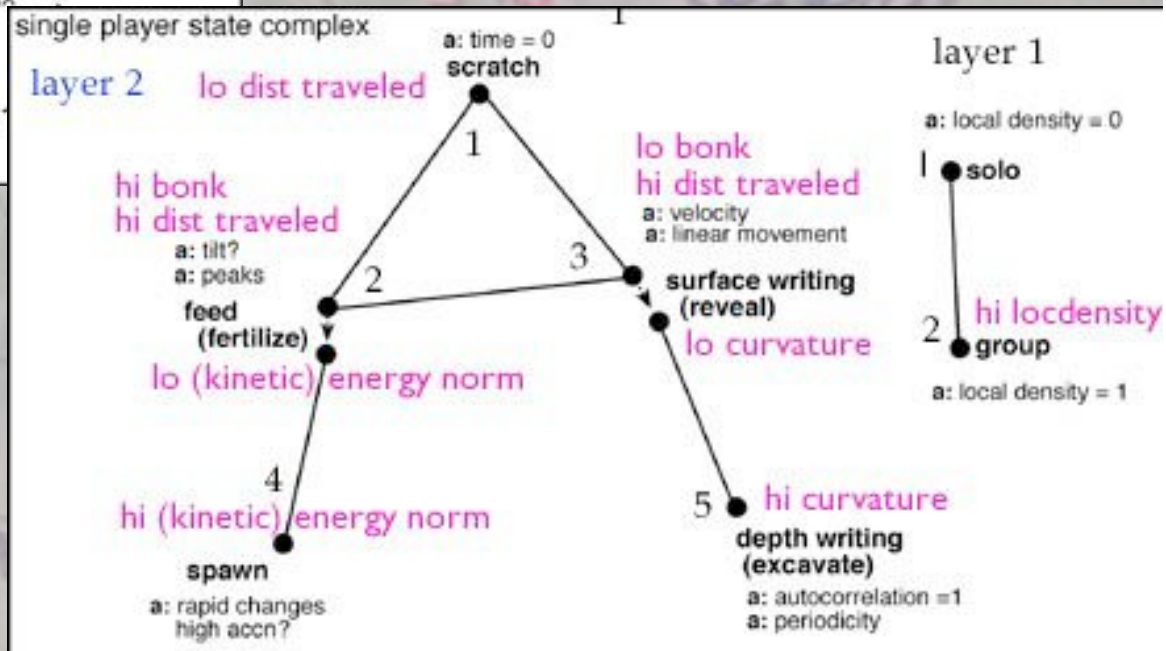
# media choreography




continuous state topologies for room and each person

metaphorical labels superposed states continuous evolution



# dynamics on manifolds

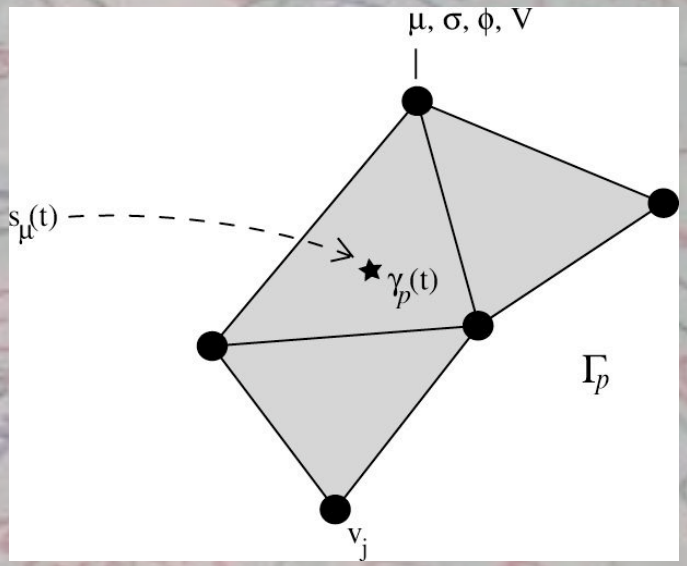
Total manifold = Metaphorical State x Observables

$$M = \prod_{p=0}^{N_p} M_p = \prod_{p=0}^{N_p} \Gamma_p \times S_p.$$

State is a convex combination of elementary states

$$\gamma_p(t) = \sum_{j=1}^{N} \lambda_j(t)\, v_j \qquad \sum_{j=1}^{N} \lambda_j(t) \equiv 1 \ .$$

# dynamical system on simplicial complex




Metaphor space: meaningful experience, manifold
State: (convex) combination of pure states
Potential energy U = E(sensor) + E(static)
Kinetics: F = -Grad[U] / mass

two areas of concentration:
Speculative Architecture / Poetic Built Space
and
Movement Art Research

