

Chaos, Fractals, and the Arts

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Porter College 63F, UCSC
Winter 2017

Complex Dynamical Systems

Chief characteristic features:

Chaotic behavior
Fractal bifurcations

Art History as a CDS

- Bifucations between stylistic periods
- Examples
 - Realism —> Abstract expressionism
 - Beatniks —> Hippies
 - Boogie —> Bebop —> Jazz —> Rock
 - Animations —> Light shows

Abstract Animation = AA

1 = Computer Revolution

2 = Storage Scopes

3 = Overhead Projectors

4 = Data Projectors

1930

1940

1950

1960

1970

1980

Digital AA

Light Shows, Analog

Light Shows, Digital

1

2

3

4

Meeting #1, January 12

- Course organization
- Begin the four threads
 - A. Art History
 - B. Basic chaos theory
 - C. P5 programming
 - D. Discussion

Course organization

- Class times
- Homework
- Projects
- Grading
- Tentative syllabus

Class Times

- Meetings will begin at 9:50 am, and end by 11:25 am
- Meetings will usually begin with calling the roll and discussion of the assigned readings
- Office hour after class
- Code coach: Evan Schaffer

Homework

- Weekly homework:
 - A. Readings for discussion
 - B. Chaos theory experiments
 - C. HTML, CSS, JS, and P5 programming exercises
 - Posted to personal websites for scoring
- Browse our website for assignments:
www.ralph-abraham.org/courses/porter34b17/

Projects

- Individual or team projects
 - Modify a given P5 model
 - Create a short movie of a light show
 - Present in class at the end of the quarter

Grading

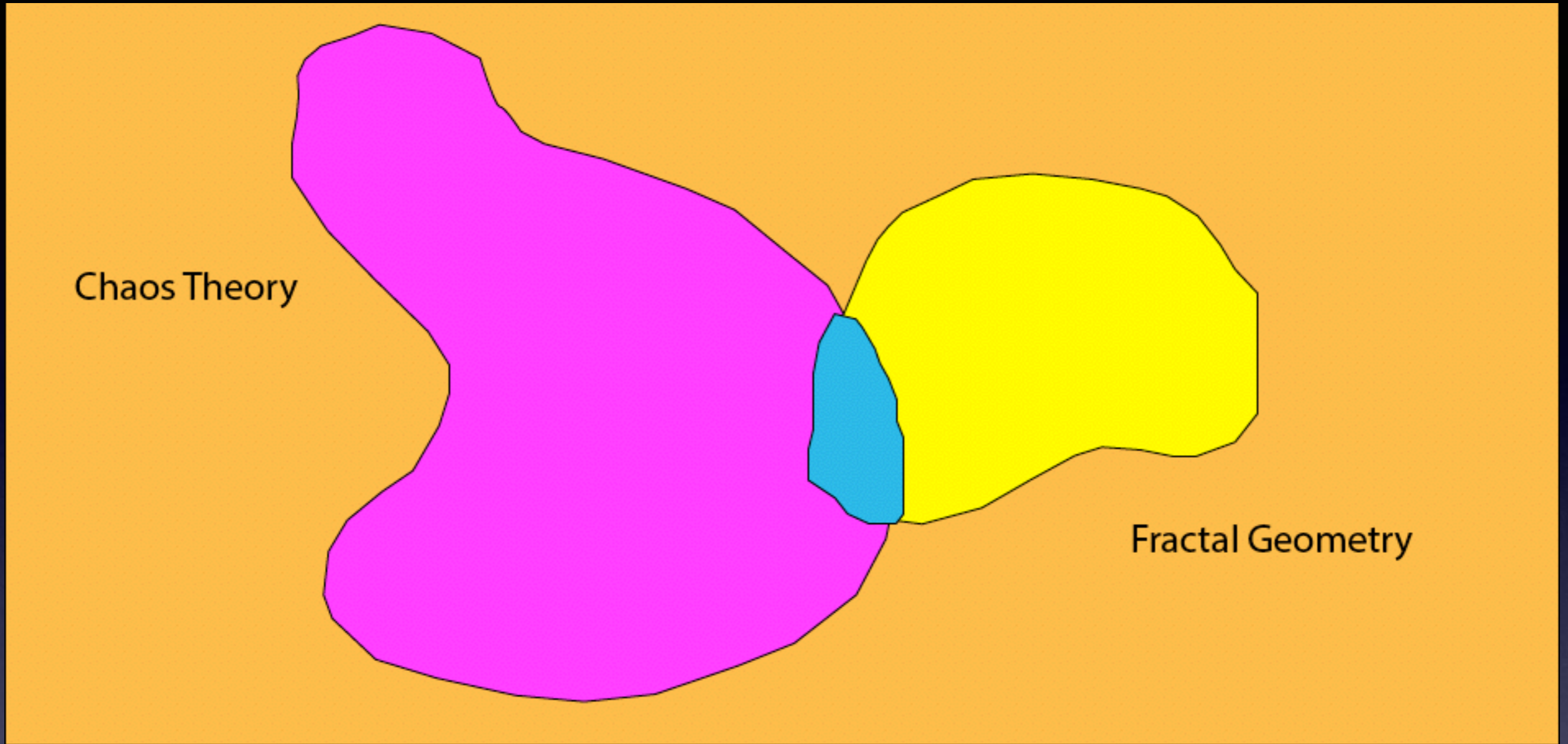
- Participation in classroom discussions
- Pop quizzes (perhaps)
- HW website
- Projects
- Final (based upon homework)

