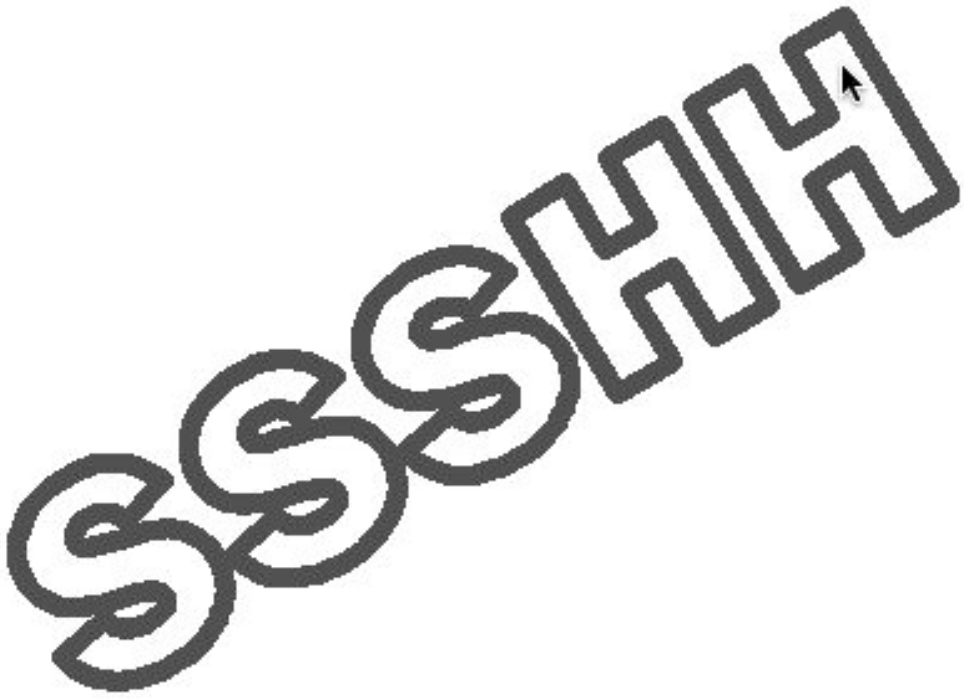


virtual sand programmed with processing 91

sand of changes: granular zen

kitp, granular physics conference, june 22 05

jean-pierre hébert

with david bothman, victor dinovi, iannis zannos

vietnam

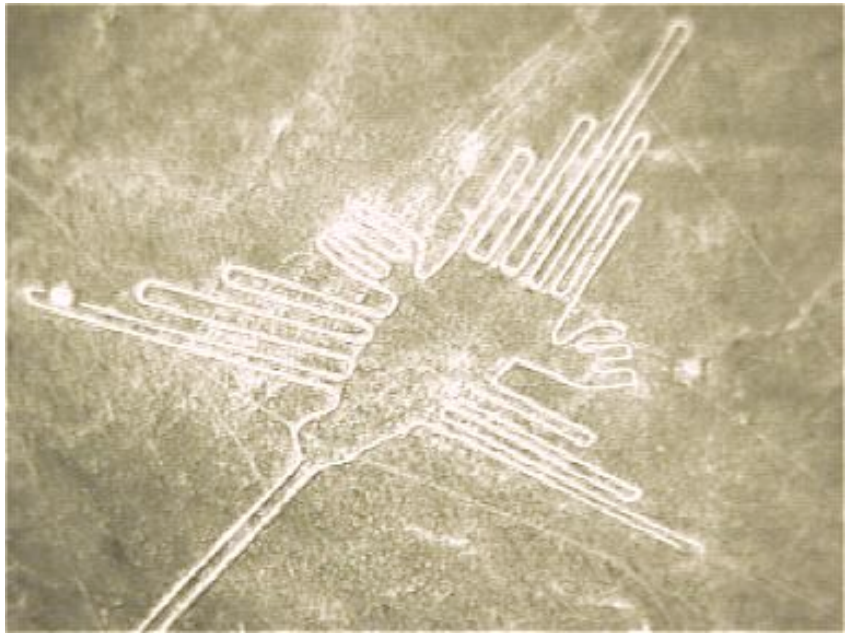
hawaï

white sands

sahara

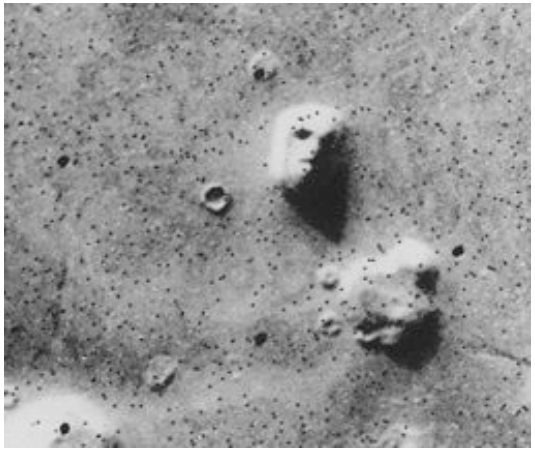
gobi

arizona

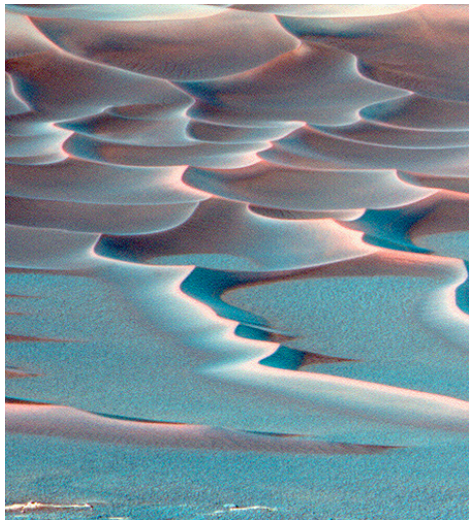


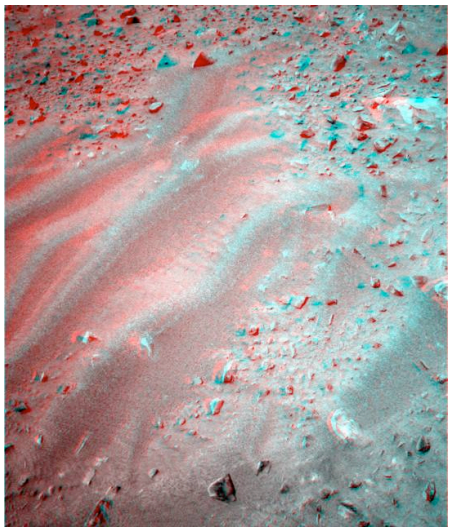
nazca

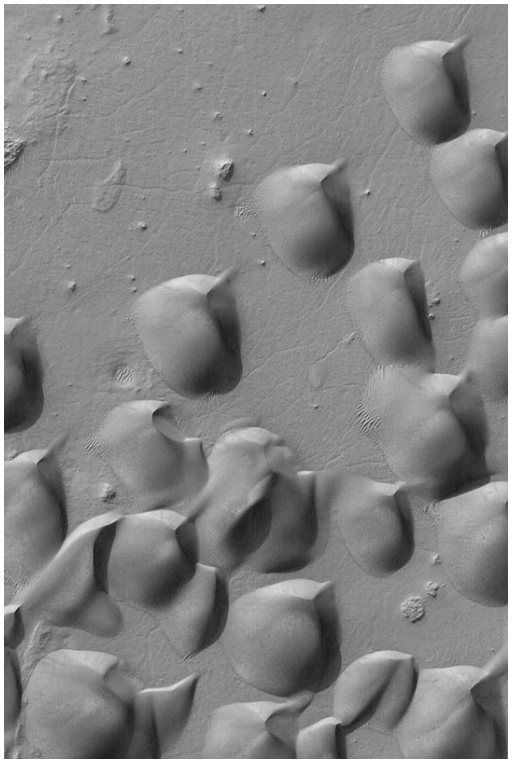
isamu noguchi's
sculpture to be seen from mars



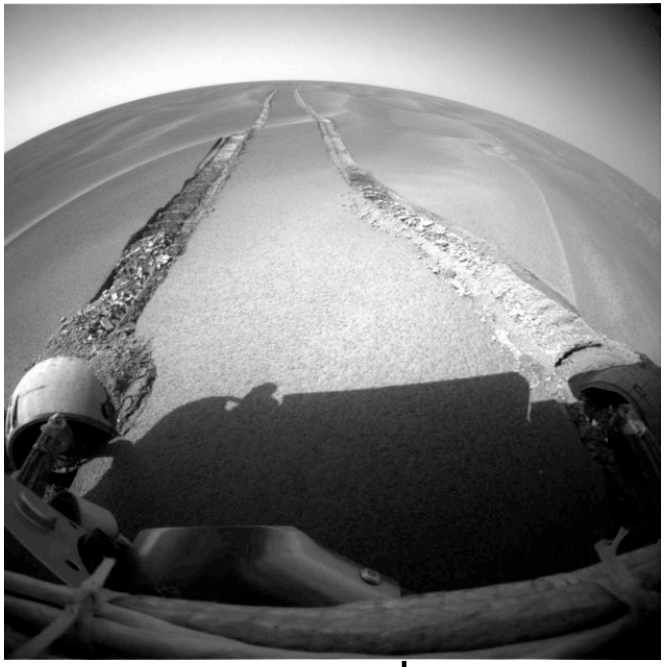
nasa's
face on mars





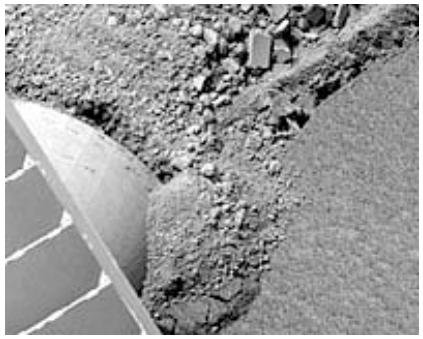


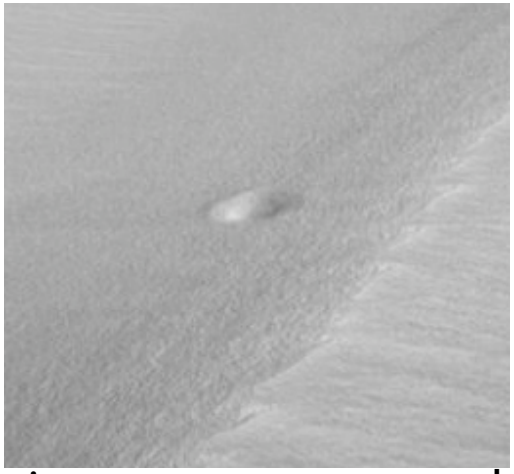
mars dunes



traces on mars sand
(mars rover tracks)

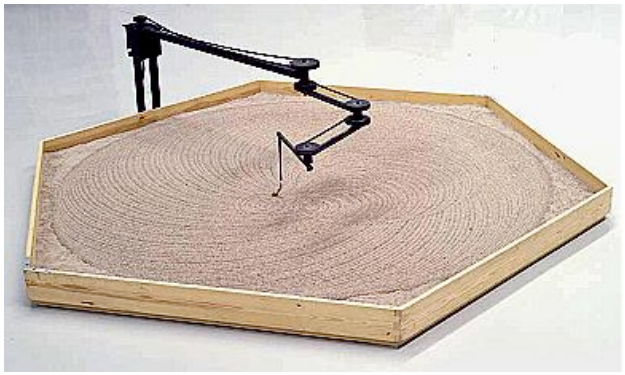
mars sand tracer
(stuck rover wheel)