# poetic architecture

Numinal

Flower Lunn

custom felts, proximity sensing

May 2006



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# speculative architecture

Troglodyte

Erik Conrad, Justyna Latek, Josée-Anne Drolet

Space thickened by brilliance. Continuously deformed gaze

May 2006



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# vivesection architecture

Workshop on pneumatic structures & hacked toys

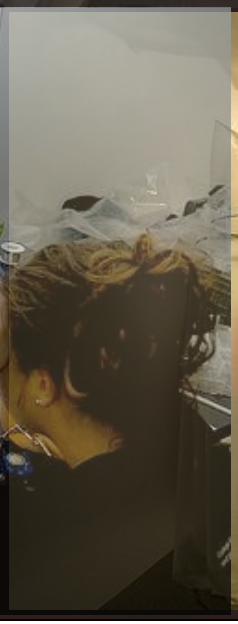
October 2006

Patrick Harrop

Prof. Architecture, U Manitoba

Ted Krueger

Assoc. Dean, Architecture, Rensselaer Polytechnic Institute



# contrapuntal buildings

## Blink!

Maroussia Levesque, Sebastien Speier,

Harry Smoak, Erik Conrad

May 2006



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soft architecture + autopoiesis
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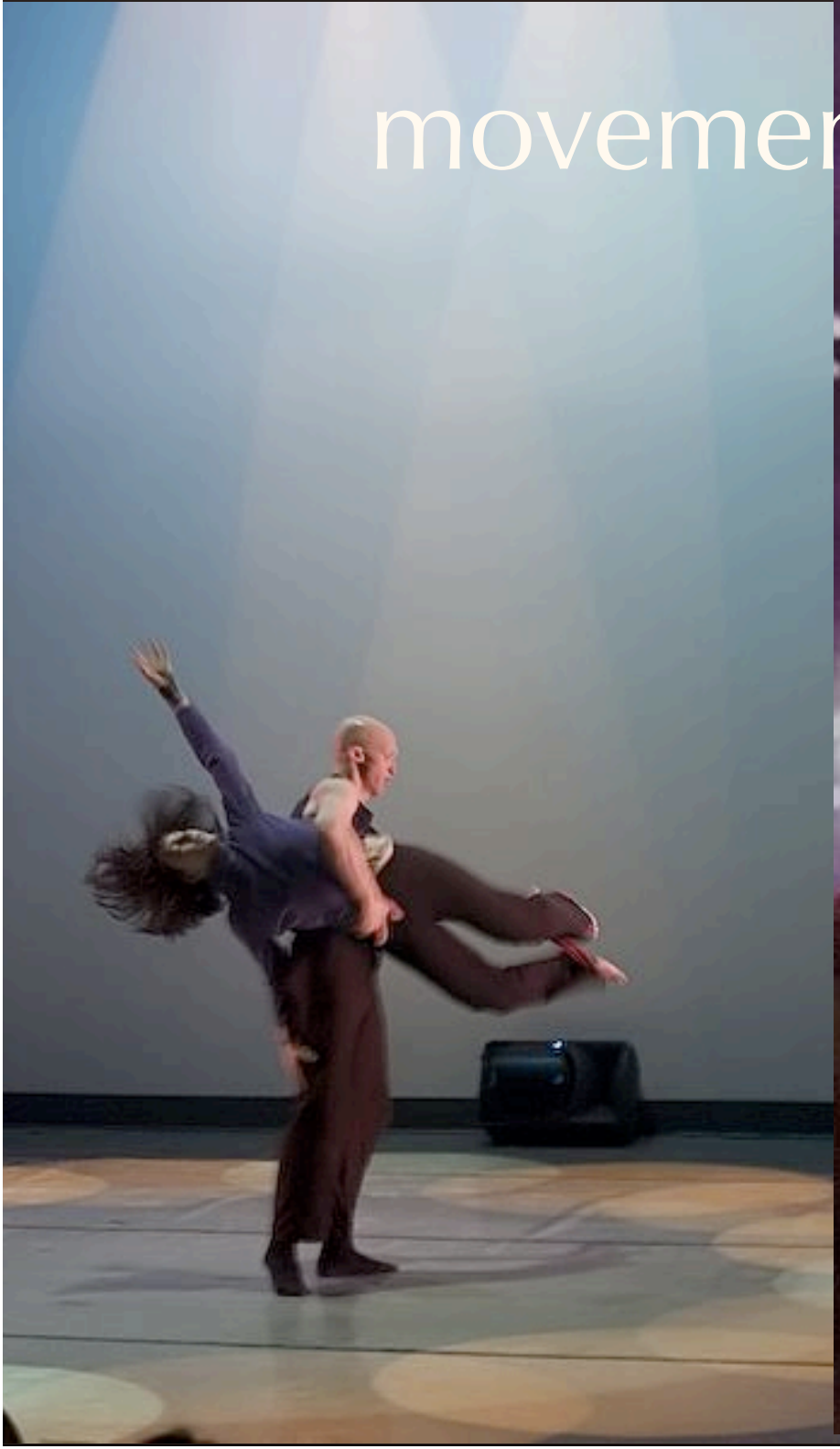
# movement research



# ARTAUDIAN lighting

camera-based tracking
mapping movement to
theatrical, structured
light

theatrical light

real-time, responsive projected lightfields
M. Montanaro, H. Smoak, et al. Nov. 2006



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# Meteor Shower

Jean-Sebastien Rousseau, Tim Sutton, Emmanuel Thivierge, + TML



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public installation-events
55

# back to performance

Wet Petal, finale movement
Nov 2006, with Livia Daza-Paris

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Visible Silence, Livia Daza-Paris Choreographer, 2006
Work sensitive to human, social-political concerns

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# puppet theater

Mark Sussman, Great Small Works
animated objects, folk forms
February 2007



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# Dance Moves: Virtual Puppetry

with Bob Krupinsky, Ex Centris, HEXAGRAM

Using game controllers to articulate bodies in VR worlds (e.g. Sony Home, Second Life)

New genres of multi-player movement games.