Tentative Syllabus by Week

- A. Bifurcations in art history
 - A1. Models of Consciousness
 - A2. Early visual music
 - A3. Early light shows
 - A4. Guest lecture

B. Basic Chaos Theory

- Chaos and fractals
- Stairway to chaos
- Attractors, basins, and separatrices
- Bifurcations
- 1D: The logistic scheme
- 2D: The Mira scheme



The Math Map

Dimension

0

1

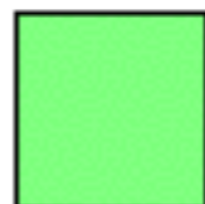
2

3

Flows



Cascades



Iterations



The Stairway to Chaos

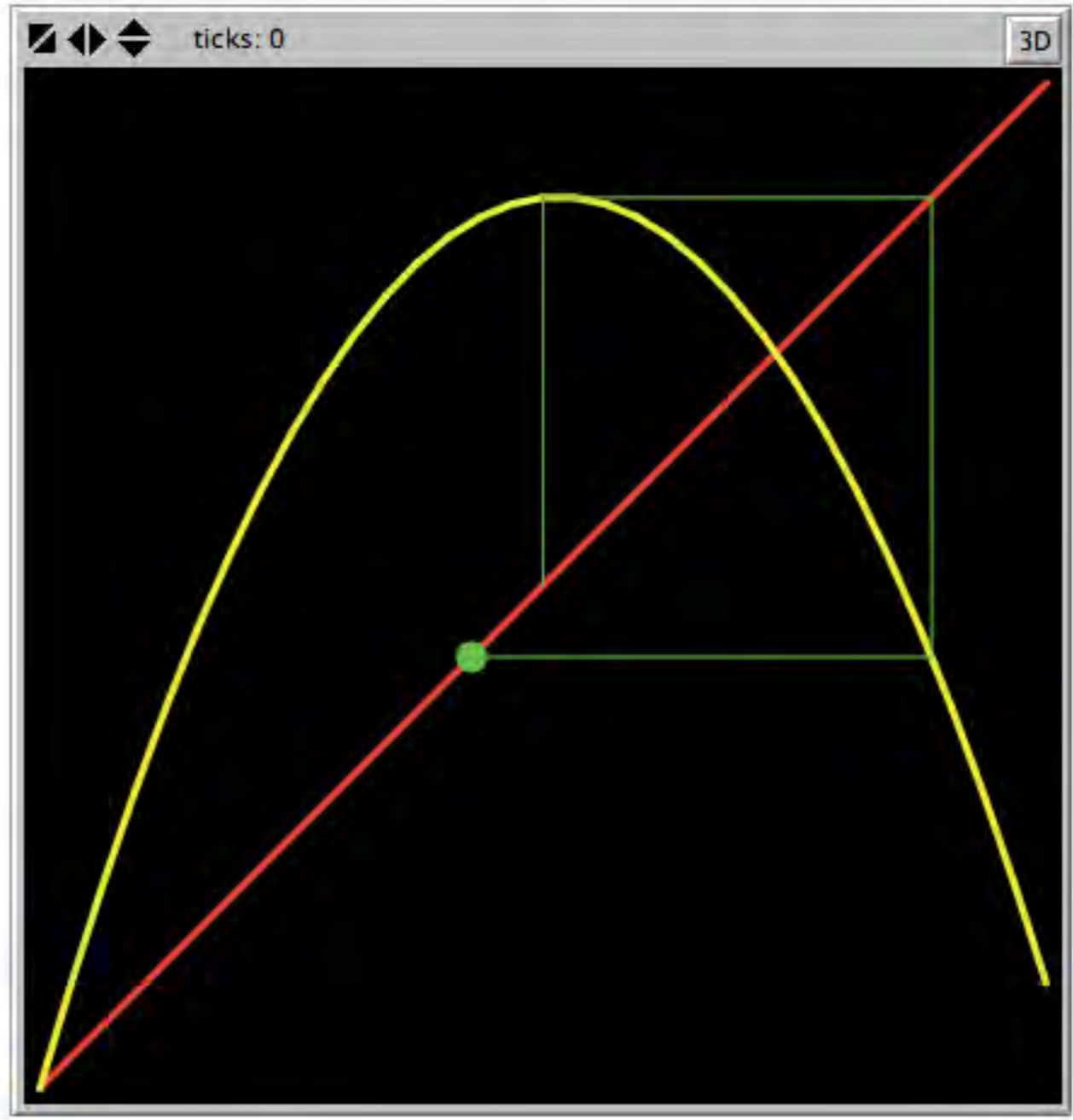
Interface Info Code

Edit Delete Add Button

normal speed

view updates
continuous Settings...

R 3.44
setup step
clear



Command Center

observer>

NetLogo — logisticresponse [/Users/abraham/Theon Files /WRITING/COURSES/UCSC/PORTER34B/20...

Interface Info Code

Edit Delete Add abc Button

normal speed view updates continuous Settings...