tiny crater on mars sand

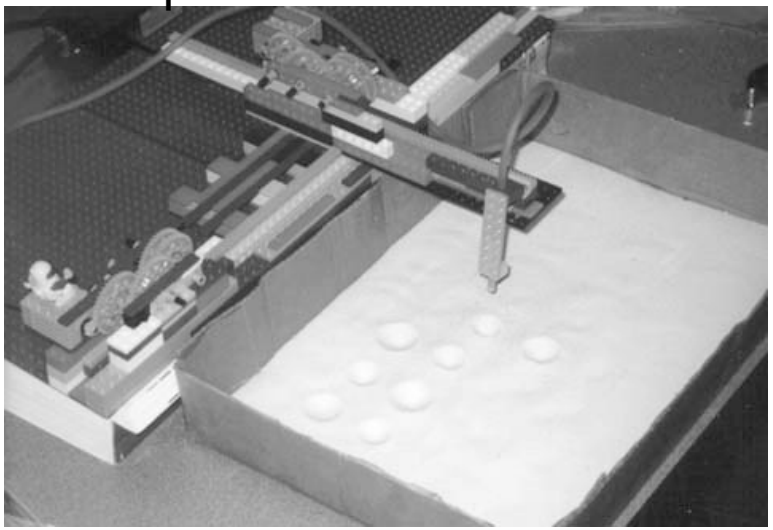
osmo valtonen's circulograph



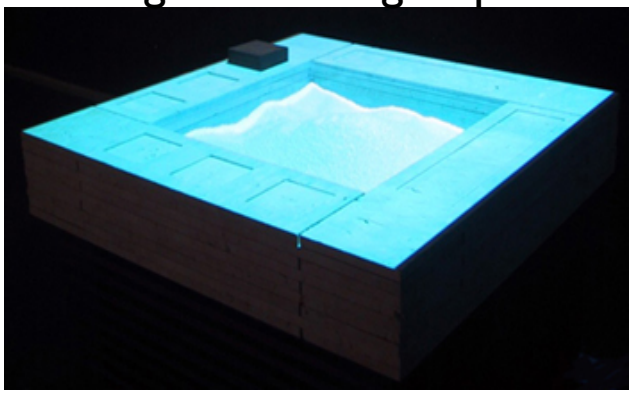
earthquake trace

SF exploratorium

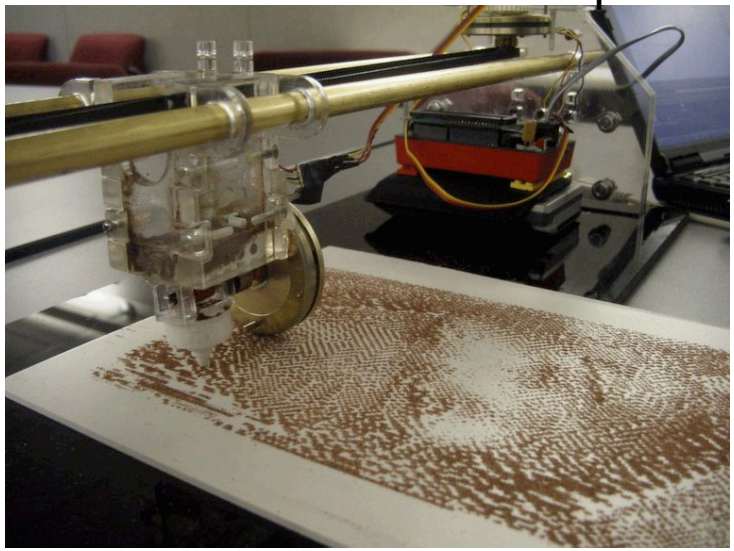
sandscapes

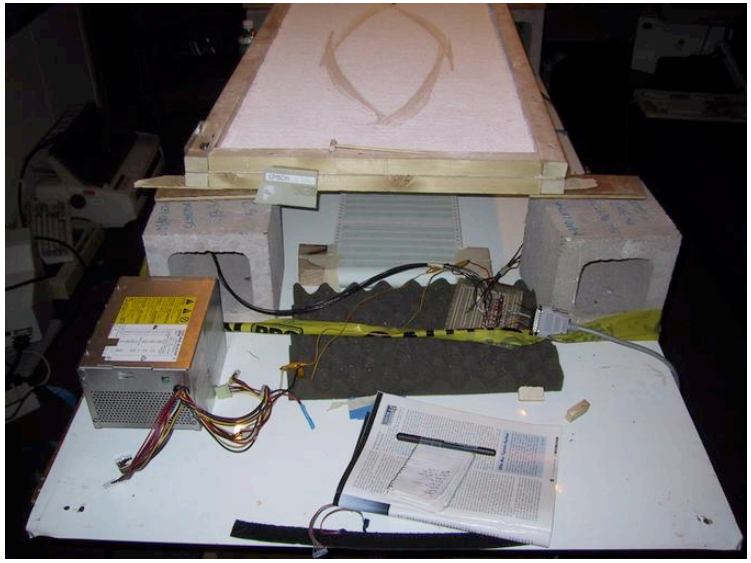


mit tangible media group

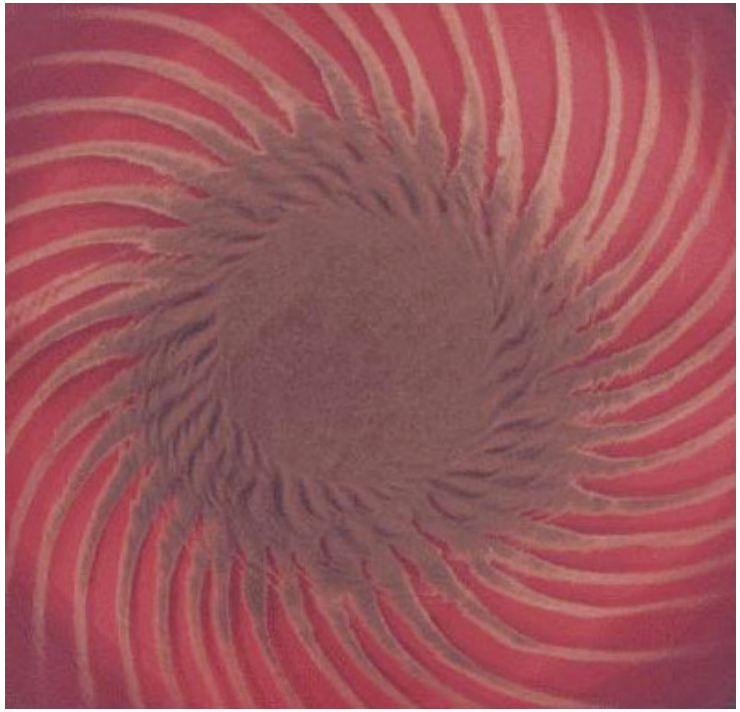


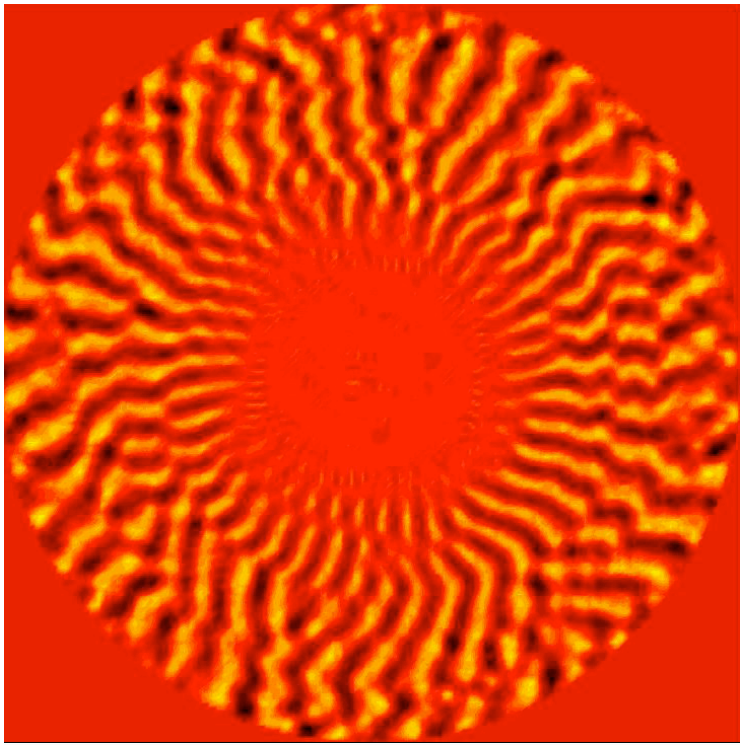
sand printer

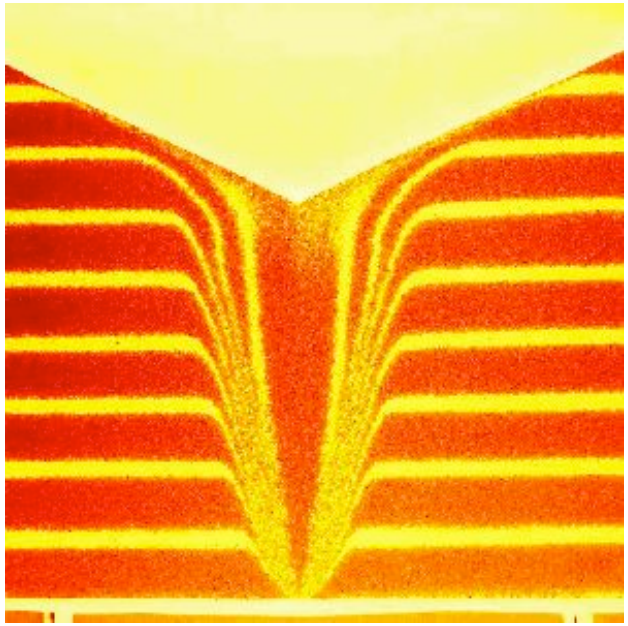


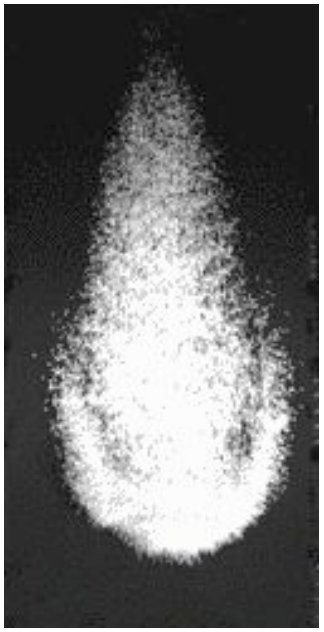


tetazoo LQ1050

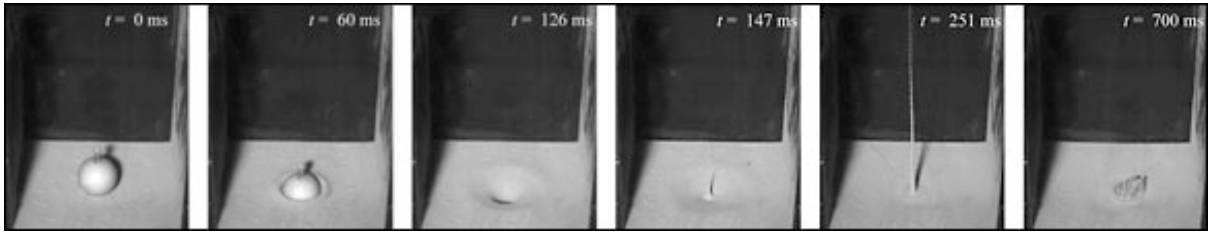


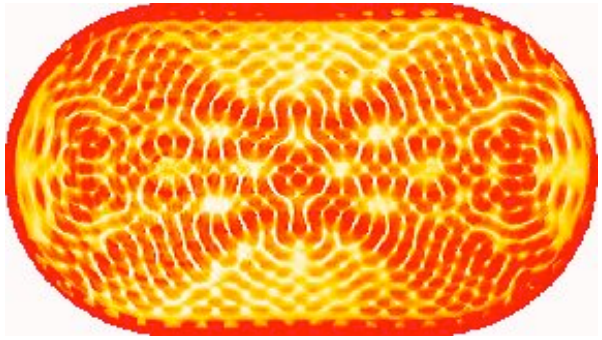


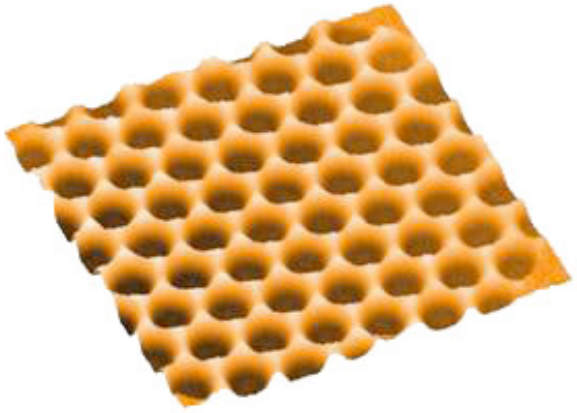




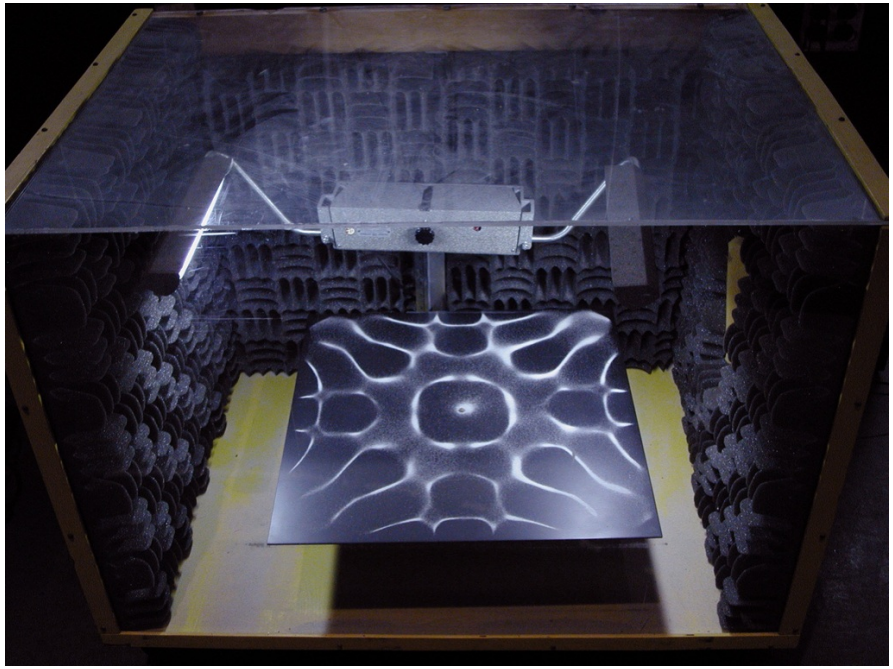
kitp granular matter program



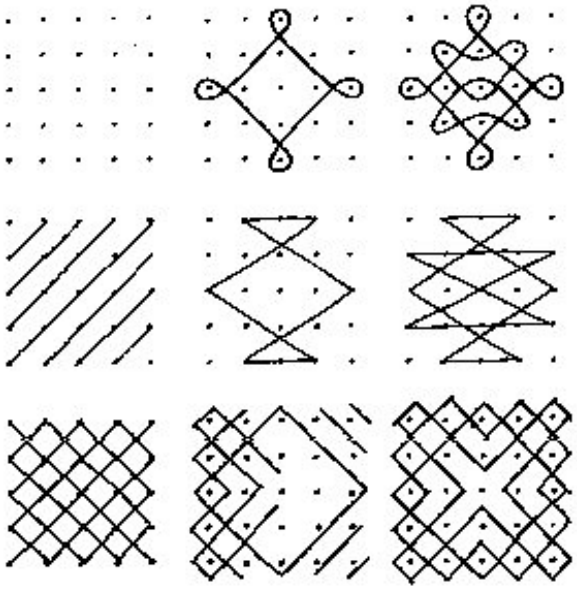




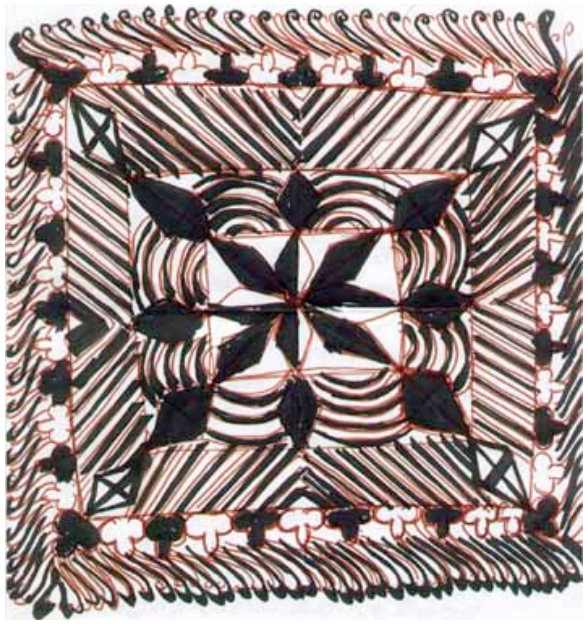