Work with high profile choreographers, and artists. Local virtuosi.



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Cosmicomics
Elektra July 2007
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# Ouija: entrainment

Ouija Experiment on Collective Gesture in Responsive Media Spaces, June-July 2007



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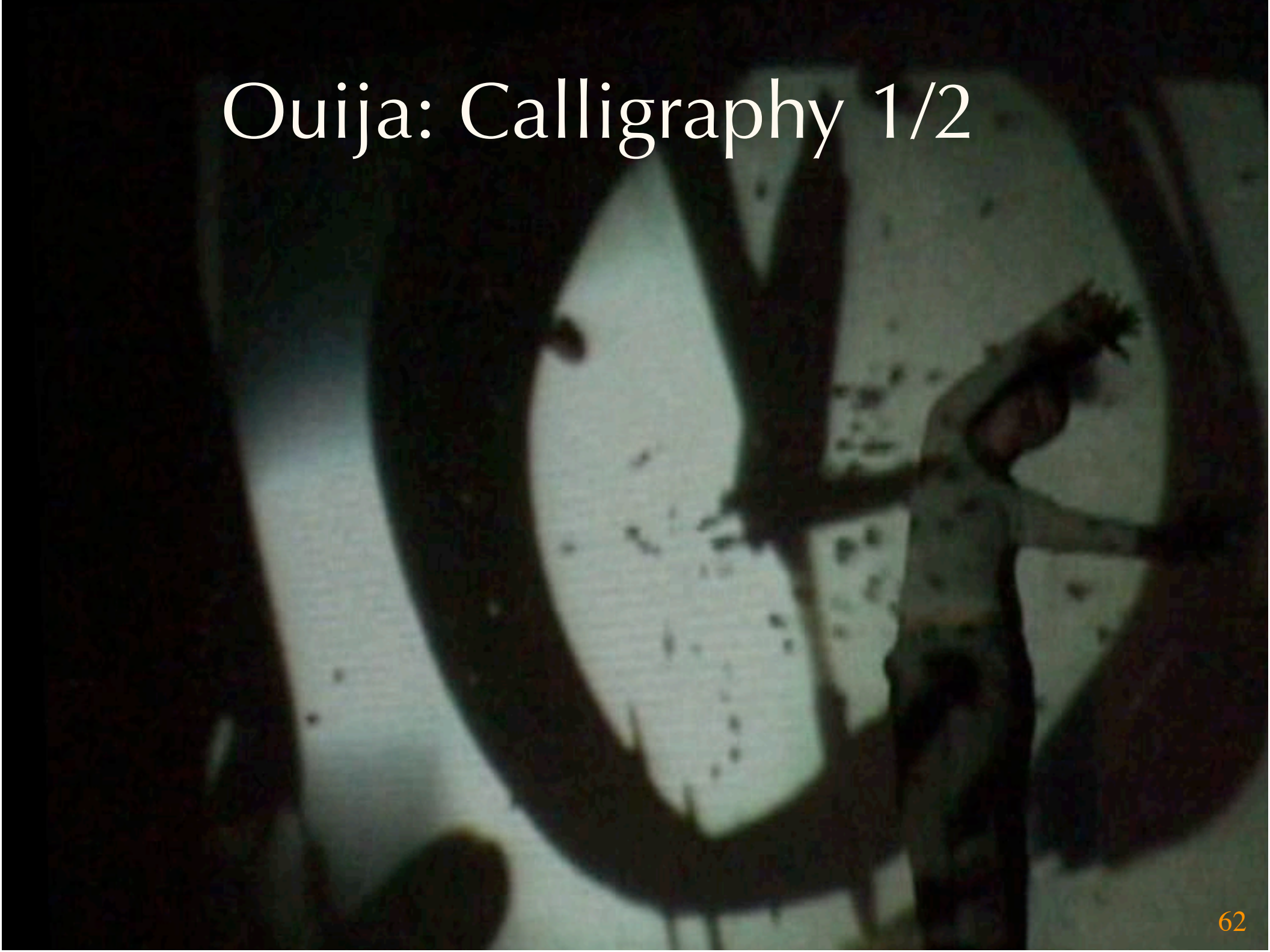
# Ouija: Calligraphy 1/2