u = 1

ticks: 0 3D

u = 0

setup

R-min 2.8

R-max 4.0

transient 100

attractor 150

* makeit

R-min 2.8 R R-max 4

Command Center

observer>

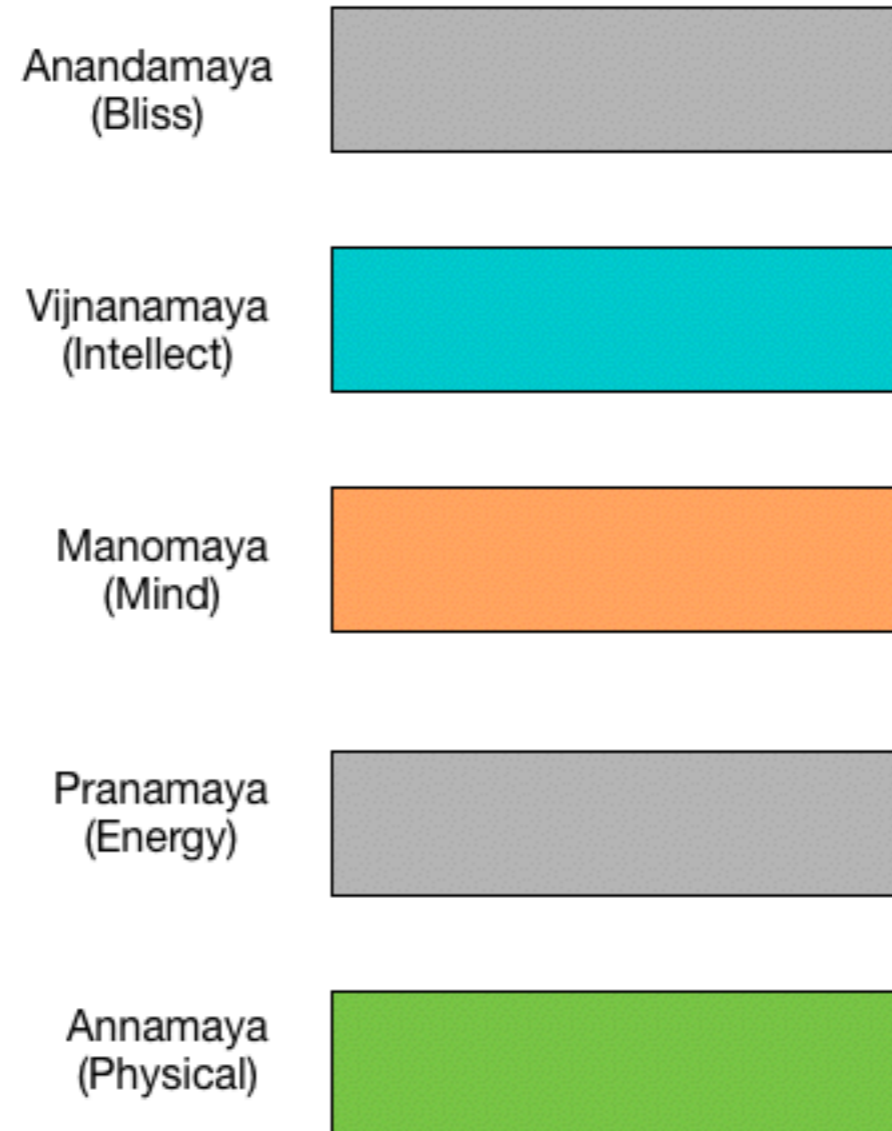
Logistic Response Diagram

C. P5 Programming

- HTML, CSS, JS, P5
- Personal websites

A. Theosophy Books

- Helena Petrovna Blavatsky (1831–1891)
 - Isis Unveiled, 1877; The Secret Doctrine, 1888
- Charles Webster Leadbeater (1854–1934)
 - Clairvoyance, 1889; The Astral Plane, 1896
- Annie Besant (1847–1933)
 - The Ancient Wisdom, 1897
- Besant and Leadbeater
 - Thought-Forms, 1901



Panch Kosa, 800 BCE?