faraday patterns

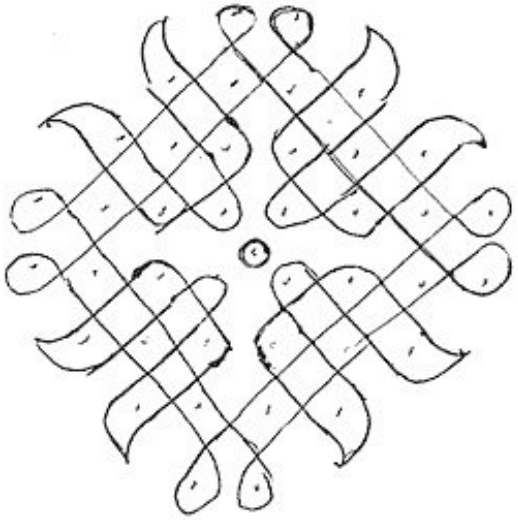


chladni patterns

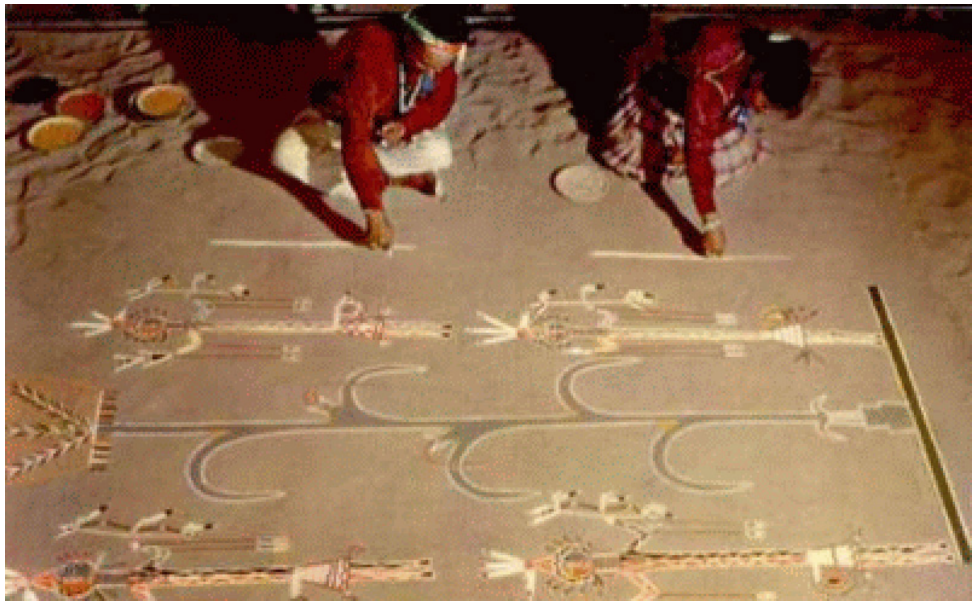


india: rangoli / kolam / alpana

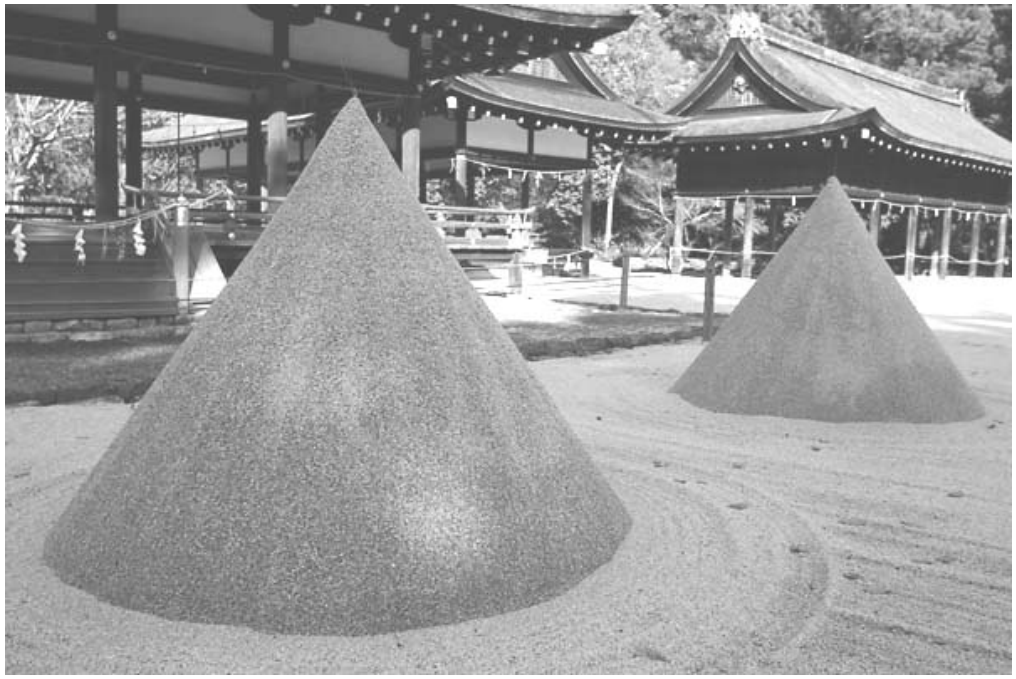


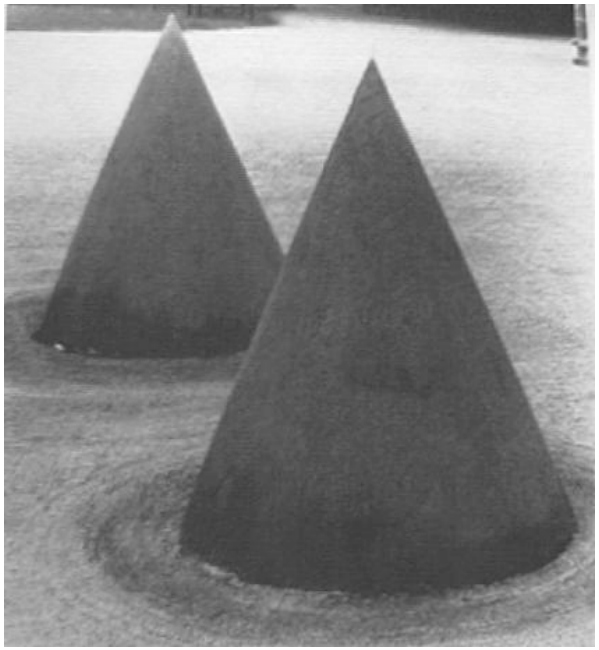


navajos

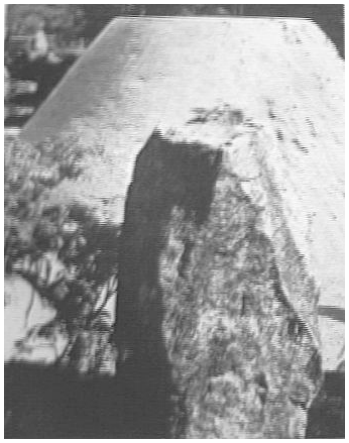


tibet

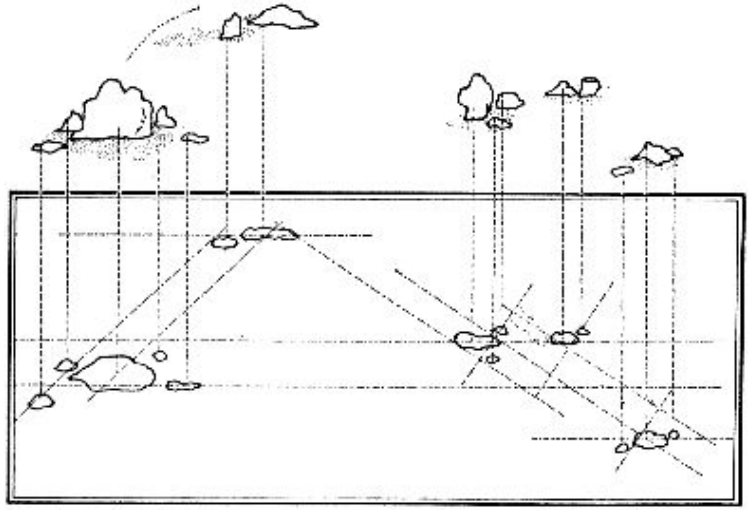




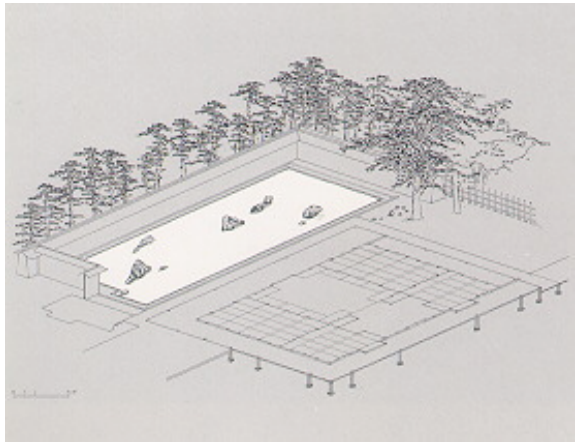
kamigamo



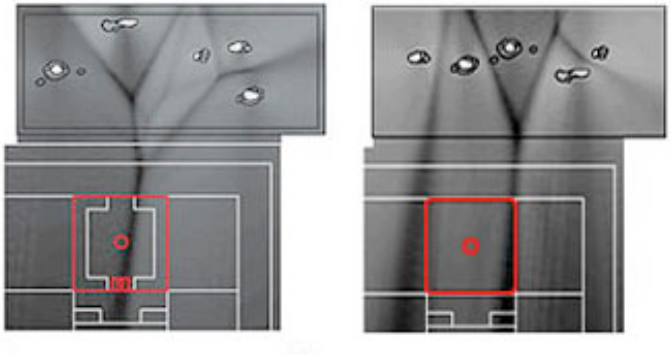
kogetsugai

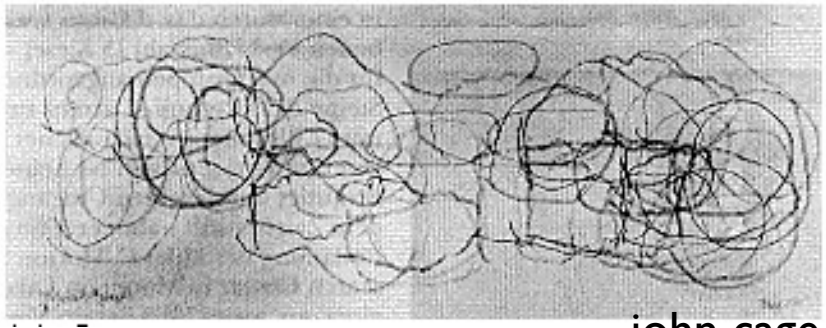


ryoanji

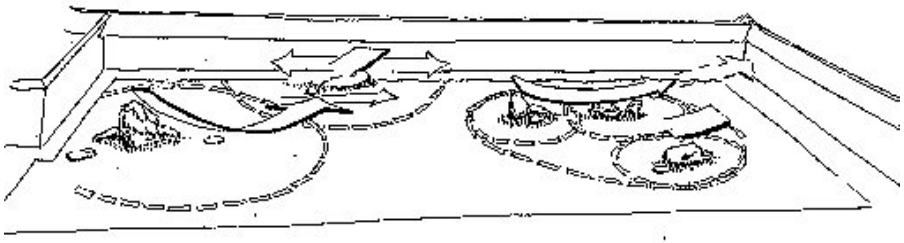


ryoanji





john cage



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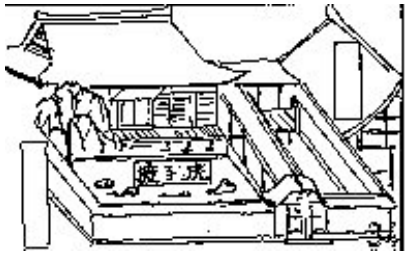
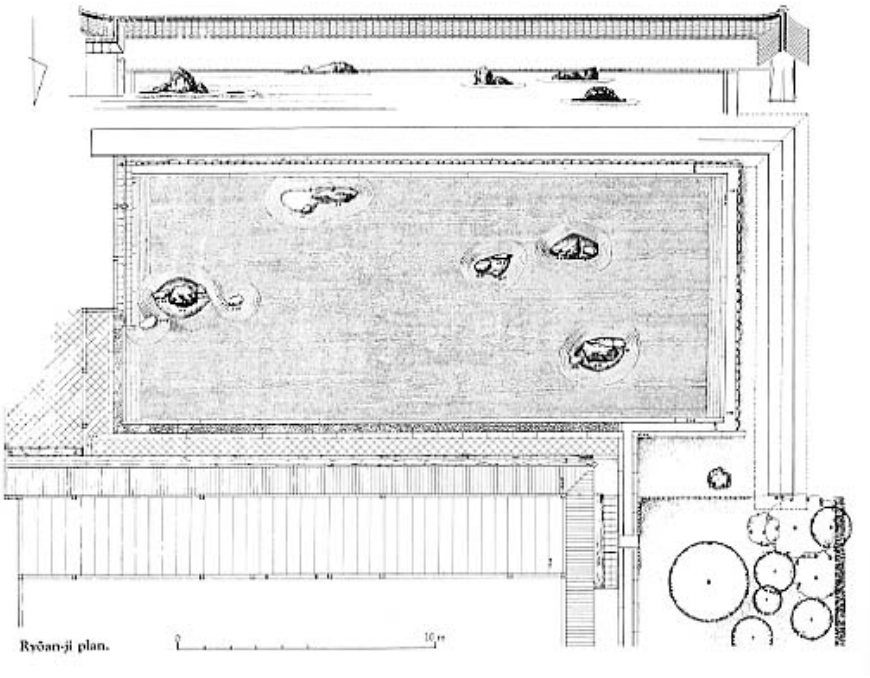
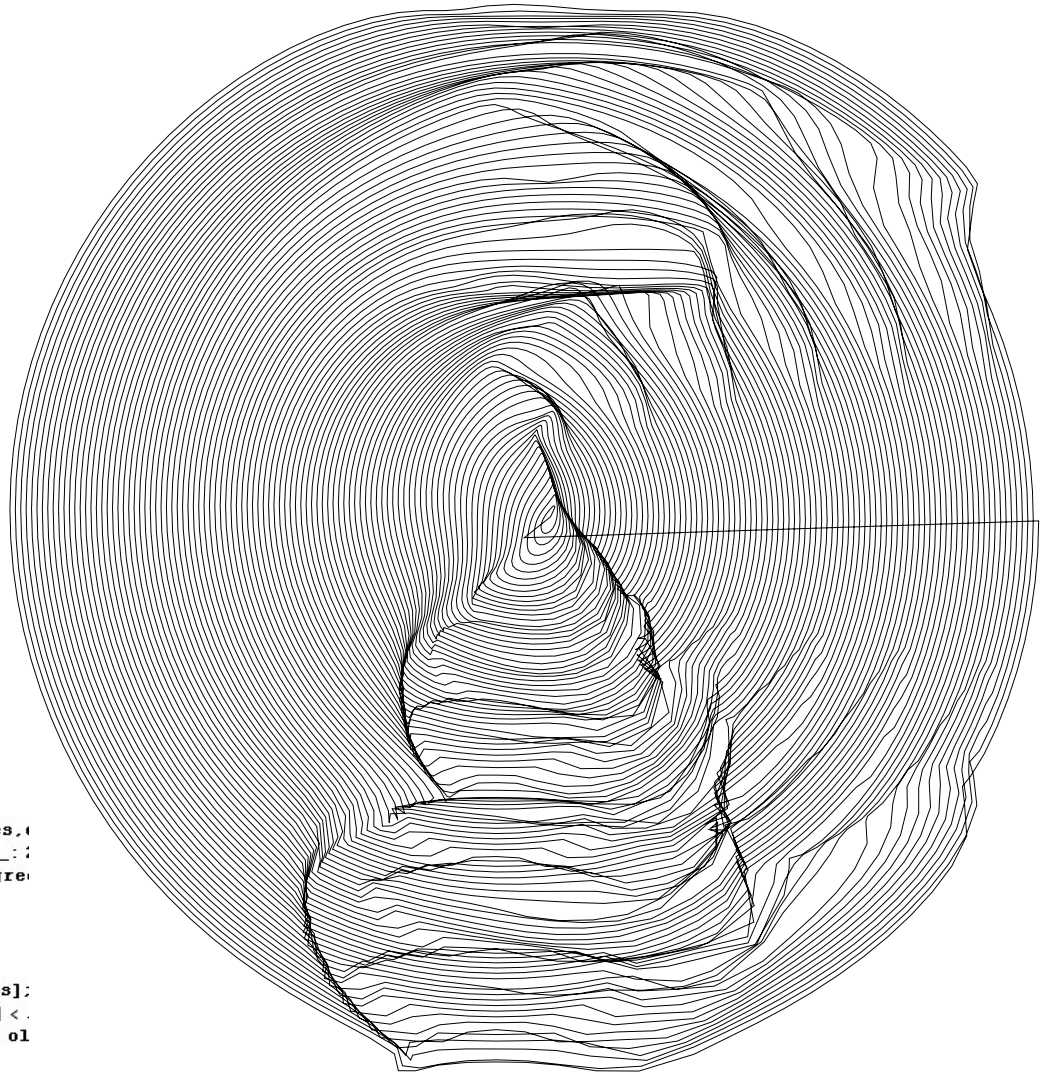
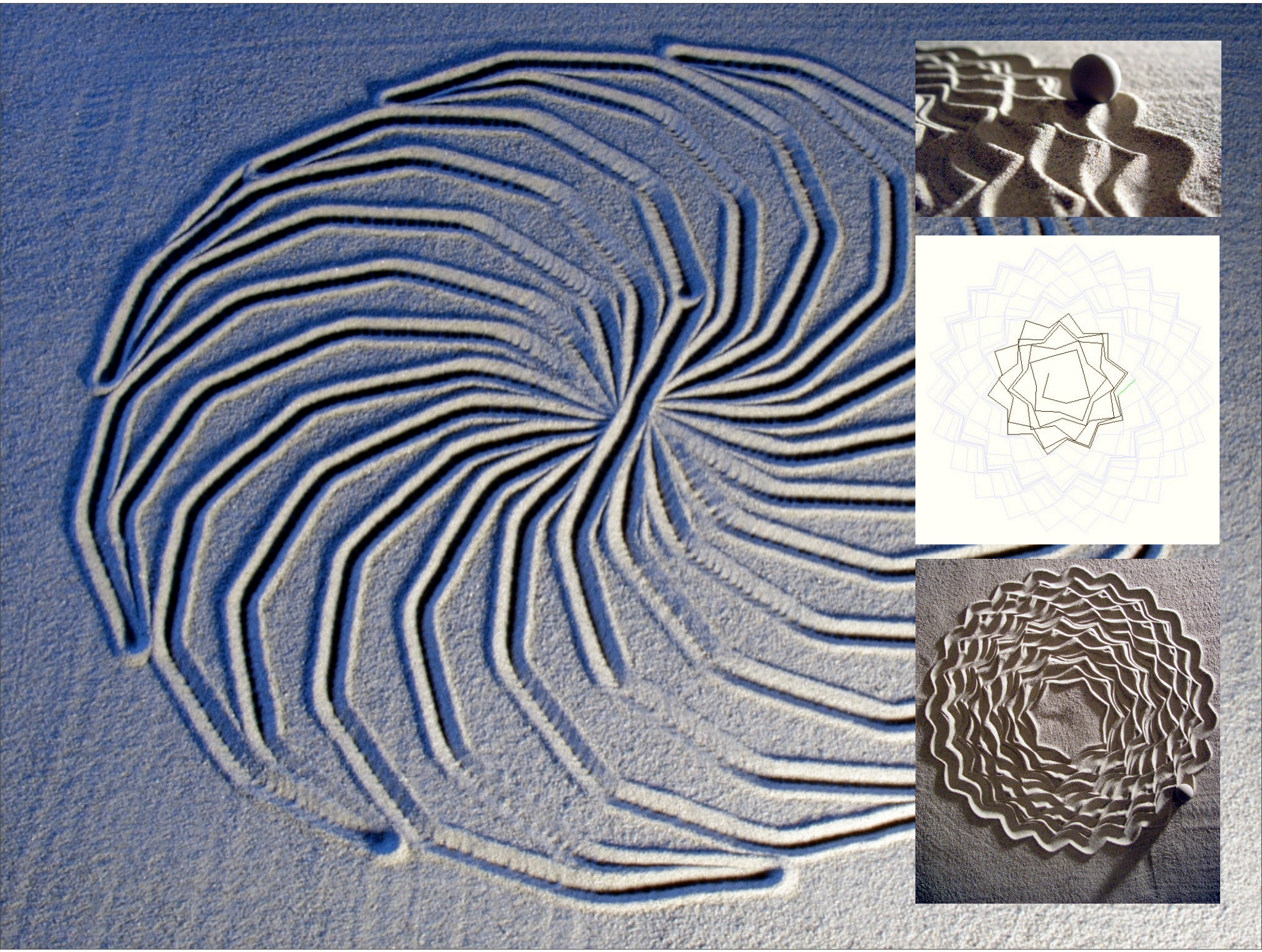