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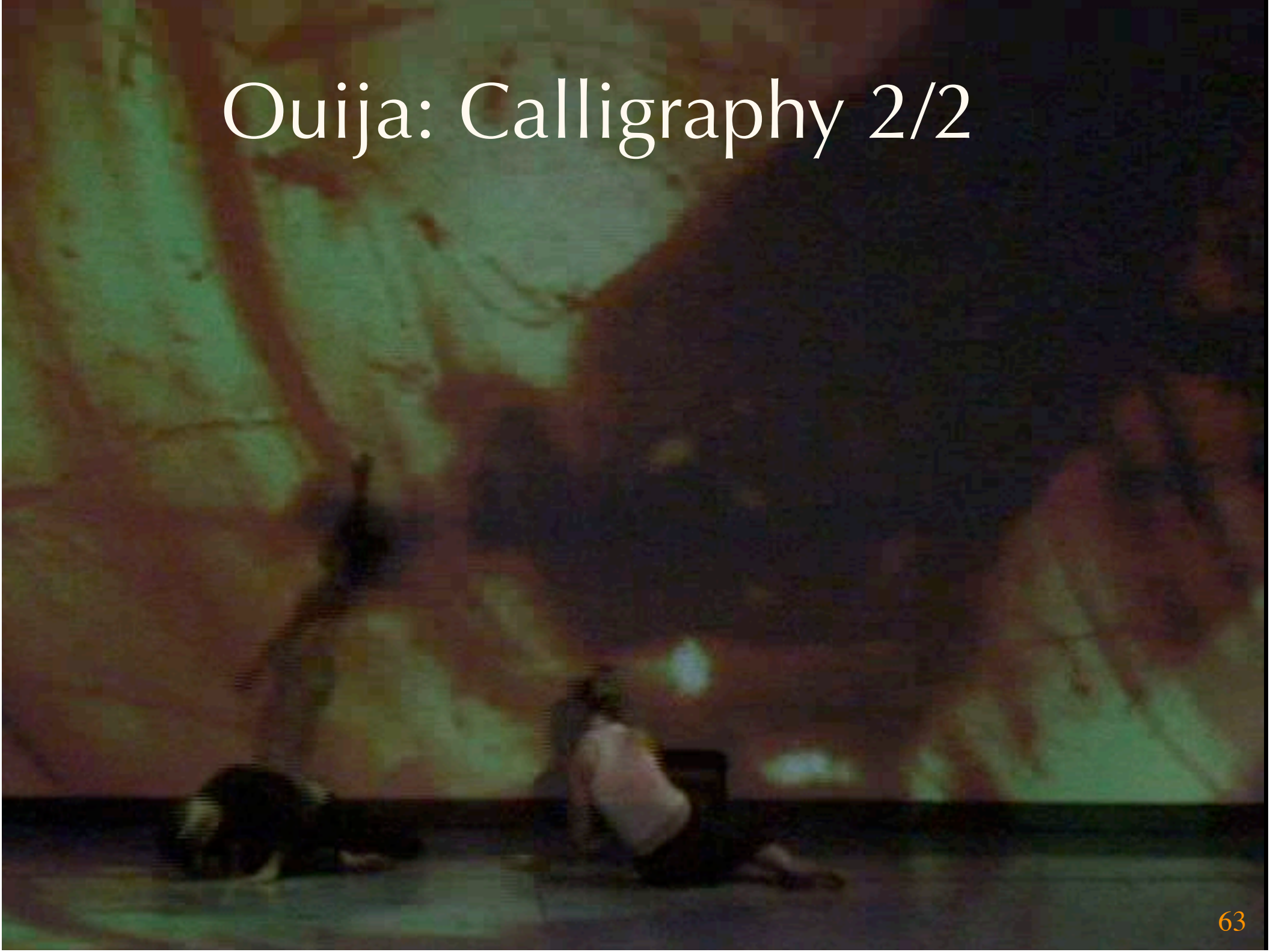
# Ouija: Calligraphy 2/2