A. Theosophy Ideas

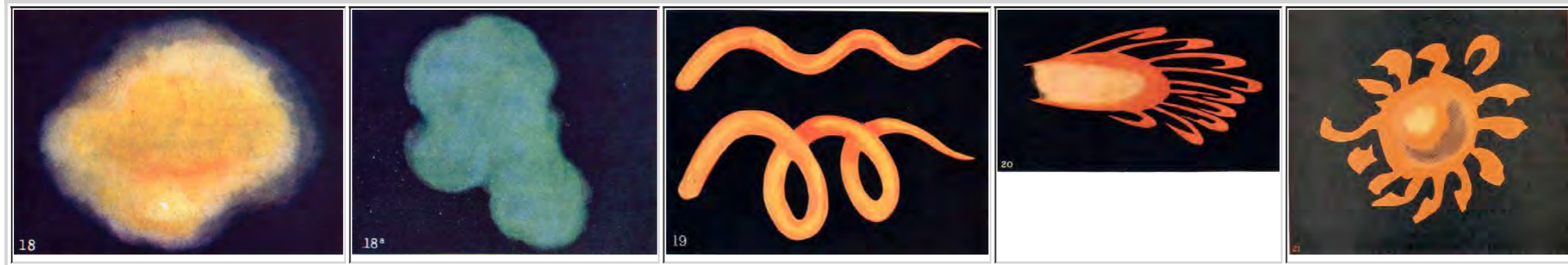
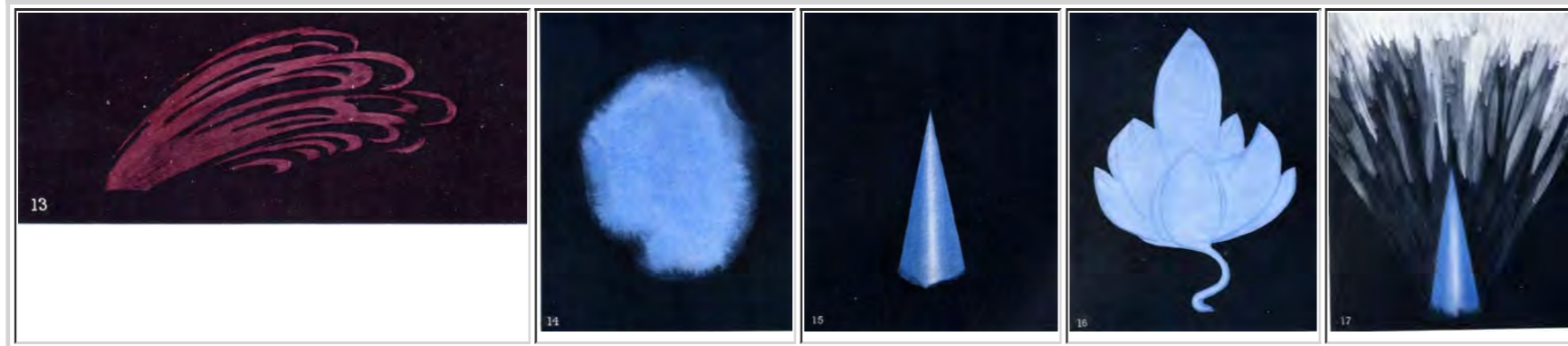
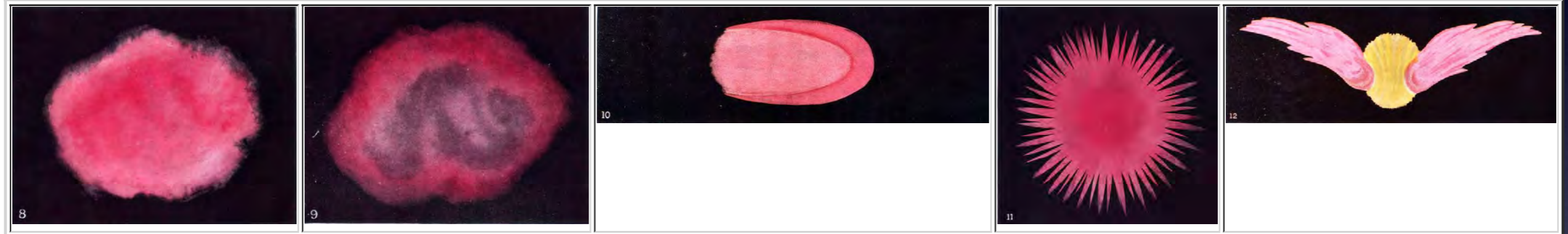
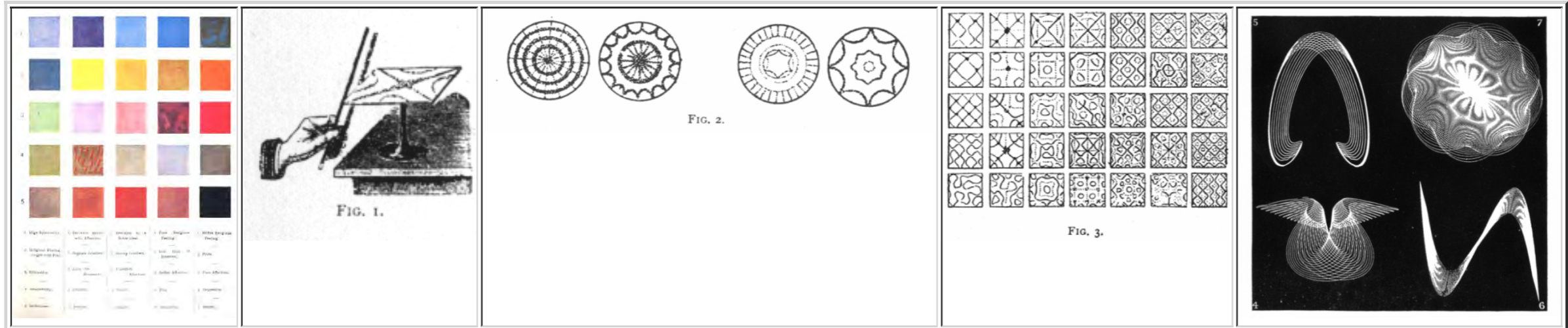
- The planes
- The bodies
- Meditation and Clairvoyance
- Life in the astral and mental fields
- Thought-forms

A. Theosophy and the Arts

- Thought-forms book, 1901
- Abstract Expressionism
 - Mondrian 1908
 - Kandinsky 1910

Thought-Forms, Illustrations

Click to enlarge.



Wassily Kandinsky

Click to enlarge.



Porter 63FW2017 Meeting #1

End Lecture

Begin Discussion

End at 10:25 am