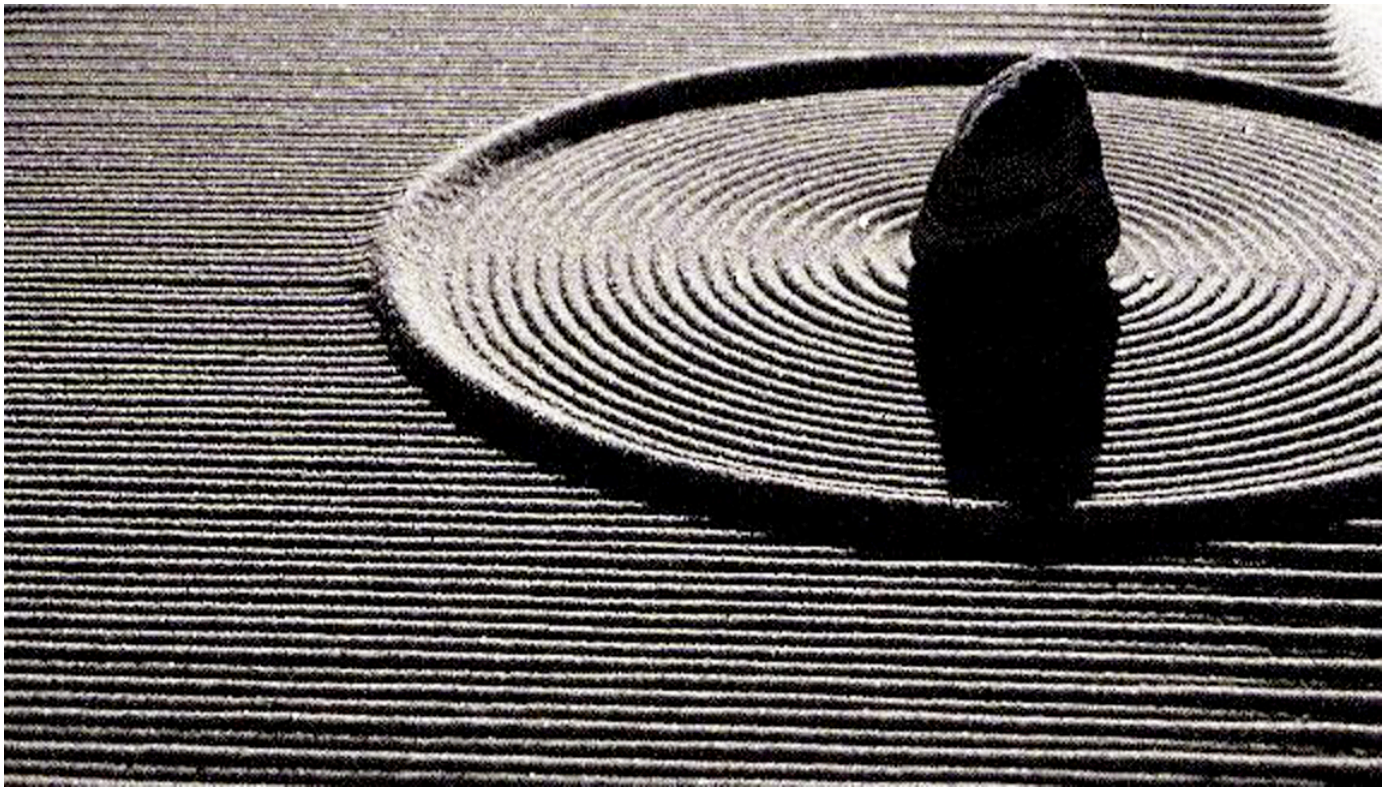
daisenin

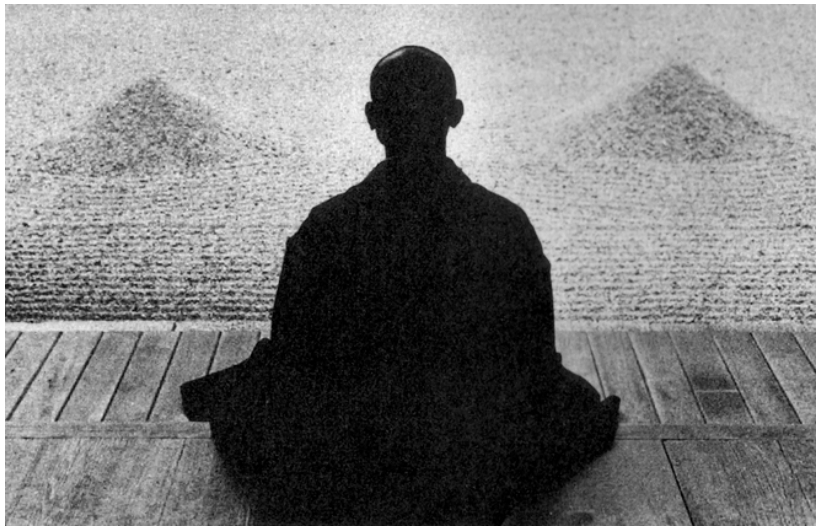


```
(*center and normalize,rotate 22 degrees,
toUxy[list_List, fname_: "last.xy", alfa_:
 Module[{ol = N[list], cos = N[Cos[alfa Degre
   ay = -10, ix = 10, iy = 10, l = {}},
  (* first, rotate *)
  If [alpha ≠ 0,
   Do[x = ol[[i, 1]]; y = ol[[i, 2]];
    rx = N[x cos + y sin]; ry = N[-x sin + y cos];
    If[Abs[rx] < .0001, rx = 0]; If[Abs[ry] <
    l = {l, {rx, ry}}, {i, 1, Length[ol]}]; ol
  (* find scaling parameters *)
  Do[x = ol[[i, 1]]; y = ol[[i, 2]];
   If[x > ax, ax = x]; If[x < ix, ix = x];
   If[y > ay, ay = y]; If[y < iy, iy = y], {i, 1,
  cx = -.5 (ax + ix); cy = -.5 (ay + iy); rngx = .
  rng = Max[rngx, rngy];
  (* center, rescale *)
  Do[rx = (ol[[i, 1]] + cx) / rng; ry = (ol[[i, 2
   If[Abs[rx] < .0001, rx = 0]; If[Abs[ry] < .0
   l = {l, {rx, ry}}, {i, 1, Length[ol]}];
  l = Partition[Flatten[l], 2];
  (* double check *)
```