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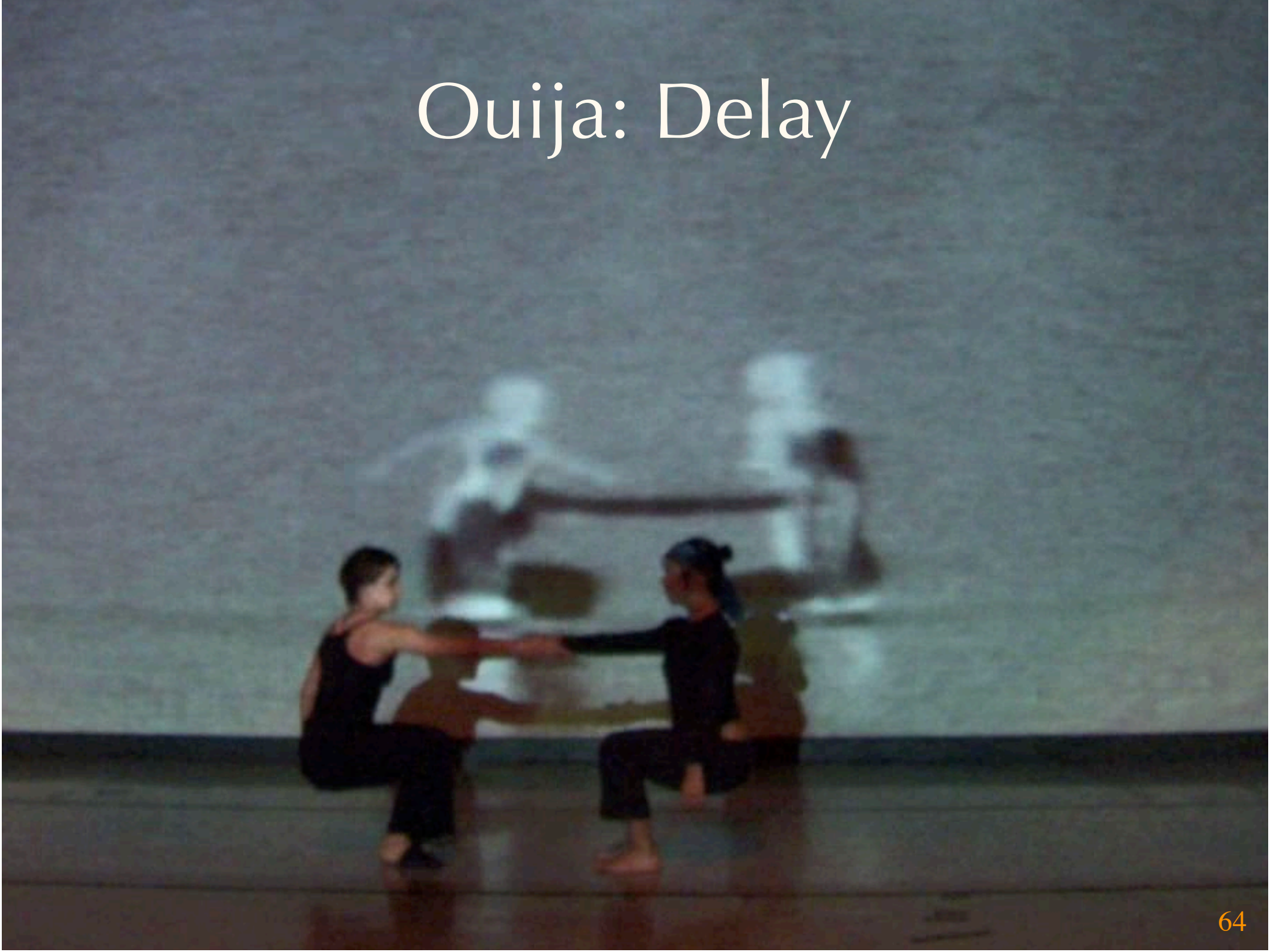
# Ouija: Delay





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Παντα το πυρ επελθον κρινεει και καταλεπσεται.

*Fire is the ravisher of all things. Heraclitus*

# working ethos



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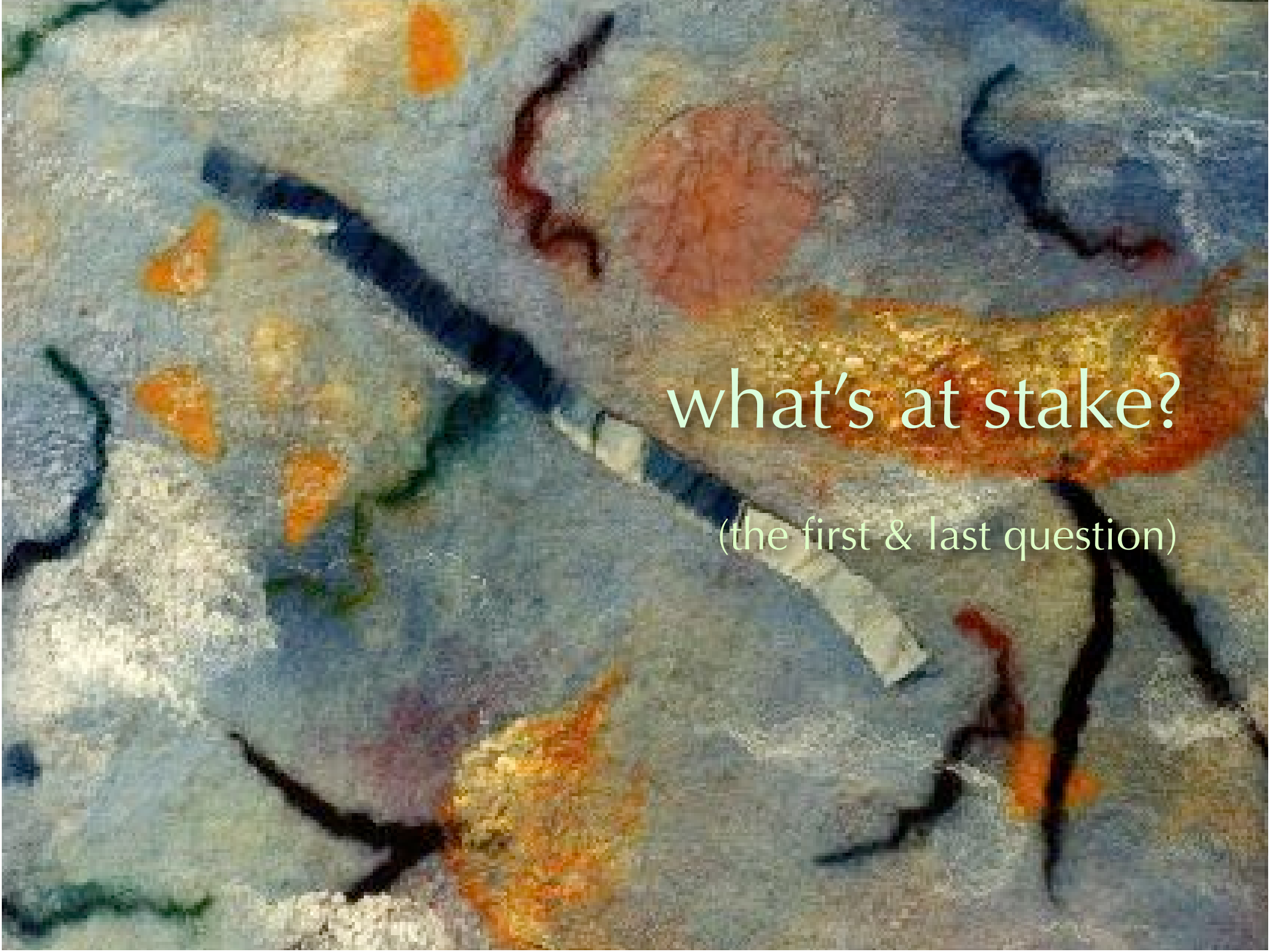

what's at stake?
(the first & last question)

# what's at stake?

Ethico-aesthetic Play

Event

Gesture

Tissue and Molecular Politics

# art all the way down:
# opening blackboxed concepts

"interaction" "program"

"information" "bit" "sensor" "cpu"

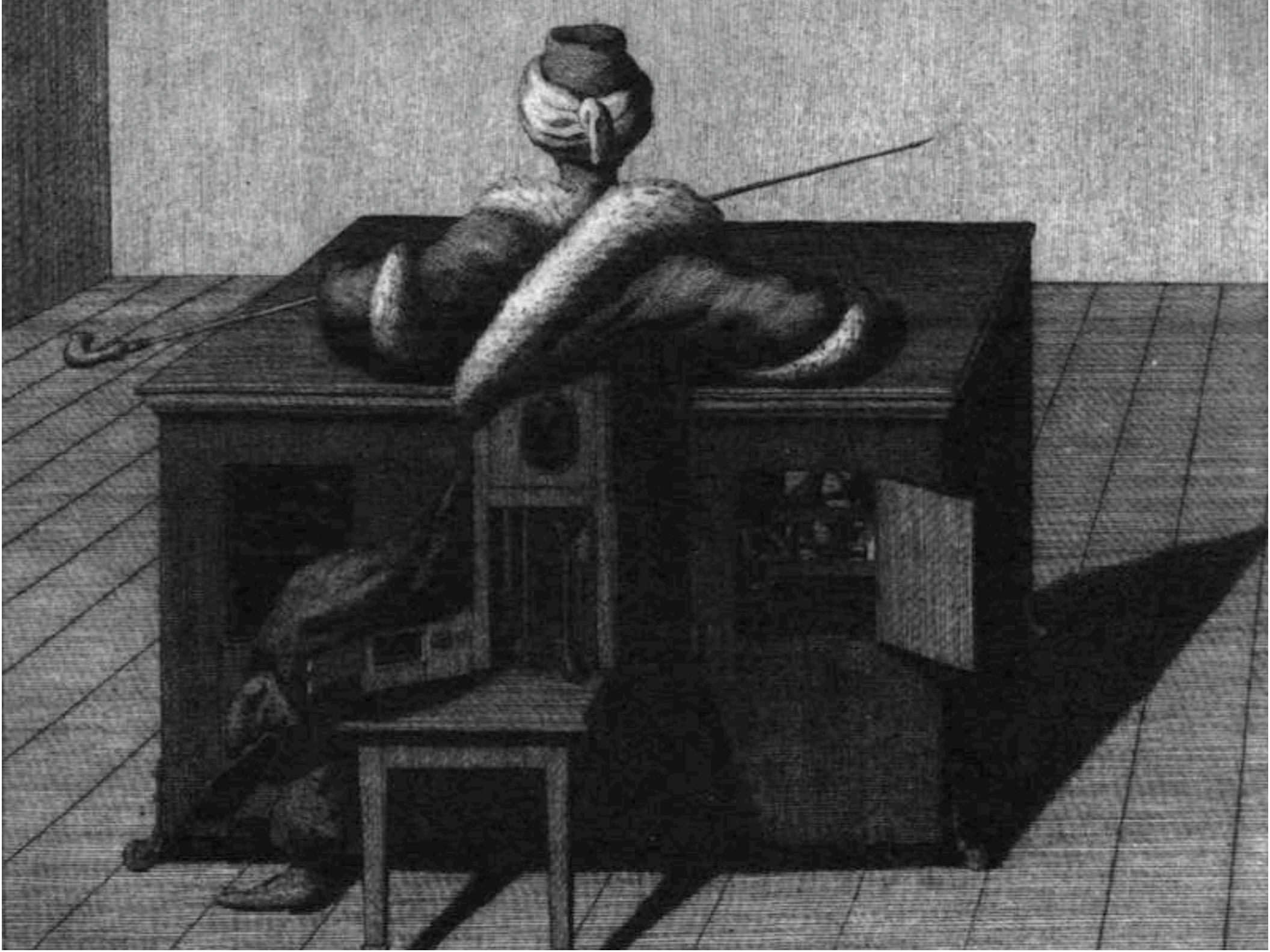
"linguistics" "market" "design" "industry"