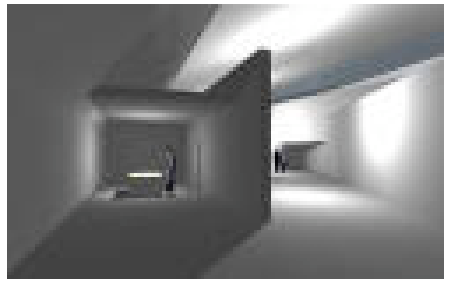
ryoanji

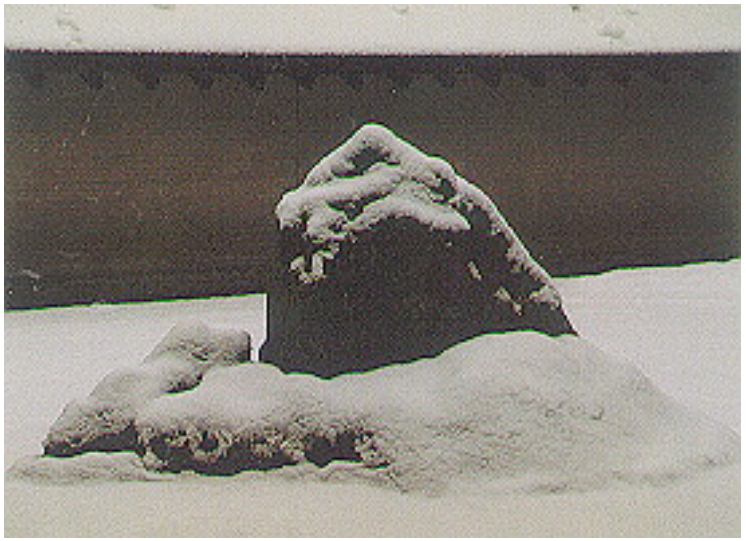




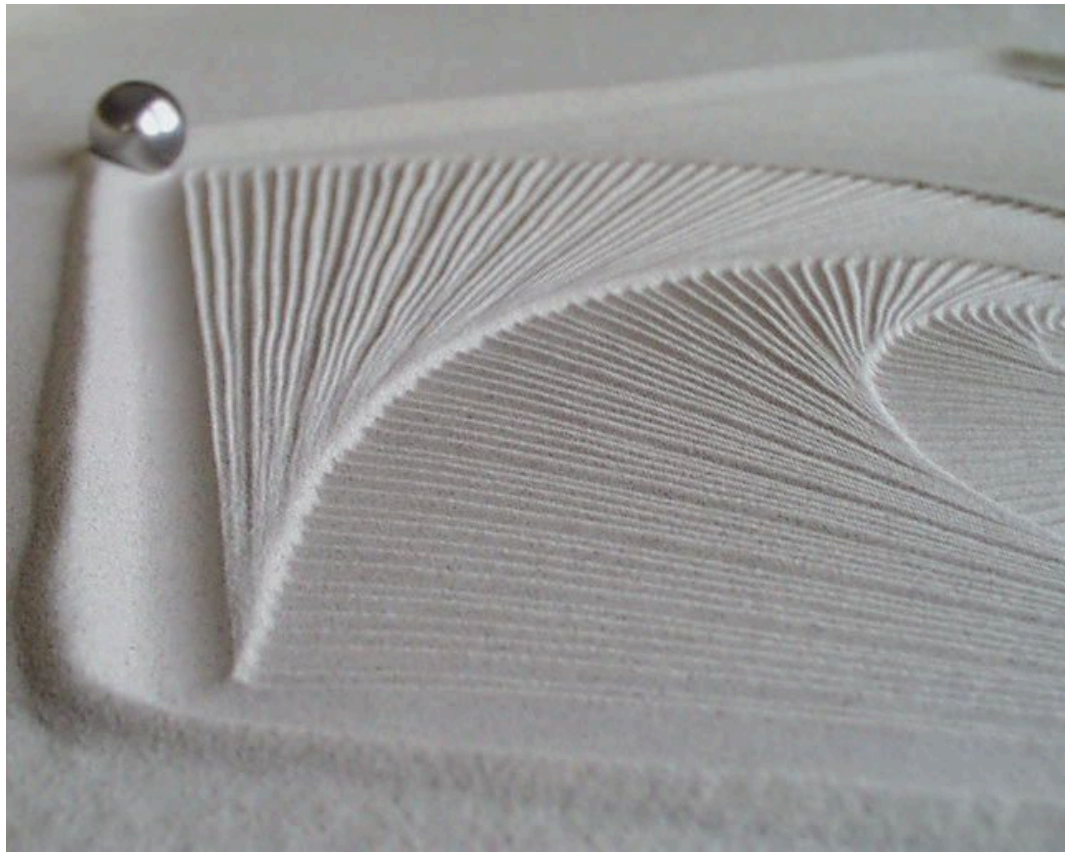
daisenin

kiasma

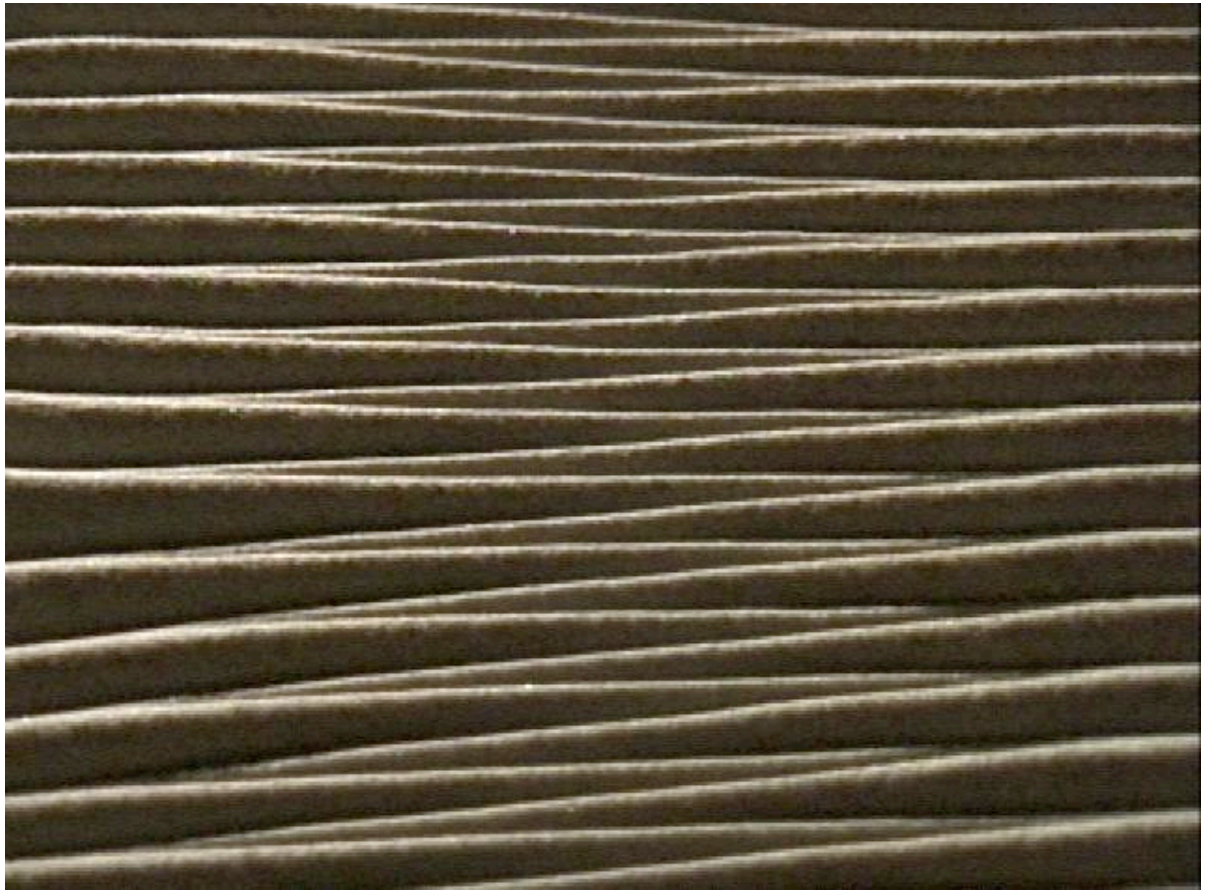




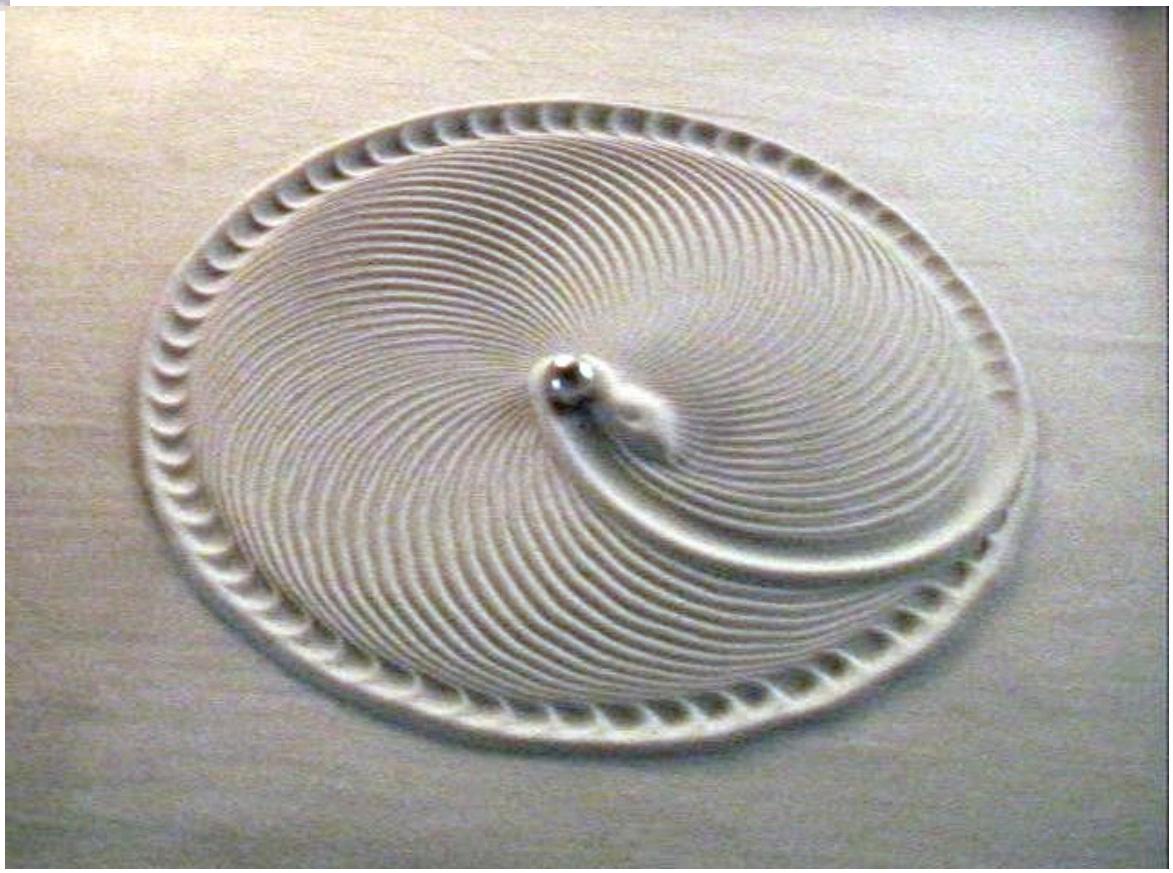
ryoanji



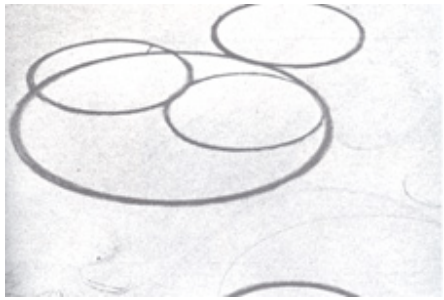
ripple marks

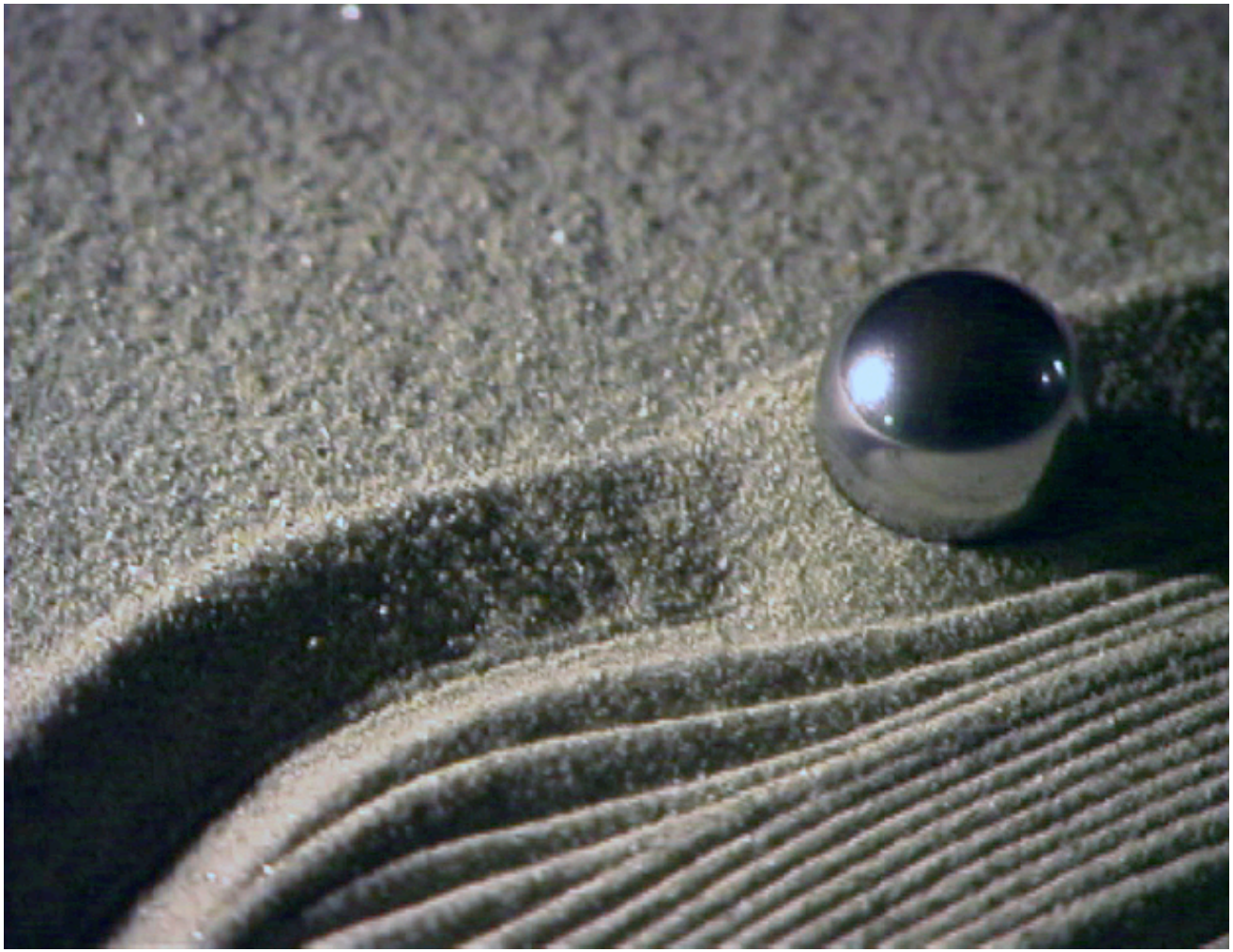


dalai lama
kalashakra initiation

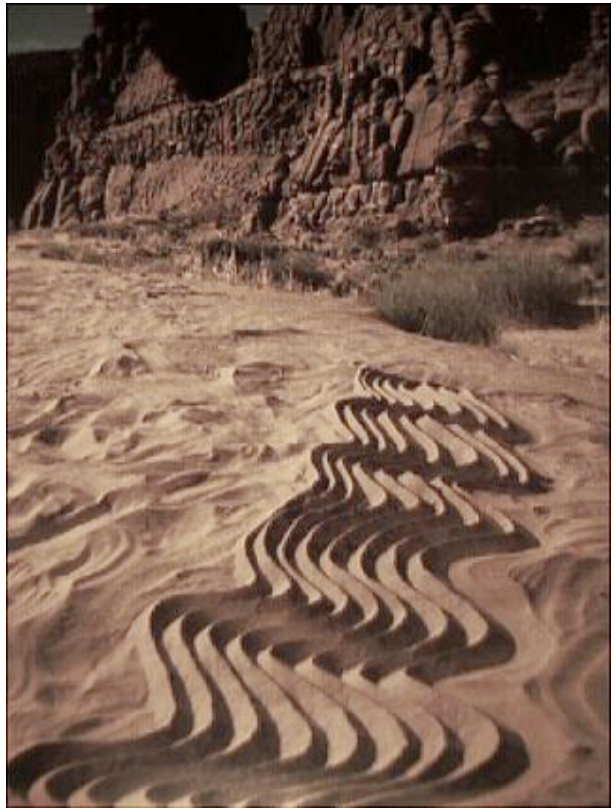


michael heizer



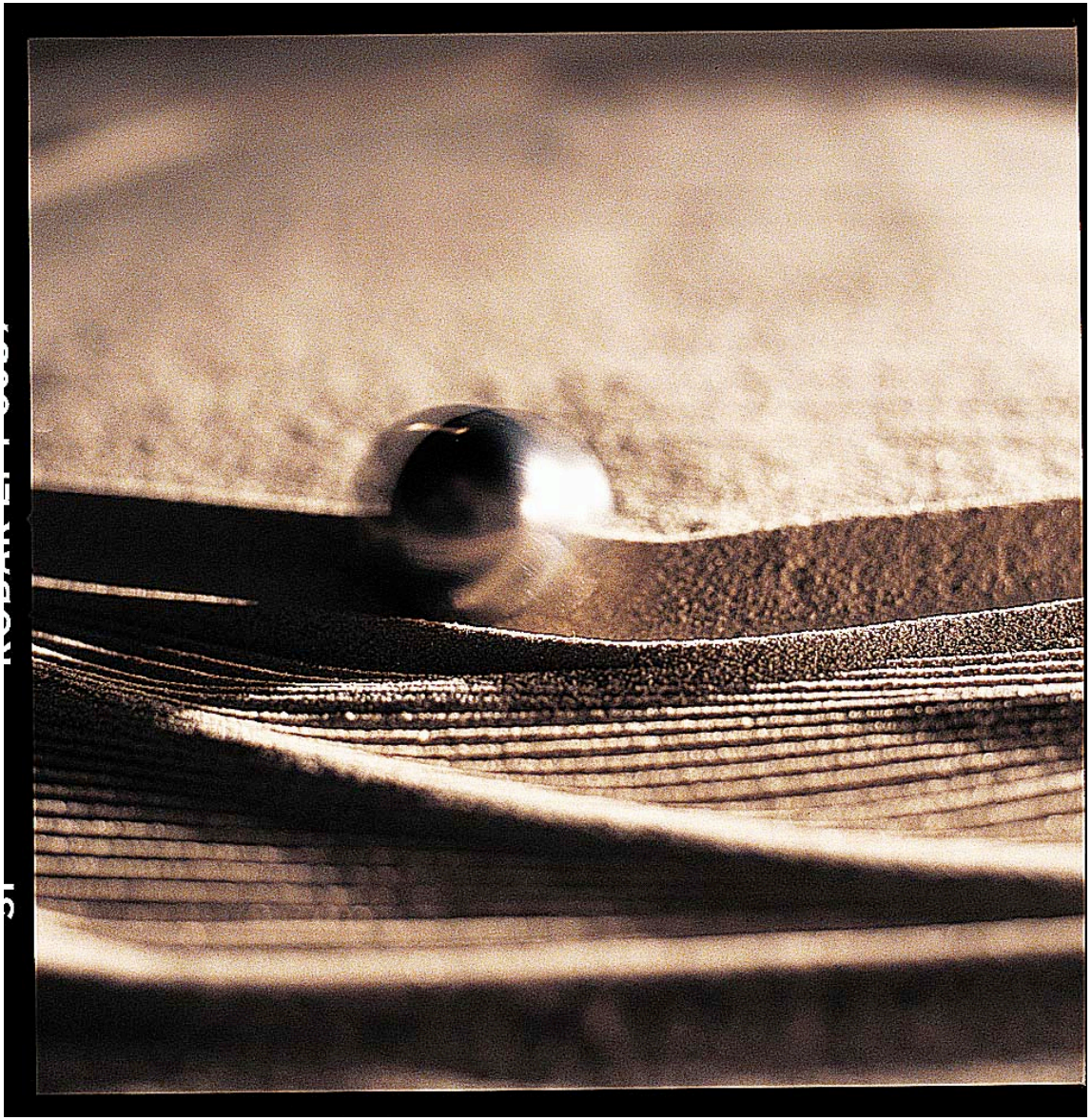


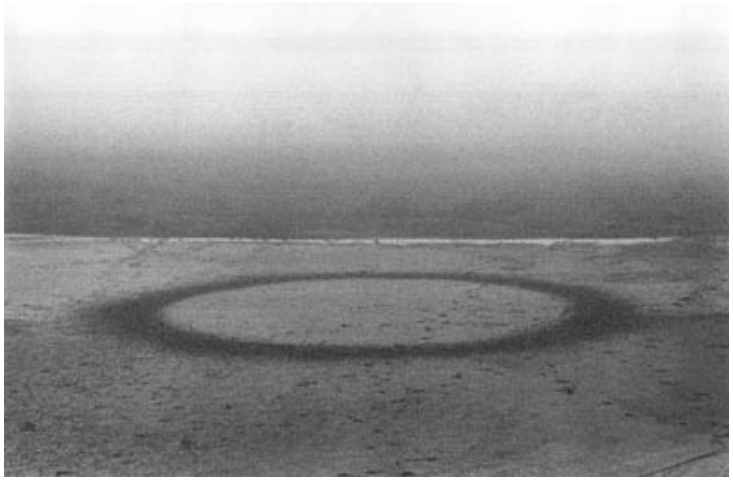
robert smithson



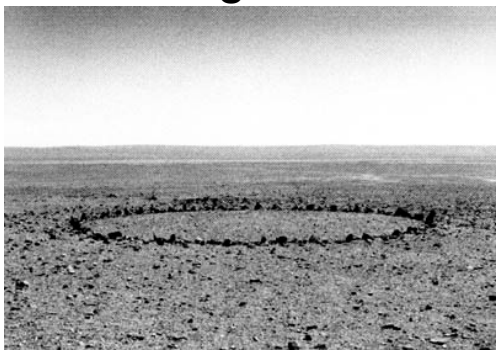
andy goldsworthy

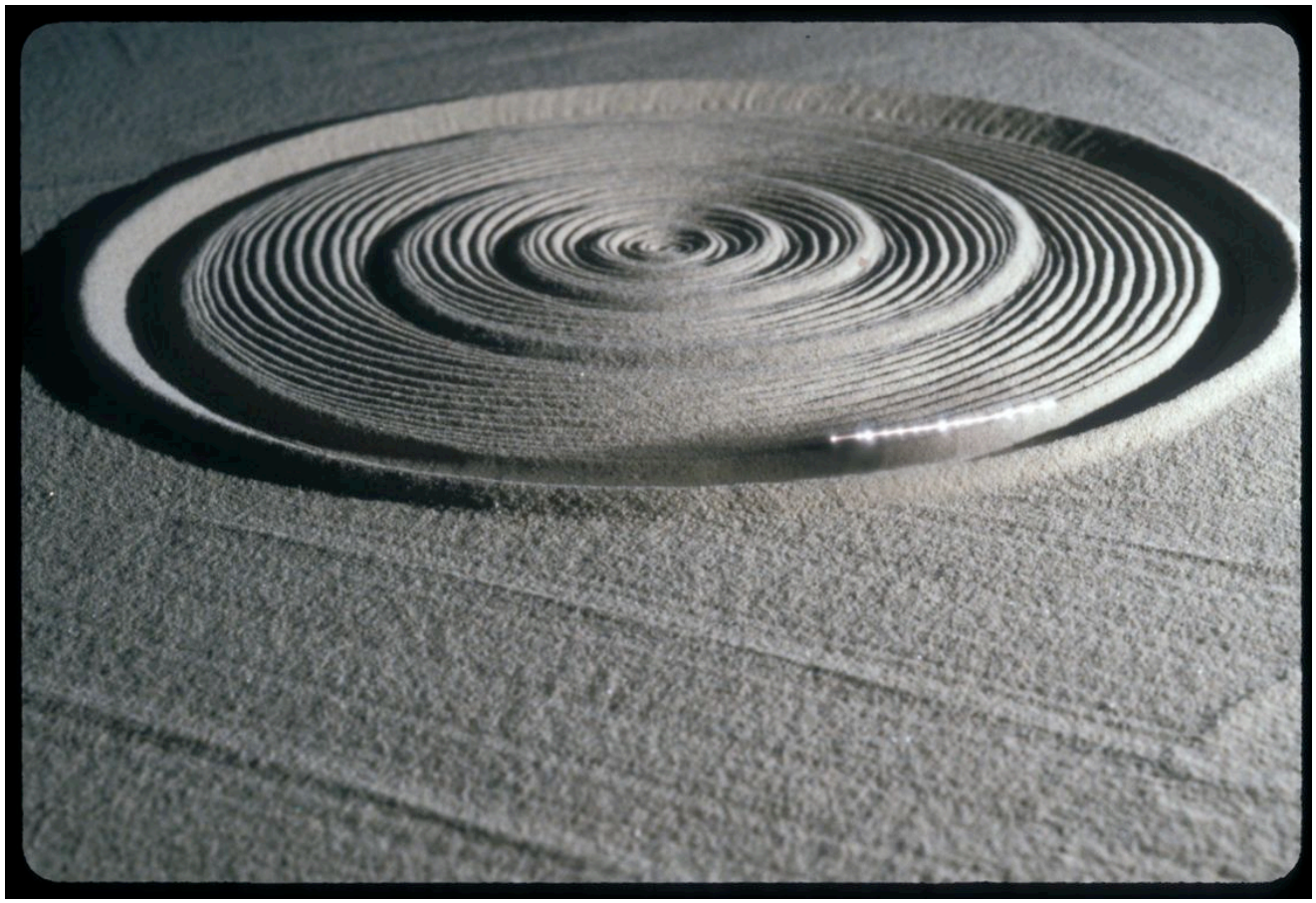
santa monica art tool
by carl cheng

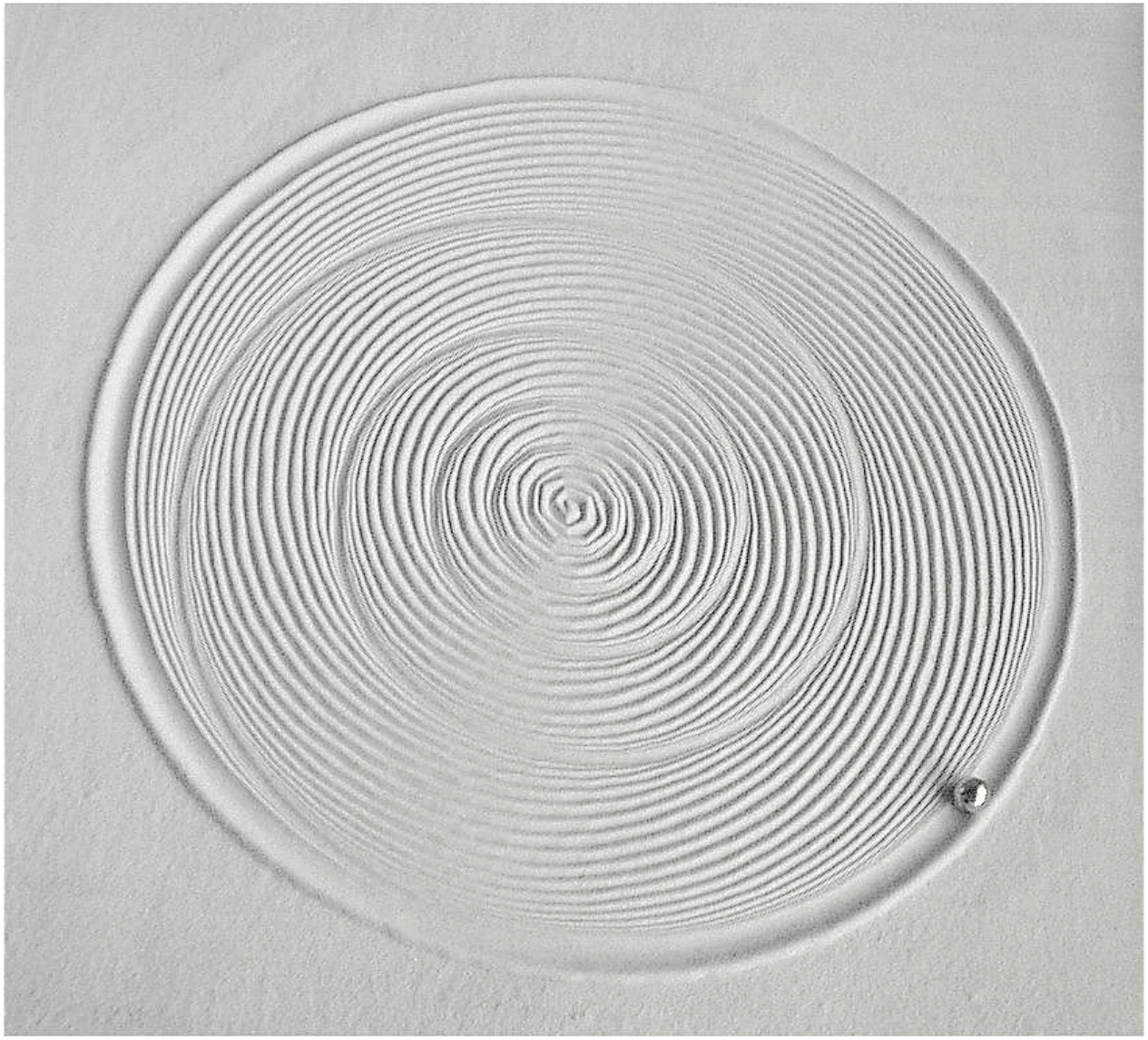




richard longman







gerry smith &
bernhard huwiler

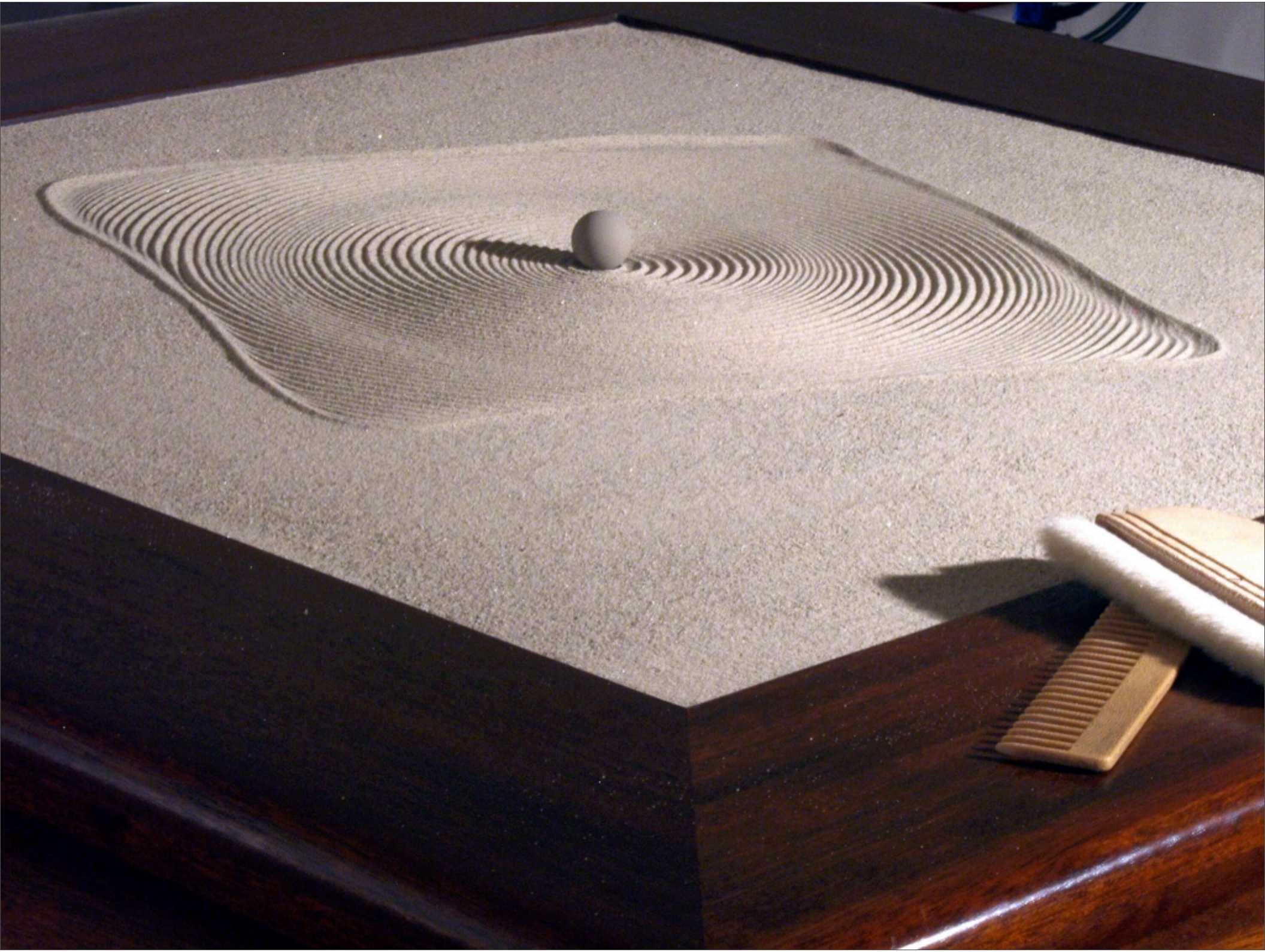
1998

1999, 2002

instances

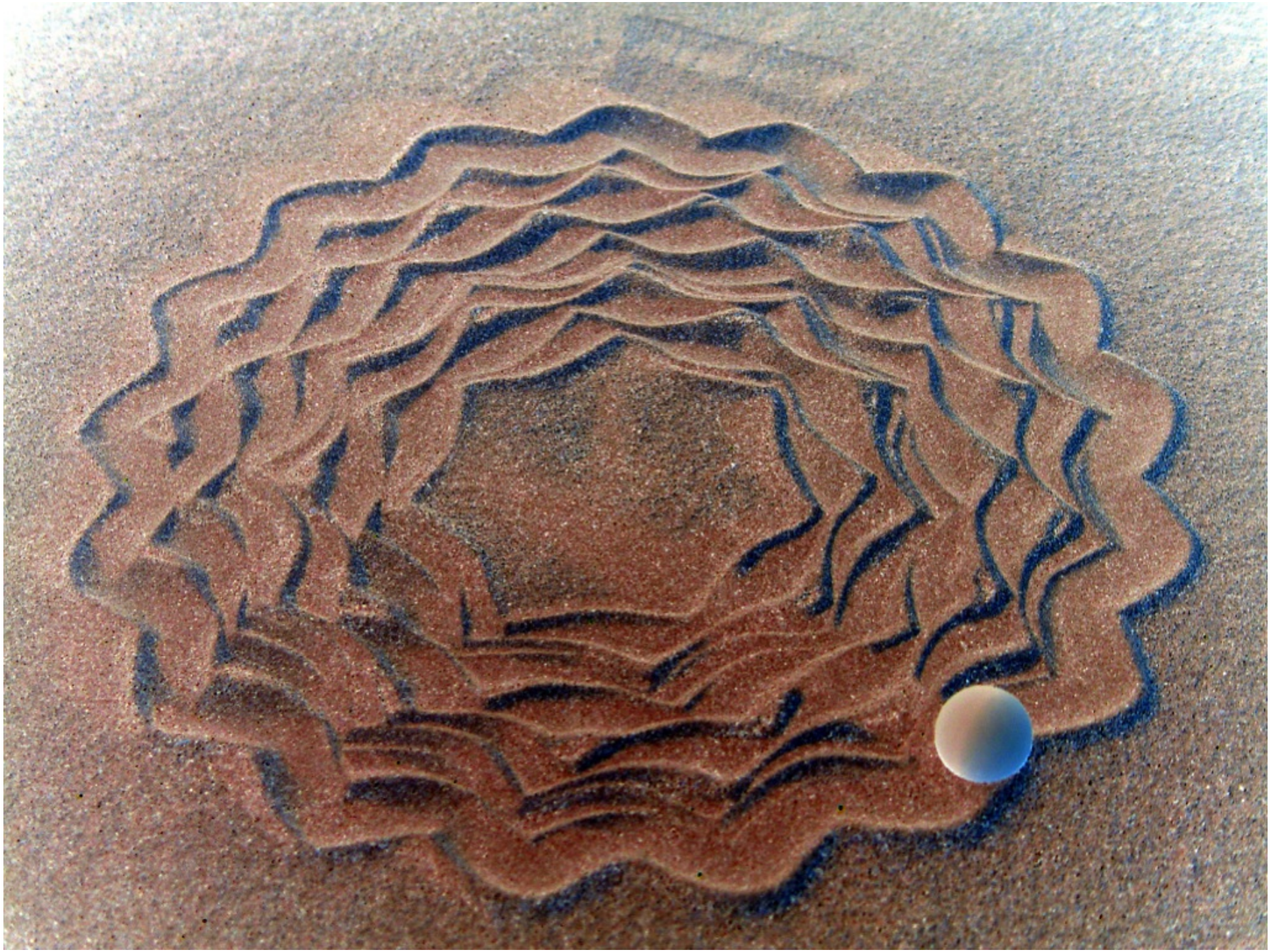
2000, 2001

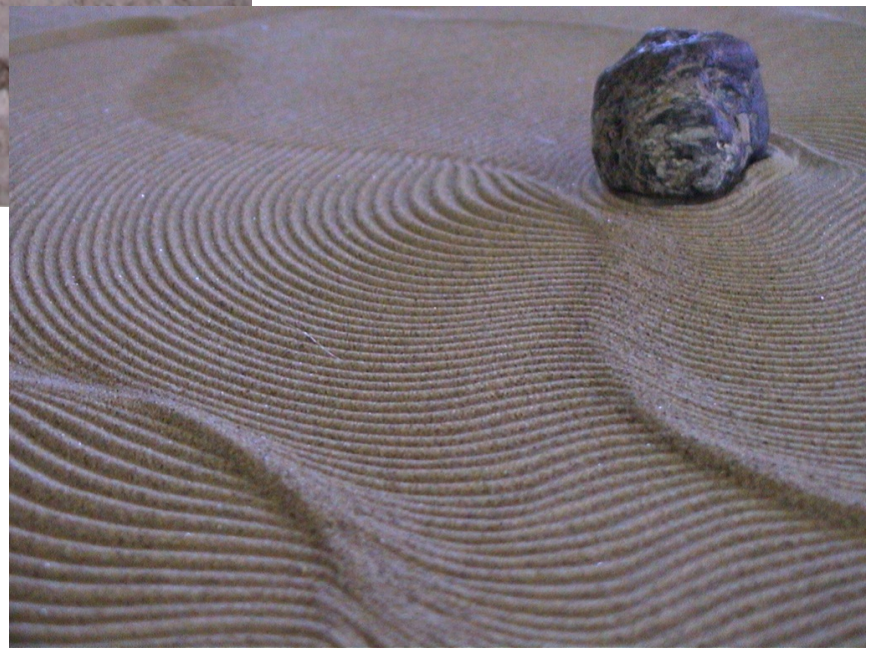
2004

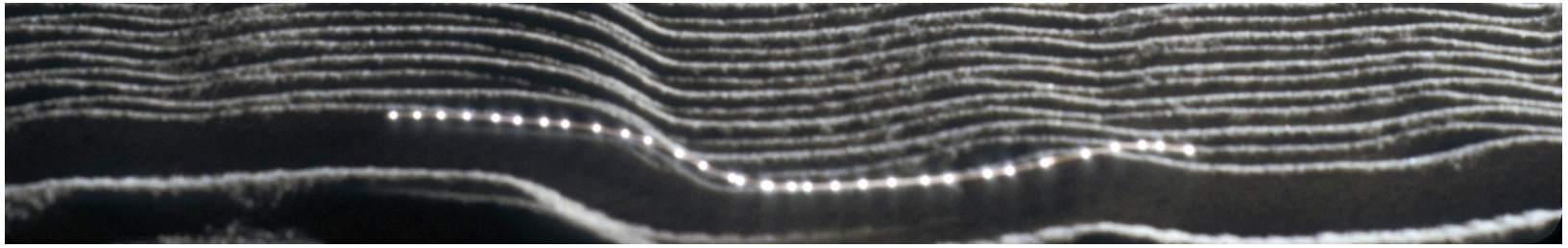


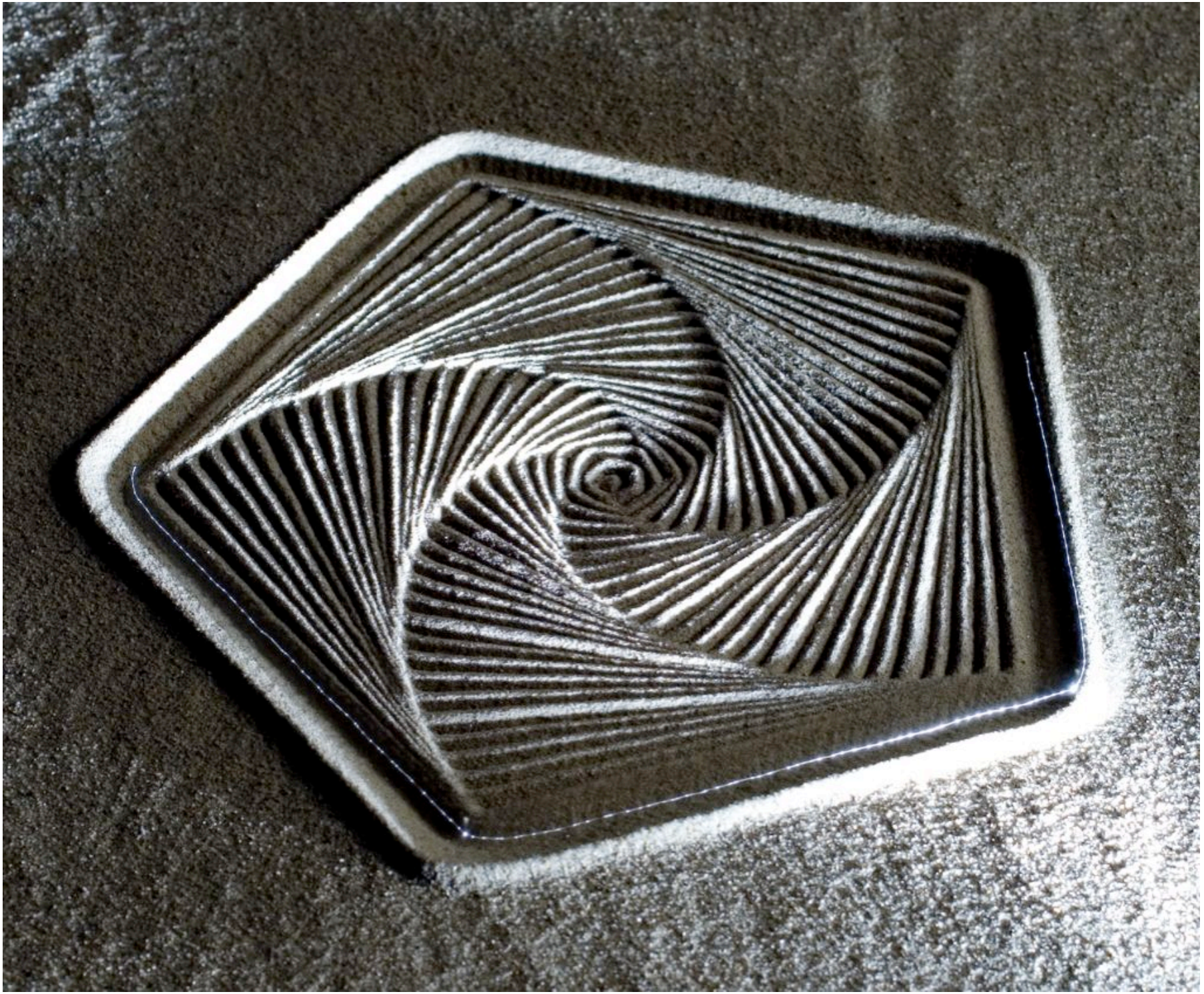
observations

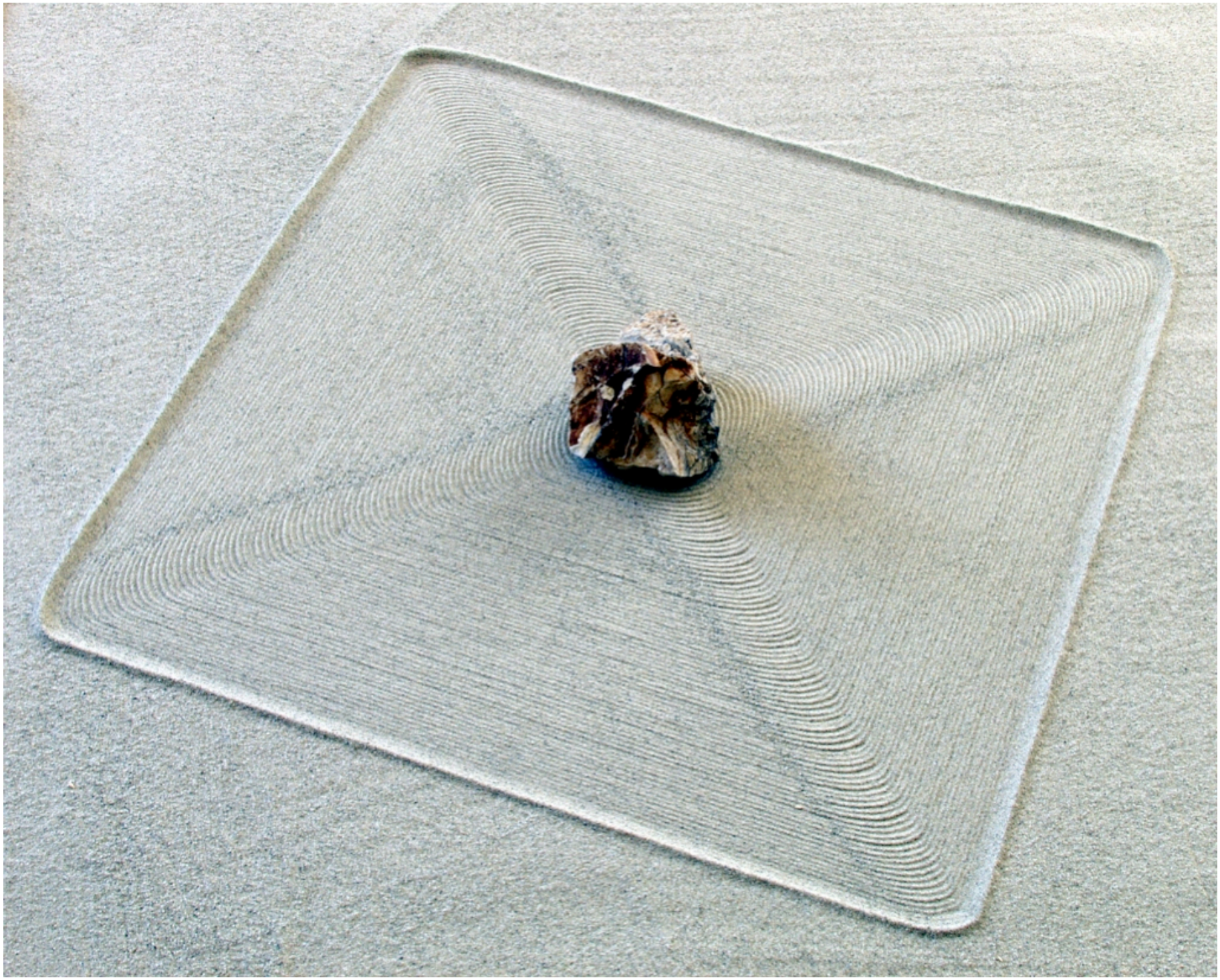
sand and sand
powders
ball slip/stick motion
trajectories
segregation
sand depths
ball sizes

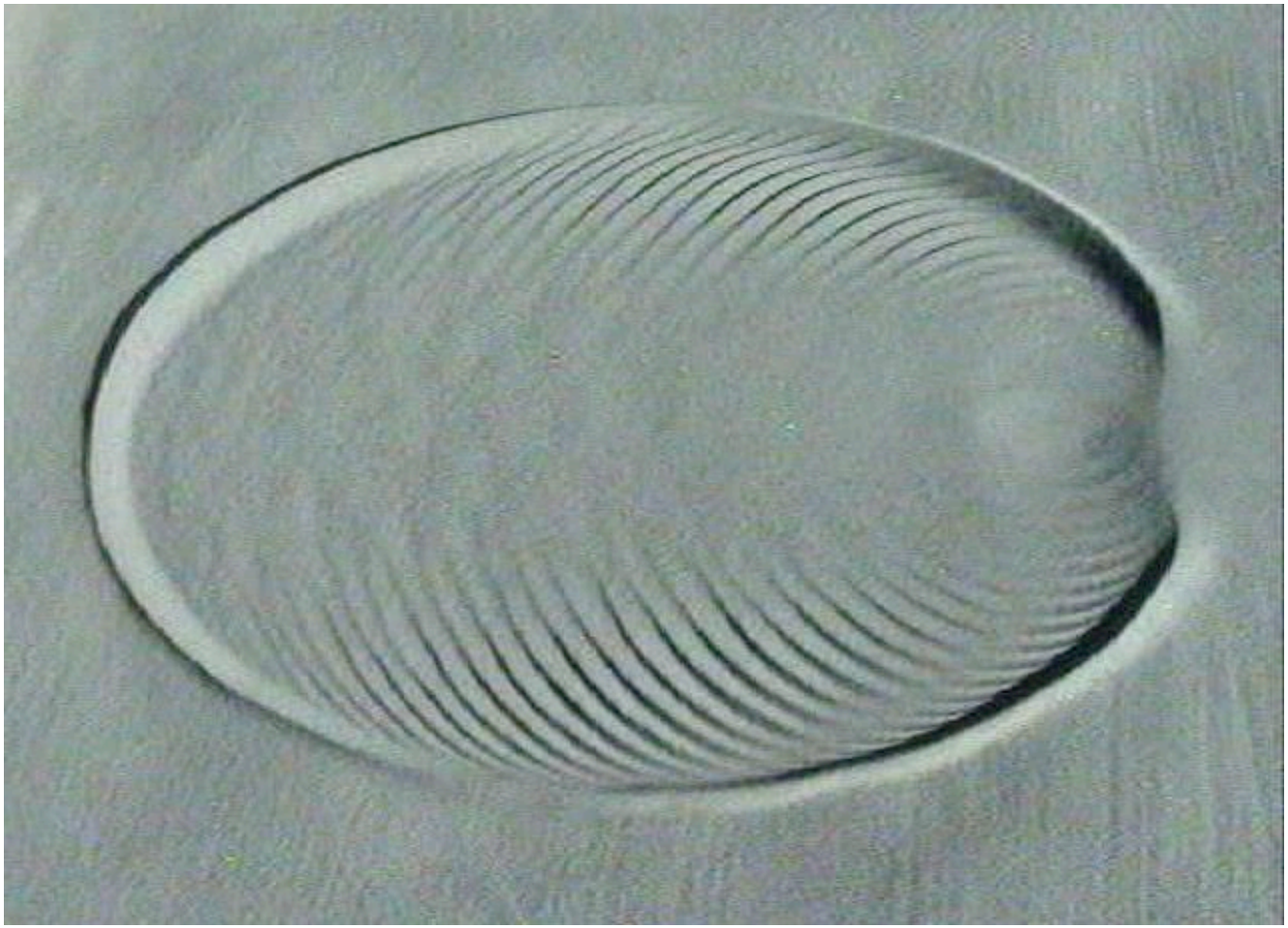












Exhibition History

Siggraph Art Gallery, LA 1999
City College Art Gallery, Santa Monica 1999
Imagina, Monaco 2000
Kiasma: "Alien Intelligence", Helsinki 2000
DesignArc: "On Lines", SB 2000
El Camino College Art Gallery: "Unus Mundus", LA 2001
Arizona State U.: "Traces on Sand and Paper", Tempe 2001
Santa Barbara County Art Commission, SB 2002
Monlleo Gallery, SB 2002
KITP at U. of California–Future of Physics, SB 2004
City College Art Gallery, Santa Monica 2005
KITP at U. of California–Granular Matter Seminar, SB 2005
Next: Siggraph Art Gallery, LA 2005
Chicago, San Luis Obispo, Evanston 2005-07