"body" "ego" "citizen"

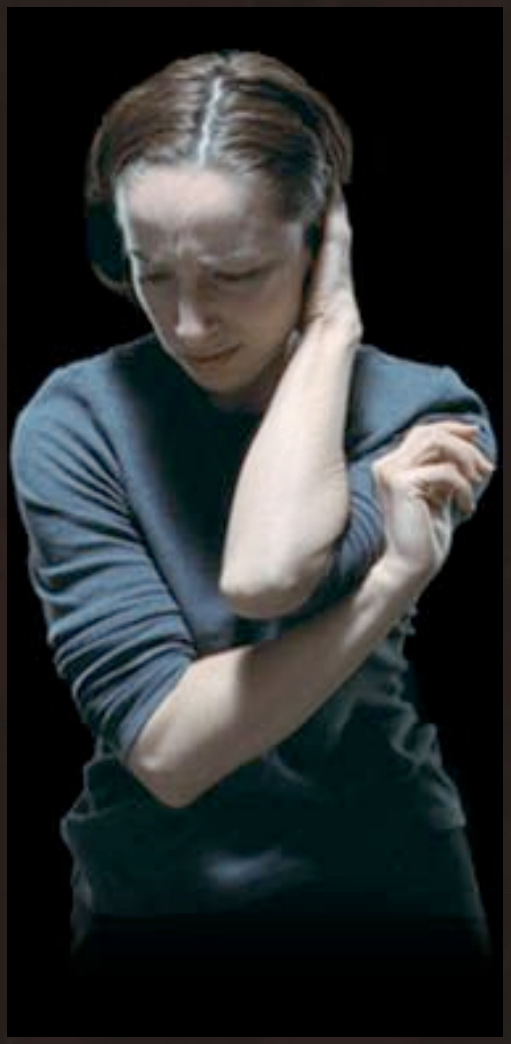
"machine" "human"

...

Eden Musée.
SEANCES
Extraordinary & Mysterious.
"AJEEB,"
THE FAMOUS AUTOMATON.
ITS MOVEMENTS ARE SO LIFE-LIKE, THAT IT IS DIFFICULT TO BELIEVE THAT IT IS NOT ENDOWED WITH LIFE.
THE GREATEST WONDER
VISITORS TO THE
EDEN MUSÉE
"AJEEB,"
On the Gallery of the Winter Garden.



# Bill Viola, The Passions



To whom do you owe allegiance: Homo Sapiens Rex, or ...



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to whom do you owe allegiance?
Homo Sapiens Rex
or...



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# the world ?

The force that through the green fuse drives the flower
Drives my green age; that blasts the roots of trees
Is my destroyer.
And I am dumb to tell the crooked rose
My youth is bent by the same wintry fever.

The force that drives the water through the rocks
Drives my red blood; that dries the mouthing streams
Turns mine to wax.
And I am dumb to mouth unto my veins
How at the mountain spring the same mouth sucks.

The hand that whirls the water in the pool
Stirs the quicksand; that ropes the blowing wind
Hauls my shroud sail.
And I am dumb to tell the hanging man
How of my clay is made the hangman's lime....