Plus Art/Design Shows in Pasadena, Philadelphia,
San Francisco, Santa Barbara, Seattle

Collaboration History

Jean-Pierre Hébert, principal artist 1998 to date
Artist in Residence, Kavli Institute for Theoretical Physics at U.C. Santa Barbara

Bruce Shapiro 1998 (Sisyphus)

David Bothman 1999 to date
Department of Engineering at U.C. Santa Barbara

Victor di Novi 2000 to date
Independent Functional Artist, Santa Barbara

Iannis Zannos 2004 to date
Director of CREATE, Music Department at U.C. Santa Barbara

Acknowledgement of Support

A.S.U.
Expertelligence/WebBase
Kiasma Museum Helsinki/Nokia
Silicon Graphics
K.I.T.P. at U.C.S.B.
Greg Wood (stone collection)
Anaël Lemaître, Peter Schiffer
& Wolfgang Losert (granular physics suggestions)

(early statement for The Tricycle)

sabbe sañkhãrã aniccã, ``all things are impermanent''.
How Sand Traces come close to the Buddhist Wisdom.

As it happens, the tracing of sand is a time performance, a series of snapshots of time where time is space in motion. Watching the tracehappening is watching time, and watching time has virtues. Motion points to time, and both point to impermanence, which points to Buddhism. Impermanence is the absolute state, not to be feared, but treasured: ``Impermanence is the Buddhahood.'' (Master Dõgen).

Sand traces show as deep reliefs on the surface of the sand, and as the stones that may adorn them, these reliefs neatly catch the changing light of the time of day and cast obviously variable shadows. Watching a sand trace throughout the day is thus and again an experience in impermanence.

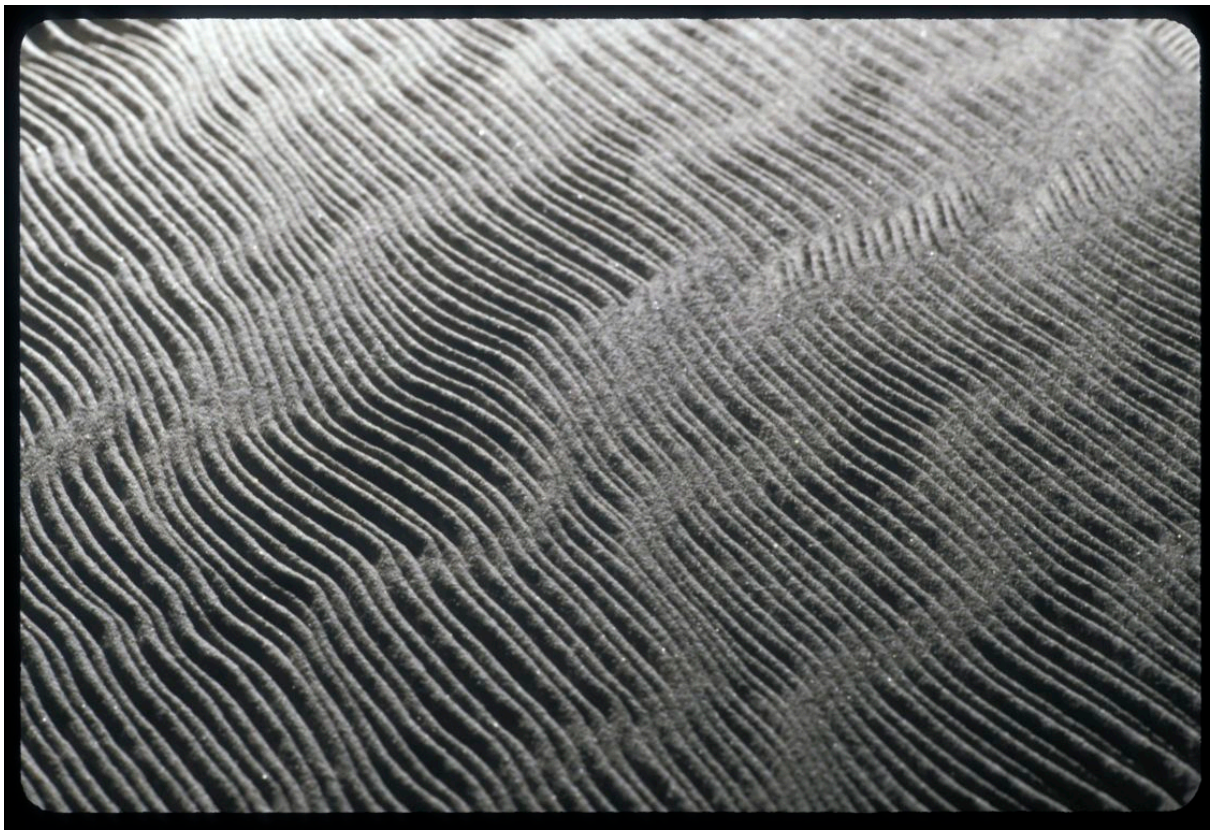
Sand tracings are twice impermanent. Sand, symbol of the impermanence of the hardest stones and the tallest mountains, results in fragile arrangements threatened by rain, wind, pressure, contact. This double impermanence, in the long run of time and in the short run of time, points to Buddhism again.

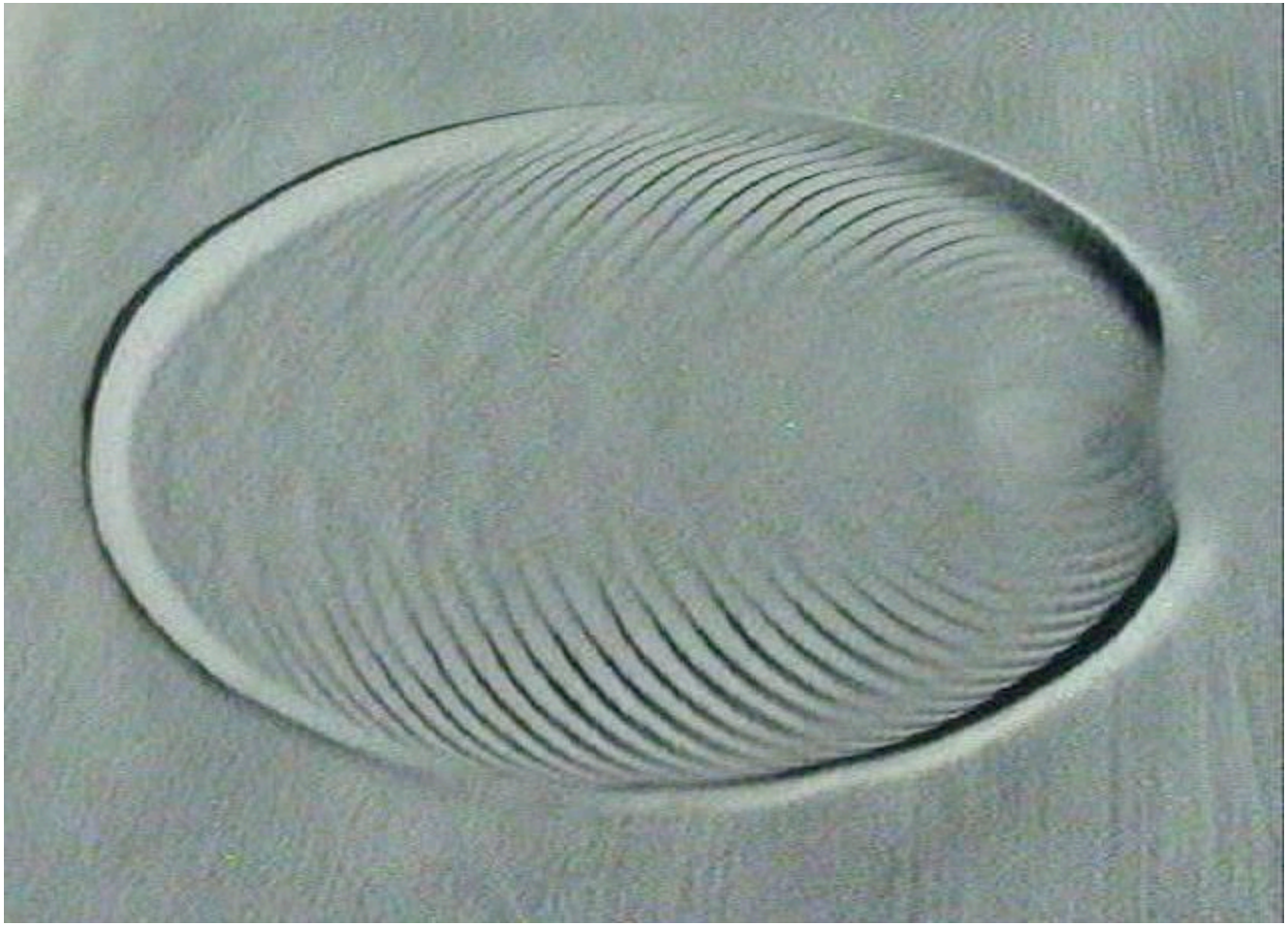
There is a wheel of life for sand tracings: one happens only because the previous ceased to exist. Each sand trace is only one sample of a succession of sand traces existing repeatedly in limitless time and perpetual re-birth. Some tracings may last for years, others for a brief while only, all must vanish, all are protected from the corruption of craving, the temptation of lasting. Buddhism emphasizes the transience and impermanence of human existence: all things pass away. Sand tracings pass away.

Sand traces can easily be chosen as classical buddhist and zen patterns from Tibetan mandalas to the raked motifs of the karesansui gardens in Japanese temples which have long established sand as a traditional buddhist and zen medium and have inspired this work.

SSSHH

simulated sand
in processing





To see a world in a grain of sand,
And a heaven in a wild flower,
Hold infinity in the palm of your hand,
And eternity in an hour.

William Blake - Auguries of Innocence
cited by Thomas Halsey

Aural development

(in progress)

Intro and concepts

Natural Elements: sand, water, [air, light]
Inspirations: Japanese zen gardens, calligraphy
Calligraphy - on sand / sounding calligraphy - a slow gesture translated to sound.
Trace results from Pattern plus Motion –or Space plus Time. Time and Pattern lead naturally to Sounds and Music.
The surface of the "little garden" as a resonating instrument that the ball "plays"

On the other hand: Tonal music as a trajectory in space - ideas starting from Pythagorean canon and the enharmonic tetrachord of Archytas and moving over "Harmonie Celeste" to 19th and 20th century models of tonality (Oettingen, Schoenberg)
Change of perspective? Perspective?

"…with tape, each half inch equals a second, and a second is a second, so that it would be possible to make musical notation, not symbols, but graphics." (John Cage)

"Correspondances" (Charles Baudelaire)

Space Time / Visual Aural

drawing is gesture, trajectory with speed, a line in space time. the shape of the line, the timing of its development can translate into harmony and rhythm, into instruments and tones, into sound and music. there are infinitely many sets of rules to convert drawing to score or score to drawing and some of them may prove interesting.

pythagorean canon, harmonie céleste, tonal maps.

synesthesia

Technical description

Sand part: Plotter, python scripts, long experience in mathematically generated graphic patterns (examples on pictures)
[Samples chosen - "miro", japanese master name?, satie, chinese lattice.
[Utility: OSC library by Stephen Kerstens]

Sound part: Supercollider , communication via OSC.
Resonator - exciter model
Resonator: 64 fixed resonating frequencies with individually controllable ring times and amplitudes
Exciter: physical model of bouncing ball, various envelopes and energy sources, other exciters.

sand, from Calais & la Garoupe – France to Santa Barbara – California

"No place is either far or near; a distance of 30,000 leagues shrinks to a foot and one inch",
(Tessen Soki)

"It was with tape, though, finally…that it became clear that time equals space. You could do graphic things in space that would have musical effect in time. Notation could change from being symbols to being what really caused the music",
(John Cage)

"The reason I chose to work with him is because he knew all the techniques of doing graphic work, and I knew all the business of composing. So I composed the graphic work and he executed it, just as I would write a piece for a pianist and she would play it, or he would play it. In other words, in moving from music to graphic work, I took with me the social habits of musicians",
(John Cage)

Japanese gardens History

In the river of time (according to François Berthier):

- *612* First record of a Japanese symbolic garden : a rock in a pond
- *620* A symbolic island in a pond
- *1052* Byödö-in Monastery garden
- *late XIth* earliest treatise on the art of garden making
- *1141* Mötsuji Temple garden
- *1339* Saihöji Temple garden restored
- 1342 Tenryüji Temple garden remodeled
- *1397* Golden Pavilion
- *1482* Silver Pavilion
- *1488* Ryöanji rebuilding; *1499*, construction of the rock garden
- *Late XVth* Jöeiji, Yamaguchi Temple garden
- *1513* Daisen-in, Daitokuji Temple garden
- *Early XVIth* Taizö-in, Myöshinji Temple garden
- *Early XVIIth* Shödenji Temple garden
- *1655* Katsura Imperial Villa garden
- *Early XVIIth* Katsura Family garden at Höfu
- *Early XIXth* Tökai-an, Myöshinji Temple garden
- *1960* Gyokudö Museum garden at Öme

Readings

Sacred Mountains of the World, Edwin Bernbaum
Le jardin du Ryoanji, Lire le Zen dans les pierres, François Berthier
The Wheel of Time, Sand Mandala, Barry Bryant
Silence, John Cage
Nature in Asian Traditions of Thought, J.Baird Callicot & Roger T. Ames
The Voices of Time, J.T. Fraser
Kernels of Energy, Bones of Earth: The Rock in Chinese Art, John Hay
The Chinese Garden, Maggie Keswick
The World of the Japanese Garden: From Chinese Origins to Modern Landscape Art, Loraine Kuck
Sacred Mountains in Chinese Art, Munakata
Master Dogen's Shobogenzo, Nishijima & Cross
The Role of Rocks in the Japanese Dry Landscape Garden, Graham Parker
Musicage, Cage Muses on Words, Art, Music, John Cage in Conversation with Joan Retallack
Silence and Sounds in Japanese Garden; Innovations by Nature and Man, Sonja Servomaa
The Sound of Stones, Sonja Servomaa

http://hebert.kitp.ucsb.edu/sand/