Dylan Thomas



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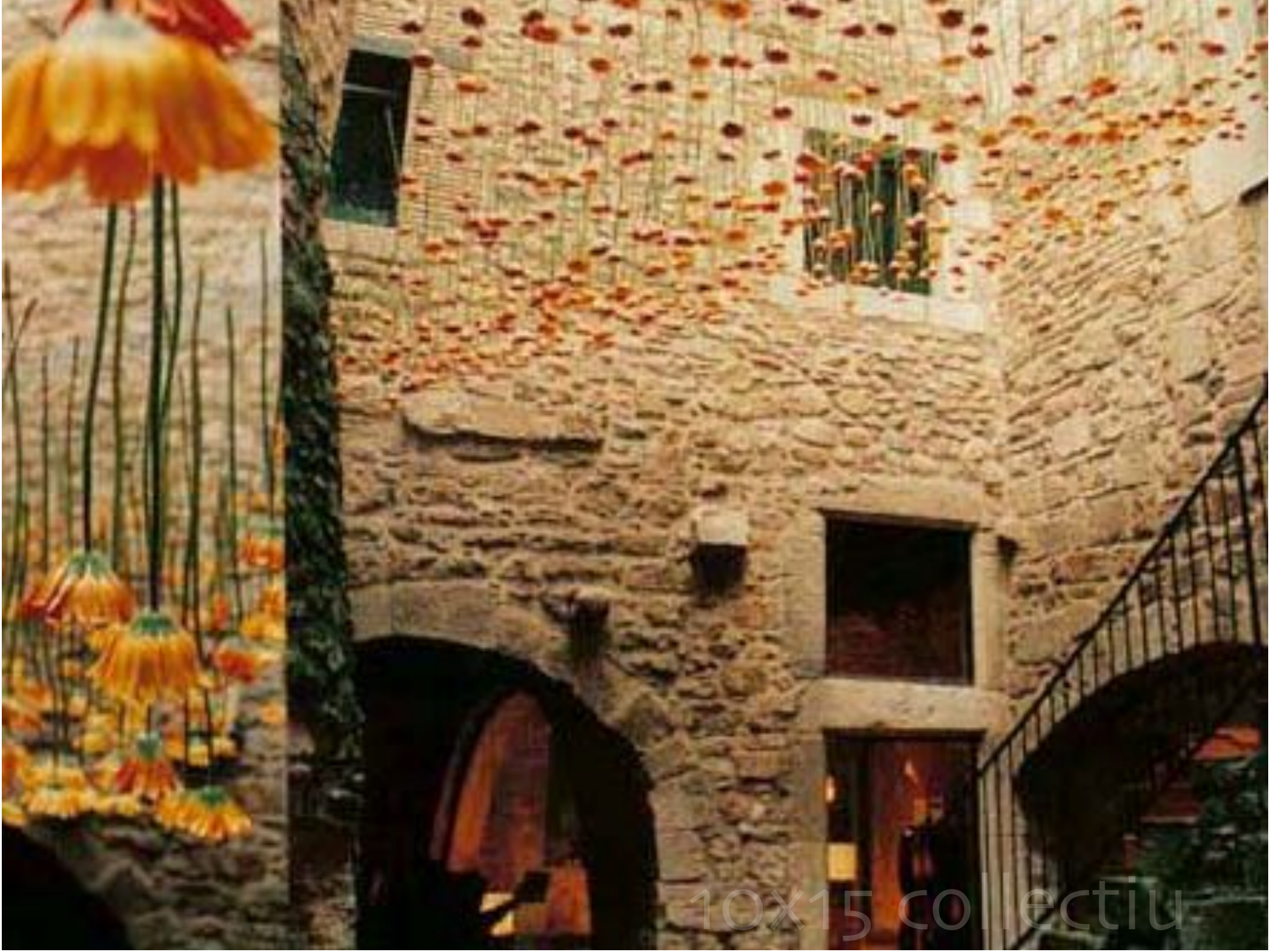
10x15 collectiu

Παντα το πυρ επελθον κρινεει και καταλεπσεται.

*Fire is the ravisher of all things. Heraclitus*

TML @
Concordia.Montreal.Quebec.Canada
SUPPORTING FOUNDATIONS & CORPORATIONS
AFFILIATE STUDENTS, ARTISTS & RESEARCHERS

# foundation support ...

Canada Research Chairs
Canada Fund for Innovation (CFI): Topological Media Lab
Rockefeller Foundation: Boundary Crossings
Langlois Foundation:  Wearable Sound Instruments
Hexagram: WYSIWYG Gestural Sound
FQRNT: Team Grant for SRE Research (Media Choreography)
FQRSC: "Il Y A" Calligraphic Video



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# foundation support

Creative Work Fund: Sauna
Rockefeller Foundation: TGarden; Boundary Crossings
Langlois Foundation: TGarden
LEF ++ TGarden

$1,350,318 since June 2005



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# pending

SSHRC, Soft Architecture (creation / research)

SSHRC, Poiesis in Topological Matter (theoretical)

Hexagram, Nataraja: Continuous Dynamics Media Choreography

Shastri, Bringing Knowledge To Life

Pending: $600,000



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# industrial support

Sony: researcher (2 years)

Intel Research: motes

Intel: wearable computing fund

IBM: deep computing consultation

Apple: equipment subsidy

Solotech: technical consultation



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# industrial contacts

IDEO Design

Gensler Associates

Steelcase design research

IBM research

Sony

+...



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# research advisory network

**Stanford University**: Winograd (CS), Mazzeo (Mathematics)

**Duke University**: Lenoir (History of Science)

**Harvard University**: Biagioli (History of Science)

**University of California Irvine**: Philip (Women's Studies, Post-colonial Studies)

**Georgia Institute of Technology**: MacIntyre, Essa, Bobick, Mynatt (CS); Crawford (Literature and Theory)

**University of Paris 1 and 8**: Formis (Philosophy & Art), Abrioux (Art)

**Cambridge University**: Gill (Psychology & Linguistics)



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